Crazy Traits Lab

What role does chance play in an organism's heredity?

Your traits are determined by the genes you inherit from your parents. For each gene, you get at least one allele from your mother and one allele from your father. The alleles you end up with are determined by two factors:

(1) the genotypes of your parents; and
(2) the allele from each parent you inherit.

The two copies (or alleles) of the gene may or may not be identical, and one may be dominant in determining the phenotype while the other is recessive. The alleles you inherit from each parent are determined by chance.   In this investigation, you will play a game that will help you learn about inheritance.

Materials

- Crazy Traits game
- Name tags
- Markers

Determining the genotype

a. The first trait you will flip for is **gender**. Choose the male sex chromosome coin (**X** on one side and **Y** on the other) and the female sex chromosome coin (**X** on both sides). Place both coins in the plastic cup and shake. Toss the coins onto the table and record your results in **Table 1**.

b. Next, flip coins to determine the allele for each of the other traits your creature inherits from each parent. In this activity, we will assume that both parents have the same genotype for all traits (**Tt**). You will need a blue (egg) coin with a capital **T** on one side and a lower case **t** on the other side. You will also a green (sperm) coin with a capital **T** on one side and a lower case **t** on the other side.

c. Flip the coins for the next trait—skin color. Place the coins in the plastic cup. Shake the cup and toss the two coins onto the lab table. The side that lands up on each coin represents the sperm and egg that unite during fertilization. Record the allele from each parent and genotype in columns 2, 3, and 4 of the first row of **Table 1**.

d. Repeat this procedure for traits 2 through 14.

Stop and Think

1. What information do the letters on the sperm and egg coins indicate: alleles, genotype, or phenotype? _____

2. For the sperm coin, what are the chances of getting a T or getting a t? State your answer as a fraction and a percent. _____ _____

3. For the egg coin, what are the chances of getting a T or getting a t? State your answer as a fraction or a percent. _____ _____

4. When both coins are flipped at once, what are your chances of getting each of the following combinations: **TT, Tt**, or **tt**? State your answer for each as a fraction and a percent.

_____ _____

Table 1: Genotypes and Phenotypes (15 points)

Trait	Allele from mother	Allele from father	Genotype	Phenotype
1. Gender				
2. Skin color				
3. Leg				
4. Foot				
5. Arms				
6. Hands				
7. Eye color				
8. Eyebrows				
9. Beak				
10. Ears				
11. Antenna				
12. Antenna shape				
13. Tail				
14. Wings				

Building your creature

   a. Once you have completed columns 2 through 4 of **Table 1**, use **Table 2** (back of this page) to look up the phenotype for each trait. Record the phenotype for each trait in column 5 of **Table 1**.

   b. Once you have completed **Table 1**, select the correct body parts to build your creature.

   c. Carefully assemble your creature.

   d. Give your creature a name and make it a name tag. Write the sex of your creature on the name tag.

   e. Place your creature on the table at the front of your classroom.

Crazy Traits Lab Page 2

5. Examine the creatures. Do any of them look exactly alike? Why or why not?

   _____

   _____

6. How does this investigation explain why siblings may resemble each other, but never look exactly alike (unless they are identical twins)?

   _____

   _____

7. Count the number of males and number of females. Does the number of each match the chances of getting a male or female in the game? Why or why not?

   _____

   _____

8. Which trait(s) are examples of complete dominance?

   _____

9. Which trait(s) are examples of incomplete dominance?

   _____

10. Which trait(s) are examples of codominance?

   _____.

Table 2: Genotypes and phenotypes

Trait	Genotypes and phenotypes
1. Gender	*XX* - female *XY* - male
2. Skin color	*TT* - red *Tt* - purple *tt* - blue
3. Leg	*TT* - short *Tt* - short *tt* - long
4. Foot	*TT* - webbed *Tt* - webbed *tt* - talons
5. Arms	*TT* - long *Tt* - long *tt* - short
6. Hands	*TT* - paws *Tt* - paws *tt* - claws
7. Eye color	*TT* - red *Tt* - one red and one green *tt* - green
8. Eyebrows	*TT* - unibrow *Tt* - unibrow *tt* - separate
9. Beak	*TT* - trumpet *Tt* - trumpet *tt* - crusher
10. Ears	*TT* - elephant *Tt* - elephant *tt* - mouse
11. Antenna	*TT* - long *Tt* - long *tt* - short
12. Antenna shape	*TT* - knob *Tt* - knob *tt* - star
13. Tail	*TT* - long *Tt* - short *tt* - none
14. Wings	*TT* - no wings *Tt* - no wings *tt* - wings