

# CASE

*Curriculum for Agricultural  
Science Education*

**Principles of Agricultural Science – Plant**

# **Fun-de-Mendels of Genetics**

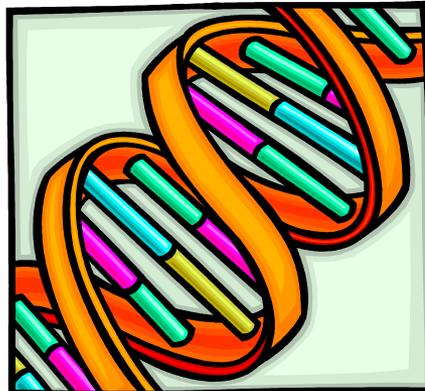
**Unit 7 – Plant Reproduction  
Lesson 7.1 Plant Genetics**

# Gregor Mendel: The Man, the Monk, the Master of Genetics

- Austrian monk in the mid-1800s
- Through experiments with pea plants, discovered the principles of heredity
- Provided the basis for laws of inheritance:
  1. The law of dominance
  2. The law of segregation
  3. The law of independent assortment
  4. The law of unit characters

# What are genes?

- The simplest units of inheritance
- Influence specific genetic traits
- Carried in the **chromosomes** of **gametes**
- Passed from parent to offspring during sexual reproduction



# Genotype

-  The genetic make-up of living things.
-  Individual organisms of the same genotype breed alike.

# Phenotype

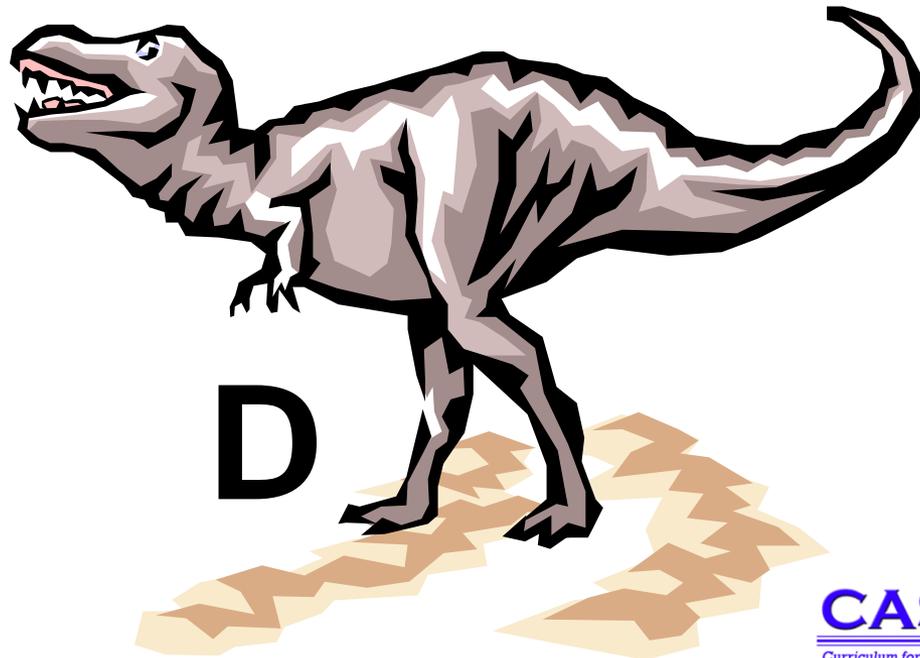
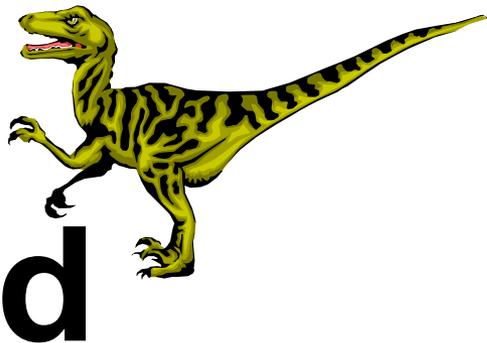
-  The observed characteristics of an individual organism.
-  Influenced by both environment factors and genotype.
-  Individuals of the same phenotype may look similar but may not breed alike.

# How Heredity is Affected by Genes

- The genetic transfer of traits from parent to offspring is called **heredity** or **inheritance**.
- Each characteristic or trait has two genes – one derived from each of the parents.
- If both genes for a characteristic are the same, the plant is **homozygous** for that characteristic.
- If the two genes differ, the plant is **heterozygous**.

# Which Trait Wins in Heterozygous Pairings?

The law of dominance offered by Mendel states that one gene of the pair may exert influence over the other.



# Dominance

-  One gene overrides the other gene and is visible in the organism's phenotype.
-  This is also referred to as a **dominant trait**.

# Recessive

-  The other gene partner of heterozygous traits will not be visible in the phenotype.
-  The recessive gene remains in the genotype.
-  When crossed with another plant containing the same recessive trait, some offspring may exhibit the recessive characteristic.

# Predicting Offspring

-  Each gene is signified by a letter (ex: D)
-  Each gene is paired with another – one from each parent plant (ex: DD, Dd or dd)
-  If the letter is capitalized it is a dominant gene (ex: D)
-  If the letter is not capitalized it is a recessive gene (ex: d)

# Flower Color

 If purple is the dominant trait, it could be represented by “P.”

 The recessive trait, white, represented by “p.”

Plant Phenotype	Corresponding Genotype
Homozygous dominant for purple traits	PP
Heterozygous for purple trait	Pp
Recessive for white traits	pp

# Punnett Square

- Use a Punnett Square to determine the offspring for two homozygous parents:

		Homozygous Parent	
		<b>P</b>	<b>P</b>
Homozygous Parent	<b>P</b>		
	<b>P</b>		

# Results of Homozygous Pairing

		Homozygous Parent	
		P	P
Homozygous Parent	P	<i>PP</i>	<i>PP</i>
	P	<i>PP</i>	<i>PP</i>

What is the percent chance of offspring with purple flowers?

# Let's see how recessive genes reappear...

- Use a Punnett Square to determine the offspring for two heterozygous parents:

		Heterozygous Parent	
		<b>P</b>	<b>p</b>
Heterozygous Parent	<b>P</b>		
	<b>p</b>		

# The Results...

		Heterozygous Parent	
		P	p
Heterozygous Parent	P	<i>PP</i>	<i>Pp</i>
	p	<i>Pp</i>	<i>pp</i>

What is the percent chance of offspring with purple flowers?

# References



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