Chapter 11 PPT Notes

**11-1 The Work of Gregor Mendel**

**Gregor Mendel’s Peas**

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** is the scientific study of heredity**.**

Gregor Mendel was an Austrian monk. His work was important to the understanding of heredity.

Mendel carried out his work with ordinary garden peas.

Mendel knew that

* + - * the male part of each flower produces \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, (containing sperm).
      * the female part of the flower produces \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

During sexual reproduction, sperm and egg cells join in a process called fertilization.

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** produces a new cell.

Pea flowers are self-pollinating.

Mendel had **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** pea plants that, if allowed to self-pollinate, would produce offspring identical to themselves.

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

Mendel was able to produce seeds that had two different parents.

**Genes and Dominance**

A **\_\_\_\_\_\_\_\_\_\_\_\_** is a specific characteristic that varies from one individual to another.

Mendel studied seven pea plant traits, each with \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

He crossed plants with each of the seven contrasting characters and studied their offspring.

Each original pair of plants is the **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

The offspring are called the **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** generation.

The offspring of crosses between parents with different traits are called **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Mendel's first conclusion**

was that biological inheritance is determined by factors that are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Today, scientists call the factors that determine traits **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

Each of the traits Mendel studied was controlled by one gene that occurred in two contrasting forms that produced different characters for each trait.

The different forms of a gene are called **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Mendel’s second conclusion**

is called the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**The principle of dominance states that \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

The reappearance of the trait controlled by the recessive allele indicated that at some point the allele for shortness had been separated, or **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**, from the allele for tallness.

Mendel suggested that the alleles for tallness and shortness in the F1 plants segregated from each other during the formation of the sex cells, or **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Genetics and Probability**

The likelihood that a particular event will occur is called **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**The principles of probability can be used to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Punnett Squares**

The gene combinations that might result from a genetic cross can be determined by drawing a diagram known as a **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Punnett squares can be used to predict and compare the genetic variations that will result from a cross.**

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ allele for tall.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ allele for short.

In this example,

*T* = tall

*t* = short

Organisms that have two identical alleles for a particular trait are said to be **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.**

Organisms that have two different alleles for the same trait are **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

Homozygous organisms are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ for a particular trait.

Heterozygous organisms are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ for a particular trait.

All of the tall plants have the same **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**, or physical characteristics.

The tall plants do not have the same **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** or genetic makeup.

One third of the tall plants are *TT*, while two thirds of the tall plants are *Tt.*

**Probabilities Predict Averages**

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ outcome of a large number of events.

**Probability cannot predict the precise outcome of an individual event.**

In genetics, the larger the number of offspring, the closer the resulting numbers will get to expected values.

**11–3 Exploring Mendelian Genetics**

**Independent Assortment**

To determine if the segregation of one pair of alleles affects the segregation of another pair of alleles, Mendel performed a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**The Two-Factor Cross: F1**

Mendel crossed true-breeding plants that produced round yellow peas (genotype *RRYY*) with true-breeding plants that produced wrinkled green peas (genotype *rryy*).

*RRYY x rryy*

All of the F1 offspring produced round yellow peas (*RrYy*).

**The Two-Factor Cross: F2**

Mendel crossed the heterozygous F1 plants (*RrYy)* with each other to determine if the alleles would segregate from each other in the F2 generation.

*RrYy* × *RrYy*

The alleles for seed shape segregated independently of those for seed color. This principle is known as **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

Genes that segregate independently do not influence each other's inheritance.

**The principle of independent assortment states that \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

Independent assortment helps account for the many genetic variations observed in plants, animals, and other organisms.

**A Summary of Mendel's Principles**

* + - * \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
      * If two or more forms (alleles) of the gene for a single trait exist, some \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
    - In most sexually reproducing organisms, each adult has \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ These genes are segregated from each other when gametes are formed.
    - The alleles for different genes usually segregate independently of one another.

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, 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 **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

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

**Codominance**

In **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**, 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.

**Multiple Alleles**

Genes that are controlled by more than two alleles are said to have **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

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.

**Polygenic Traits**

Traits controlled by two or more genes are said to be **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

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

**11-4 Meiosis**

**Each organism must inherit a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** are formed by a process that separates the two sets of genes so that each gamete ends up with just one set.

**Chromosome Number**

All organisms have different numbers of chromosomes.

A body cell in an adult fruit fly has 8 chromosomes: 4 from the fruit fly's male parent, and 4 from its female parent.

These sets of chromosomes are **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

Each of the 4 chromosomes that came from the male parent has a corresponding chromosome from the female parent.

A cell that contains both sets of homologous chromosomes is said to be **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

The number of chromosomes in a diploid cell is sometimes represented by the symbol 2N.

For *Drosophila*, the diploid number is 8, which can be written as 2N=8.

The gametes of sexually reproducing organisms contain only a single set of chromosomes, and therefore only a single set of genes.

These cells are **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**. Haploid cells are represented by the symbol N.

For *Drosophila*, the haploid number is 4, which can be written as N=4.

**Phases of Meiosis**

**Meiosis is a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

Meiosis involves \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, meiosis I and meiosis II.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

When homologous chromosomes form in meiosis I, they exchange portions of their chromatids in a process called **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

Crossing-over produces new combinations of alleles.

**Meiosis II**

The two cells produced by meiosis I now enter a second meiotic division.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Each of the cell’s chromosomes has 2 chromatids

**Comparing Mitosis and Meiosis**

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Mitosis**

* + - Cells produced by mitosis have the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
    - Mitosis allows an organism to grow and replace cells.
    - Some organisms reproduce asexually by mitosis.

**Meiosis**

* + - Cells produced by meiosis have \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
    - These cells are genetically different from the diploid cell and from each other.
    - Meiosis is how sexually-reproducing organisms produce gametes.