

## 11.3 Other Patterns of Inheritance

### Lesson Objectives

- ☐ Describe the other patterns of inheritance.
- ☐ Explain the relationship between genes and the environment.

### Lesson Summary

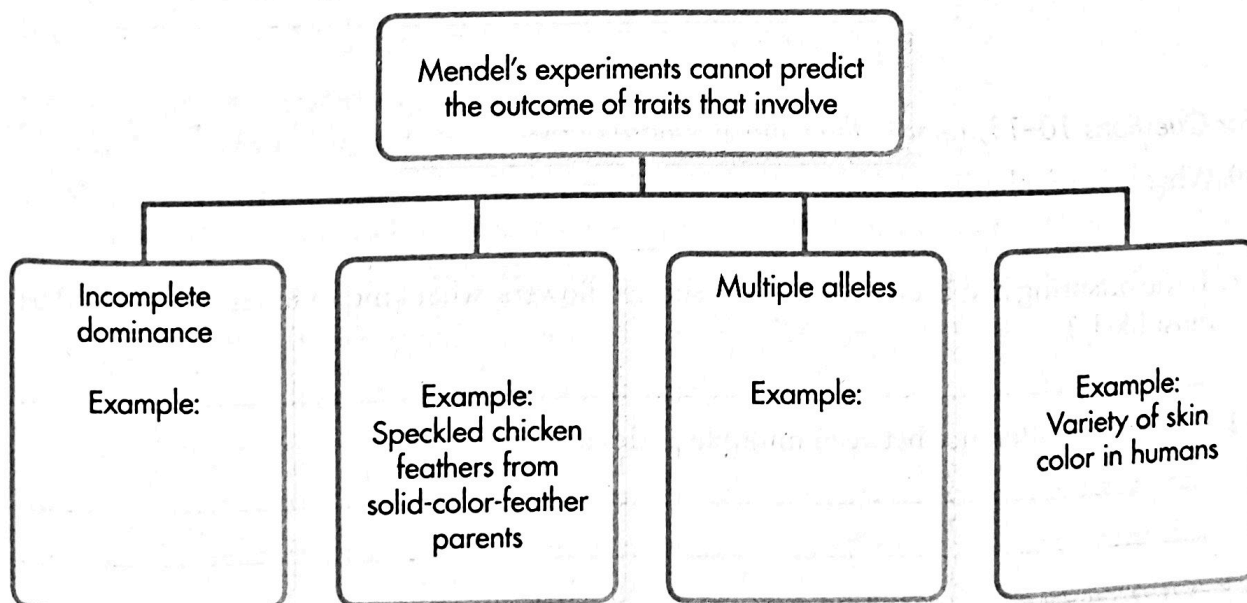
**Beyond Dominant and Recessive Alleles** Some alleles are neither dominant nor recessive:

- ▶ In cases of **incomplete dominance**, neither allele is completely dominant over the other. The phenotype is a blend of the two homozygous phenotypes.
- ▶ In cases of **codominance**, both alleles in the heterozygous genotype are expressed in the phenotype.
- ▶ Genes with **multiple alleles** have more than two forms of the same gene. There may be more than one dominant form and several different phenotypes.
- ▶ **Polygenic traits** are controlled by the interaction of two or more genes and exhibit a wide range of phenotypes.

**Genes and the Environment** The phenotype of an organism results only partly from its genotype. Environmental conditions can affect how genes are expressed.

### Beyond Dominant and Recessive Alleles

1. Complete the graphic organizer to summarize exceptions to Mendel's principles.



For Questions 2–8, write True if the statement is true. If the statement is false, change the underlined word to make the statement true.

- \_\_\_\_\_ 2. When offspring show a blend of the parents' traits, one allele is dominant over the other.
- \_\_\_\_\_ 3. In complete dominance, the heterozygous phenotype lies somewhere between the two homozygous phenotypes.
- \_\_\_\_\_ 4. A heterozygous individual that exhibits the traits of both parents is an example of codominance.
- \_\_\_\_\_ 5. Many genes exist in several forms and are said to have codominant alleles.
- \_\_\_\_\_ 6. While multiple alleles may exist in a population, an individual usually carries only two alleles for each gene.
- \_\_\_\_\_ 7. Traits produced by two or more genes are codominant.
- \_\_\_\_\_ 8. Polygenic traits often show a wide range of phenotypes.
9. A plant breeder produced a purple flower by crossing a red parent with a blue parent. Use *RR* as the genotype for the red parent and *BB* for the blue parent. Complete the Punnett square to show the resulting genotypes and phenotypes of the offspring.

	Gamete allele: _____	Gamete allele: _____
Gamete allele: _____	Genotype: _____ Phenotype: _____	Genotype: _____ Phenotype: _____
Gamete allele: _____	Genotype: _____ Phenotype: _____	Genotype: _____ Phenotype: _____

For Questions 10–11, refer to the Punnett square above.

10. What type of inheritance is the example in Question 9?

11. If the offspring had been red and blue spotted flowers, what kind of inheritance would be most likely?

12. Explain the difference between multiple alleles and polygenic traits.

# Genes and the Environment

For Questions 13–16, complete each statement by writing in the correct word or words.

13. An organism's \_\_\_\_\_ results from its genotype and its environment.
14. Some \_\_\_\_\_ produce variable traits depending on environmental conditions.
15. Western white butterflies vary in their wing color because their \_\_\_\_\_ varies depending on when they hatch.
16. \_\_\_\_\_ is an environmental variable that affects wing color in western white butterflies.

For each of the following examples, write *G* if the trait is determined by genotype, and *E* if it is determined by environment.

17. \_\_\_\_\_ Turtles whose eggs hatch at higher temperatures tend to be female.
18. \_\_\_\_\_ A blue-eyed girl is born to two blue-eyed parents.
19. \_\_\_\_\_ Bees in a colony are assigned different jobs. As they develop, workers begin to look dramatically different.
20. \_\_\_\_\_ A pair of twins is separated at birth. They grow up in different countries and speak different languages.
21. \_\_\_\_\_ A litter of puppies is born. They are all gray except one, which is brown.
22. \_\_\_\_\_ Tall pea plant seeds are planted in different locations around a yard. They produce plants of different heights.
23. \_\_\_\_\_ A kitten is born with six toes.
24. \_\_\_\_\_ A rabbit is born weak with hunger.

## Apply the Big Idea

25. A dog gave birth to four puppies. The father has brown eyes, and the mother has green eyes. Two puppies have brown eyes. One has green eyes. One puppy has blue eyes. What does this tell you about how the cellular information for eye color is passed on? Explain.

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