Monster Genetics Lab

Pre Lab Discussion

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

When one allele in a pair is stronger than the other allele, the trait of the weaker allele is masked, or hidden. The stronger allele is the *dominant allele*, and the allele that is masked is the *recessive allele*. Dominant alleles are written as capital letters and recessive alleles are written as lowercase letters. If both alleles are different, the trait is said to be *heterozygous*, or hybrid. Sometimes alleles 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 the 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 work with a partner to observe how the results of different gene combinations produce certain traits.

Problem: How are traits inherited?

Materials:
Pencil
Lab Sheet
Two Coins

Procedure:
1. Clear an open space on your lab table in which to toss the coins.
2. You and your partner should now toss your coins at the same time.
   Heads = allele 1, Tails = allele 2
   Example: If you flip two heads, your monster will have two copies of allele 1 for its genotype. The two coins should be flipped only once for each trait.
3. Determine the genotype for each trait and record it in Table 1.
4. Determine the phenotype resulting from the allele pair for each trait and record it in Table 1.
5. Repeat steps 1-2 for each trait and complete Table 1.
6. Draw a picture of your female monster in the space provided on the last page.

Table 1: Genotypes & Phenotypes for Female Monster

Trait	Allele 1	Allele 2	Genotype	Phenotype
Eye	Two small eyes (E)	One large eye (e)		
Tail Shape	Curly (C)	Straight (c)		
Tail Color	Purple (P)	Orange (p)		
Teeth	Sharp (S)	Round (s)		
Horn Color	Purple (W)	White (w)		
Ear Shape	Pointy (Y)	Round (y)		
Claws	Long (L)	Short (l)		
Skin Color	Green (G)	Blue (B)		

7. The female monster is married to the male monster (Table 2 below) and they are interested in finding out the probability of which traits their offspring will have. Fill in the missing genetic information in the table below for the male monster.

Table 2: Genotypes & Phenotypes for Male Monster

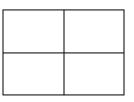| Trait	Genotype	Phenotype
Eye	Ee	
Tail Shape		Straight
Tail color		Orange
Teeth	Ss	
Horn Color		Purple
Ear shape	YY	
Claws	LI	
Skin Color		Green with Blue Spots

Analysis and Conclusion

1. Complete Punnett squares to predict what phenotypes and genotypes the offspring would have from a cross between the two monsters for the following traits:

    a. Eye

    Predicted Phenotypes:

    b. Tail Color

    c. Ear Shape

    d. Claws

    e. Skin Color

2. Write out the three possible parental crosses that could produce a child with a heterozygous genotype for tail shape (Cc).

3. 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. Monster genetics works the same way. What percent chance do the male and female monsters have of producing a male offspring? A female offspring? Explain your answer.

Critical Thinking and Application

1. How might it be possible that the baby monster would show traits that neither of the parents exhibited?

2. Do you think the baby monster could have some traits of the grandparents?

3. A small monster colony has a large amount of monsters that have an abnormal amount of horns. Why might this trait be so prevalent in this colony?

Drawing of Female Monster