

11-3 Notes – Part 2

Beyond Dominant and Recessive Alleles



Some alleles are neither dominant nor recessive, and many traits are controlled by multiple alleles or multiple genes.

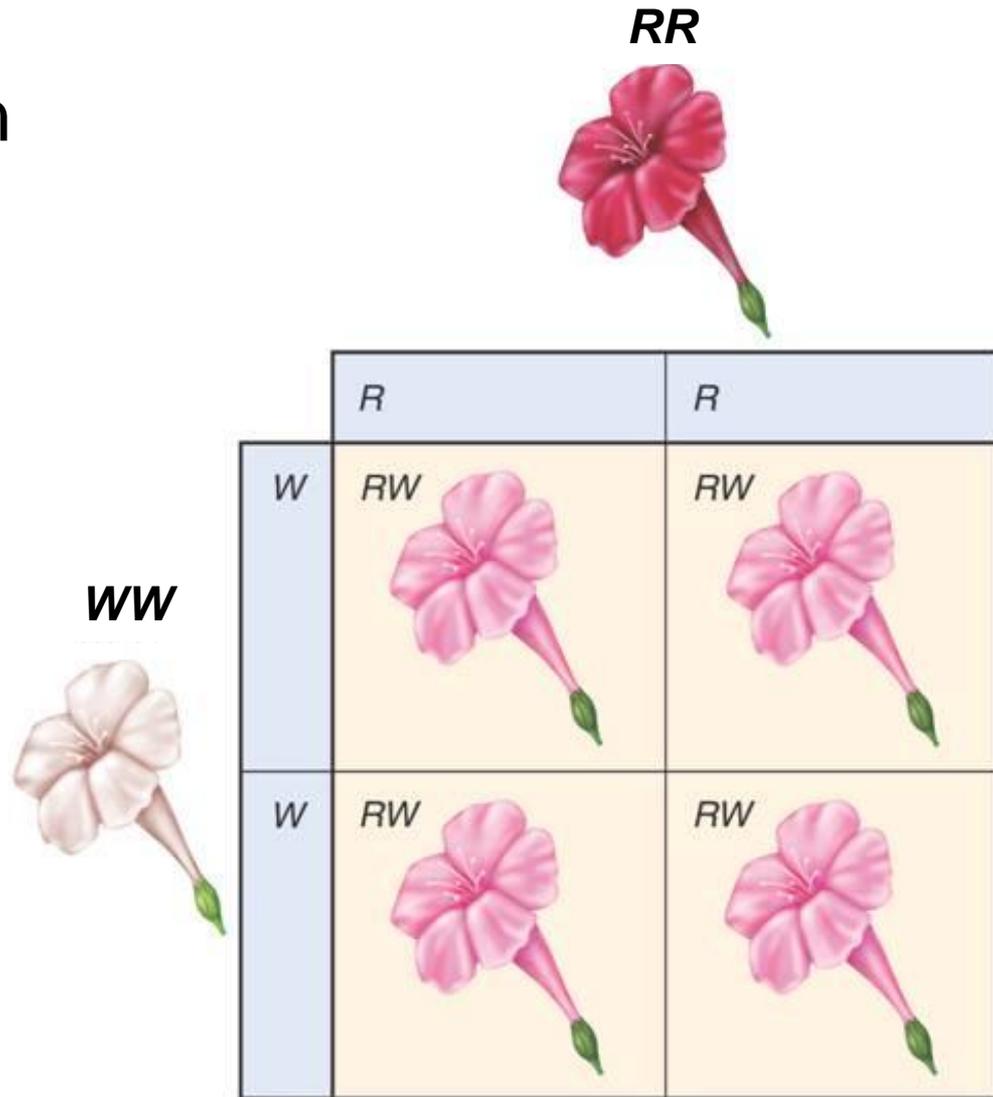
Incomplete Dominance

When one allele is not completely dominant over another it is called **incomplete dominance**.

In incomplete dominance, the heterozygous phenotype is between the two homozygous phenotypes.

Ex) blue + yellow = green

A cross between red (RR) and white (WW) four o'clock plants produces pink-colored flowers (RW).



Codominance

In **codominance**, both alleles contribute to the phenotype.

In certain varieties of chicken, the allele for black feathers is codominant with the allele for white feathers.

Heterozygous chickens are speckled with both black and white feathers. The black and white colors do not blend to form a new color, but appear separately.

blue + red = blue and red splotches.

Multiple Alleles

Genes that are controlled by more than two alleles are said to have **multiple alleles**.

An individual can't have more than two alleles. However, more than two possible alleles can exist in a population.

A rabbit's coat color is determined by a single gene that has at least four different alleles.

Different combinations of alleles result in the colors shown here.



Albino: cc

KEY

C = full color; dominant to all other alleles

c^{ch} = chinchilla; partial defect in pigmentation; dominant to c^h and c alleles

c^h = Himalayan; color in certain parts of the body; dominant to c allele

c = albino; no color; recessive to all other alleles

Polygenic Traits → <http://www.athro.com/evo/inherit.html>

Traits controlled by two or more genes are said to be **polygenic traits**.

Skin color and eye type in humans is a polygenic trait controlled by more than four different genes.

Applying Mendel's Principles

Thomas Hunt Morgan used fruit flies to advance the study of genetics.

Morgan and others tested Mendel's principles and learned that they applied to other organisms as well as plants.

Mendel's principles can be used to study inheritance of human traits and to calculate the probability of certain traits appearing in the next generation.

Genetics and the Environment

- Characteristics of any organism are determined by the interaction between genes and the environment.

11-3 Section QUIZ

Continue to:

Section QUIZ

- or -

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2 Traits controlled by two or more genes are called

a. multiple-allele traits.

b. polygenic traits.

c. codominant traits.

d. hybrid traits.

11-3 Section QUIZ

3 In four o'clock flowers, the alleles for red flowers and white flowers show incomplete dominance. Heterozygous four o'clock plants have

a. pink flowers.

b. white flowers.

c. half white flowers and half red flowers.

d. red flowers.

11-3 Section QUIZ

4 A white male horse and a tan female horse produce an offspring that has large areas of white coat and large areas of tan coat. This is an example of

- a. incomplete dominance.
- b. multiple alleles.
- c. codominance.
- d. a polygenic trait.

Section QUIZ

