

Chapter Four Science: Inheriting Traits Study Guide

Lesson Five

Inherited Trait-a characteristic that is passed from parent to offspring

Heredity-the passing of traits from one generation to the next

- applies to all organisms including plants, animals, and bacteria
- examples include hair color, eye color, and dimples

History of Genetics

- study began in the 19th century when an Austrian monk named Gregor Mendel carried out experiments with different varieties of garden peas
 - In 1857 he was put in charge of the gardens at the monastery
 - conducted experiments to trace how traits were passed from parent pea plants to their offspring
 - used scientific methods, kept detailed records, and analyzed his data mathematically
 - about 1900 three other scientists found similar conclusions
 - Gregor Mendel is known as the father of genetics

Pollination-the transfer of pollen grains from the male part of a flower to the female part of the plant

Self-pollination-when the fertilization occurs when the male and female reproductive parts come for the same plant

Cross-pollination-takes place when pollen from one flower is transported to a different flower
-helped by wind, birds, and insects

Purebred-when self-pollinated, the same form of that trait is shown in all of its offspring for several generations of self-pollination

Hybrids-an organism produced by crossing parents that have two different forms of the same trait

Dominant Trait-form of the trait that appears in the hybrid generation

Recessive Trait-form of a trait hidden, or masked, in the hybrid generation

Ratio-mathematical term that describes the relationship between two quantities

Mendel's Hypothesis

- inherited traits are passed on from parents to offspring during reproduction
- traits are passed from parent to offspring
- factors in a pair may be the same or different. If they are different the factor for the dominant form of the trait is shown, or expressed, in offspring. It is the dominant factor. The factor for the recessive form of the trait is "masked" by the dominant factor. The masked factor is the recessive factor.
- in some hybrids dominant factors mask recessive factors. Recessive factors show up in offspring only when no dominant factor is inherited.

Geneticists-scientists who study how heredity works

Probability-how likely it is that something will happen

Punnett Square-a table used to predict the outcome of crossing different forms of a trait

- A capital letter stands for the dominant factor, and a lowercase letter stands for the recessive factor

-A Punnett square shows the different combinations of factors offspring can inherit from their parents

Incomplete Dominance-results when neither of the two forms of a trait completely masks the other
-Example-red does not mask white, white does not mask red, instead you get pink

Pedigree-a chart used to trace the history of traits in a family
-shows which members of the family have a particular trait

Carriers-an individual who has inherited the factor for a particular trait but who does not show the trait

Human Inherited Traits

-color of your hair and skin, color of your eyes, thickness of eyebrows, height
-one factor for each trait is given from each parent

Lesson Six

Genes-the portion of a cell's chromosome that controls a particular trait

-contain the information needed for cells to function
-genes are arranged along a length of chromosomes
-genes are portions of long, complex molecule called deoxyribonucleic acid or DNA

DNA-contains the codes that tell each cell how to operate

-the codes that the DNA molecule contains are related to the molecule's shape and structure
-DNA is made up of four bases
 -Cytosine (C)
 -Guanine (G)
 -Thymine (T)
 -Adenine (A)
-An A always pairs with a T; a C always pairs with a G
-DNA is found in the nucleus of every cell and is what makes up the chromosomes

Body Cells-contain a full set of chromosomes

-in humans this is 46
-form by mitosis

Sex Cells-are produced inside the sex organs and only contain half the number of chromosomes in body cells

-26 from the male; 26 from the female for a total of 46
-form by meiosis

How is DNA copied?

chain
-DNA then duplicates by splitting down the middle to separate the partners in each base pair
-Bases floating in the cytoplasm of the cell move in to replace the missing partners and a new is completed
-Results in two identical DNA molecules

Environment can change how the information contained in the genes is expressed or prevent them from being expressed

-Soil condition, temperature, and availability of water can influence

Lesson Seven

What are some inherited traits?

-Not all traits are dominant or recessive
-Sickle Cell -could have the disease or just be a carrier depending on what make-up your parents have
-Blood type-there are three different genes that control blood type and you can have one of four types -A, B, AB, or O

- A contains only A proteins
- B contains only B proteins
- AB contains both A and B proteins; AB can only be given to a person who is AB but a person who is AB can receive all four types or known as the “universal recipient”
- O contains no proteins and is considered the “universal donor”

Humans have 23 pairs of chromosomes (one of which determines sex)

- There are 2 kinds of sex chromosomes X and Y
- Females inherit two X chromosomes; one from each parent
- Males inherit one X chromosome from one parent and one Y chromosome from the other
 - Only males have a Y chromosome
- The sex of a child is determined by the father

Sex-linked genes-genes carried on the X chromosome are not found on the smaller Y chromosome

- include color blindness and hemophilia

Inherited Disorders

- Sickle Cell Anemia
- Hemophilia-blood does not clot properly
- Sickle cell anemia, dyslexia, cystic fibrosis, Down syndrome, and PKU are genetic disorders that are not sex linked
 - Dyslexia-makes it difficult to read and write
 - Cystic Fibrosis-causes the buildup of too much thick, sticky mucus in the lungs and organs
 - Down syndrome-genetic disorder where the child receives an extra copy of a chromosome and leads the person to have mental retardation and may have other health problems
 - PKU-a disease in which the body cannot break down a certain substance and as the substance builds up it can cause brain damage

other

Lesson Eight

Selective Breeding-the process of crossing plants or animals to produce offspring with certain desirable traits

- used to produce drought-resistant wheat, sweeter corn, or crops that are resistant to damage from insects

Genetic Engineering-a way of changing the DNA sequence that makes up a gene so that the gene will produce a particular trait

- involves moving a gene from one organism to another
- bacteria that live in the soil have been genetically engineered to help clean up toxic wastes in the environment

Gene-splicing-process in which scientists can take the genes from one organism and attach them to the genes in another organism

- can be used to get insulin from bacteria as a result of gene-splicing

Clone-a living thing that receives all of its DNA from just one parent

George Washington Carver

- was a professor and agricultural scientist at the Tuskegee Institute in Alabama
- conducted plant-breeding experiments to develop new varieties of cotton that yielded more than twice as much cotton per acre and grew well without very much fertilizer
- also well known for research on peanuts including 300 uses for peanuts

Luther Burbank

- famous plant breeder born in Massachusetts in 1849
- developed a larger, whiter potato

- developed hundreds of unusual new varieties of plums, peaches, berries, prunes, tomatoes, nuts, and flowers
- developed a method for attaching one type of fruit tree onto another to produce faster-growing varieties