















Dominant and Recessive Alleles

Mendel reached several conclusions on the basis of his experimental results. He reasoned that individual factors, or sets of genetic “information,” must control the inheritance of traits in peas. The factors that control each trait exist in pairs. The female parent contributes one factor, while the male parent contributes the other factor. Finally, one factor in a pair can mask, or hide, the other factor. The tallness factor, for example, masked the shortness factor.

Genes and Alleles Today, scientists use the word **gene** for the factors that control a trait. **Alleles** (uh LEEZ) are the different forms of a gene. The gene that controls stem height in peas, for example, has one allele for tall stems and one allele for short stems. Each pea plant inherits two alleles from its parents—one allele from the egg and the other from the sperm. A pea plant may inherit two alleles for tall stems, two alleles for short stems, or one of each.

An organism’s traits are controlled by the alleles it inherits from its parents. Some alleles are dominant, while other alleles are recessive. A dominant allele is one whose trait always shows up in the organism when the allele is present. A recessive allele, on the other hand, is hidden whenever the dominant allele is present. A trait controlled by a recessive allele will only show up if the organism does not have the dominant allele. Figure 18 shows dominant and recessive alleles in Mendel’s crosses.

Symbols for Alleles Geneticists use letters to represent alleles. A dominant allele is represented by a capital letter. For example, the allele for tall stems is represented by *T*. A recessive allele is represented by the lowercase version of the letter. So, the allele for short stems would be represented by *t*. When a plant inherits two dominant alleles for tall stems, its alleles are written as *TT*. When a plant inherits two recessive alleles for short stems, its alleles are written as *tt*. When a plant inherits one allele for tall stems and one allele for short stems, its alleles are written as *Tt*.

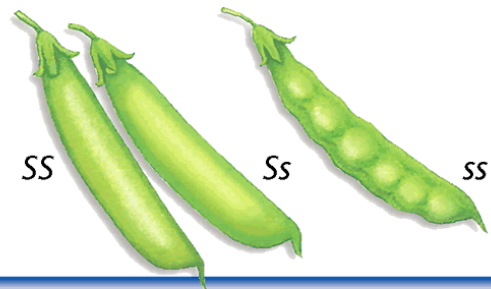
		Genetics of Pea Plants	
Traits	Controlled by Dominant Allele	Controlled by Recessive Allele	
Seed Shape	Round 	Wrinkled 	
Seed Color	Yellow 	Green 	
Seed Coat Color	Gray 	White 	
Pod Shape	Smooth 	Pinched 	
Pod Color	Green 	Yellow 	
Flower Position	Side 	End 	
Stem Height	Tall 	Short 	

Phenotypes and Genotypes

Two useful terms that geneticists use are **phenotype** (FEE noh typ) and **genotype** (JEN uh typ). An organism's **phenotype** is its physical appearance, or visible traits. An organism's **genotype** is its genetic makeup, or allele combinations.

To understand the difference between phenotype and genotype, look at Figure 24. The allele for smooth pea pods (S) is dominant over the allele for pinched pea pods (s). All of the plants with at least one dominant allele have the same phenotype—they all produce smooth pods. However, the plants can have two different genotypes— SS or Ss . If you were to look at the plants with smooth pods, you would not be able to tell the difference between those with the SS genotype and those with the Ss genotype. The plants with pinched pods, on the other hand, would all have the same phenotype—pinched pods—as well as the same genotype— ss .

Geneticists use two additional terms to describe an organism's genotype. An organism that has two identical alleles for a trait is said to be **homozygous** (hoh moh ZY gus) for that trait. A smooth-pod plant that has the alleles SS and a pinched-pod plant with the alleles ss are both homozygous. An organism that has two different alleles for a trait is **heterozygous** (het ur oh ZY gus) for that trait. A smooth-pod plant with the alleles Ss is heterozygous. Mendel used the term *hybrid* to describe heterozygous pea plants.



Phenotypes and Genotypes	
Phenotype	Genotype
Smooth pods	SS
Smooth pods	Ss
Pinched pods	ss