GENETICS AND INHERITED TRAITS

What is Genetics?

- Genetics – study of genes and heredity
- Genes determine your characteristics
- Makes you who you are
- Also controls body processes
- Passed down from parents

Where do your genes come from?

- 1/2 chromosomes come from your mother
- 1/2 chromosomes come from your father
- Create chromosome pairs

What are chromosomes?

- All your DNA wound up
- Contains all your genetic information
- Humans have 46 chromosomes
  - 23 from mom
  - 23 from dad
- Some diseases based on chromosomes

Homologous Chromosomes

- Term used to describe chromosome pairs
- Mothers chromosome + fathers chromosome
- Similar in length
- Genes in same location on chromosome

How Genes Transmit Information

- DNA contains all genes
- Genes contain information that determines traits
- Genes code for various proteins
- Proteins control development and functions

Inherited Traits

- Traits passed down from past generations
- Examples
  - Dimples
  - Tongue rolling
  - Hair, eye, skin color
  - Allergies
  - Medical conditions

Dominant vs. Recessive Alleles

- Alleles – gene varieties
- Dominant Alleles
- Recessive Alleles
- Punnett squares display these alleles
- Determine which phenotypes occur
  - Phenotype = physical appearance
  - Genotype = genetic representation of alleles

Punnett Squares

- Shows probability of allele combinations
- Heterozygous – Dominant and Recessive
- Homozygous – Dominant and Dominant or Recessive and Recessive

Codominant Traits

- 2 Alleles are equally dominant
- Blending – heterozygous, both traits expressed
  - Wavy hair, a mix of curly and straight hair traits
- Creates combinations of traits

Sex-Linked Traits

- Some genes carried by sex chromosome
- Can be shown by Punnett Square
- Examples
  - Colorblind disorders
  - Hemophilia

Polygenic Traits

- Phenotypes controlled by two or more genes
- Genes represented at different chromosome loci
- Example
  - Height – several genes affect how tall you are
- Memory hint: poly = many, genic = genes

Mendel's Laws

- Gregor Mendel – 1860s – Pea pod experiment
- Law of Segregation and Independent Assortment
  - Alleles separate during reproduction
  - Offspring don't always exactly match parents

Punnett Square Problem

- Brown eyes are dominant (B) and blue eyes are recessive (b) in humans. If a blue eyed man and a homozygous brown eyed woman have a child, what are the chances their child will have blue eyes?

Answer

	b	b
B	**Bb**	**Bb**
B	Bb	Bb

There is no chance their children will have blue eyes

Punnett Square Problem

- Colorblindness is a sex-linked trait carried on the X chromosome. If a woman is a carrier of the gene, and her husband is colorblind, what are the chances her sons will be colorblind?

Answer

	X_c	X
X_c	X_cX_c	X_cX
Y	X_cY	XY

There is a 50% chance their sons will be colorblind.

Citations

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