Biology I Name: _____
Unit II: Genetics
Chapter 11: Introduction to Genetics Date: _____ Hour: ____
Laboratory

Investigating Inherited Human Traits LAB

Pre-Lab Discussion

Heredity is the passing on of traits, or characteristics, from parent to offspring. The units of heredity are called genes. Genes are found on the chromosomes in a cell. The combinations of genes for each trait occur by chance.

When one gene in a pair is stronger than the other gene, the trait of the weaker gene is masked, or hidden. The stronger gene is the dominant gene, and the gene that is masked is the recessive gene. Dominant genes are written as capital letters and recessive genes are written as lowercase letters. If both genes in a gene pair are the same, the trait is said to be *homozygous*, or pure. If the genes are not similar, the trait is said to be *heterozygous*, or hybrid. Sometimes genes are neither dominant nor recessive. The result of such a situation is a blending of traits.

The genetic makeup of an individual is known as its genotype. The observable physical characteristics of an individual that are the result of its genotype are known as its phenotype. In humans, the sex of an individual is determined by the particular combination of the two sex chromosomes. Individuals that have two X chromosomes (XX) are females, whereas those with an X and a Y chromosome (XY) are males.

In this investigation, you will observe how the results of different gene combinations produce certain traits.

Problem

How are traits inherited?

Materials (per pair of students)

3 textbooks
2 coins
Pencil

Procedure

1. Place the textbooks on the laboratory table so that they form a triangular well in which to toss coins.

2. Determine which partner will toss for the female and which will toss for the male. Remember that there are two genes per trait.

3. Have the partner who is representing the male flip a coin into the well to determine the sex of the offspring. If the coin lands head up, the offspring is female. If the coin lands tails up, the offspring is a male. Record the sex of the offspring in Observations.

4. For all the coin tosses you will now make, heads will represent the dominant gene and tails will represent the recessive gene.

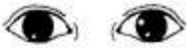
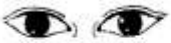
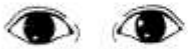
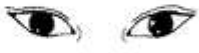
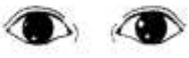
5. You are your partner should now flip your coins into the well at the same time. NOTE: THE COINS SHOULD BE FLIPPED ONLY ONCE FOR EACH TRAIT.

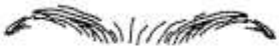
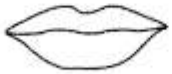
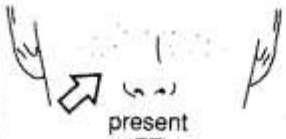
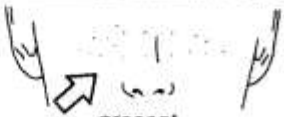
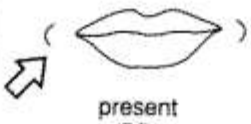
6. Continue to flip the coins for each trait listed in the table in figure one. After each flip, record the trait of your offspring by placing a check in the appropriate box in the table.

7. Using the recorded traits, draw the facial features for your offspring in the space provided.

Observations

Sex of child _____

Traits	Dominant (both heads)	Hybrid (one head, one tail)	Recessive (both tails)
Shape of face	 round (RR)	 round (Rr)	 square (rr)
Cleft in chin	 absent (CC)	 absent (Cc)	 present (cc)
Hair	 curly (HH)	 wavy (Hh)	 straight (hh)
Widow's peak	 present (WW)	 present (Ww)	 absent (ww)
Spacing of eyes	 close together (EE)	 normal distance (Ee)	 far apart (ee)
Shape of eyes	 almond (AA)	 almond (Aa)	 round (aa)
Position of eyes	 straight (SS)	 straight (Ss)	 slant upward (ss)
Size of eyes	 large (LL)	 medium (Ll)	 small (ll)

Traits	Dominant (both heads)	Hybrid (one head, one tail)	Recessive (both tails)
Length of eyelashes	 long (LL)	 long (Ll)	 short (ll)
Shape of eyebrows	 bushy (BB)	 bushy (Bb)	 fine (bb)
Position of eyebrows	 not connected (NN)	 not connected (Nn)	 connected (nn)
Size of nose	 large (LL)	 medium (Ll)	 small (ll)
Shape of lips	 thick (TT)	 normal (Tt)	 thin (tt)
Size of ears	 large (LL)	 normal (Ll)	 small (ll)
Size of mouth	 large (LL)	 medium (Ll)	 small (ll)
Freckles	 present (FF)	 present (Ff)	 absent (ff)
Dimples	 present (DD)	 present (Dd)	 absent (dd)

Analysis and Conclusions

1. What percent chance did you and your partner have of "producing" a male offspring? What about a female offspring? Explain your answer.

2. Would you expect the other pairs of students in your class to have an offspring similar to yours? Explain your answer.

3. If a woman who is homozygous for almond-shaped eyes (AA) marries a man who is heterozygous for almond-shaped eyes (Aa), what are the possible **genotypes** and **phenotypes** of their children?

4. What are the possible **genotypes** of the parents of a child who has wavy hair (Hh)?

5. Which traits in this investigation show a blending of genes?

Critical Thinking and Application

1. Did you think that anyone in your class has all the same genetic traits that you have? Explain your answer.

2. How might it be possible for you to show a trait when neither of your parents shows it?

3. Do you think you would have some genetic traits similar to your grandparents? Explain your answer.

4. There is a small village in a mountain valley in Spain where a large number of people are polydactyl (have more than five fingers or toes). Why does this trait tend to be passed on from generation to generation?

5. There have been cases in history where a king divorced his queen because she produced only daughters. Using your knowledge of genetics, explain why this was an incorrect move.

Drawing of offspring