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CHAPTER 11 ■ Human Heredity

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Investigating Inherited Human Traits

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 produced 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 the 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 heads up, the offspring is a 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 and 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 1. 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 in Observations.

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Recessive (both tails)	0	square (rr))	present (cc)	Dans state	straight (hh)	absent (ww)	far apart (ee)	round (aa)	slant upward (ss)	0	small (II)
Hybrid (one head, one tail)	0	round ')	absent (Cc)		wavy (Hh)	present (WW)	normal distance (Ee)	almond (Aa)	straight (Ss)		medium (L!)
Dominant (both heads)	0	round (RR))	absent (CC)		()	present (WW)	close together (EE)	almond (AA)	straight (SS)		(LL)
Traits		Shape of face		Cleft in chin .		Hair	Widow's peak	Spacing of eyes	Shape of eyes	Position of eyes		Size of eyes

Figure 1

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Recessive (both tails)	Thursday Shared	short (II)	fine (bb)	Call College	connected (nn)	small (II)		thin (ft)	Small (S)	small (II)	absent (ii)	absent (dd)
Hybrid (one head, one tail)	يىتىللس يىشلانىن	long (U)	bushy (Bb)		nol connected (Nn)	medium (LI)		normal (Tt)	normal (LI)	medium (LI)	Z C C C C C (F)	present (Dd)
Dominant (both heads)	عالىللىس مىلىلىلىس	long (LL)	bushy (BB)		nol connected (INN)	(LL) large		thick (TT)	(LL)	large (LL)	M C C C C C C C C C C C C C C C C C C C	present (DD)
Traits		Length of eyelashes	Shape of eyebrows		Position of eyebrows	Size of nose	*	Shape of lips.	Size of ears	Size of mouth	Freckles	Dimples

Figure 1 (continued)

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Data Table 1:Child #1

Data Lable 1. Onlik		(CD /F 7 - 33	066	066 : 1
Trait	"Female"	"Male"	Offspring's	Offspring's
	Contritubtion	Contribution	Genotype	Phenotype
Shape of face R				
Cleft in chin C				
Hair H				
Widow's peak W				
Spacing of eyes E				
Shape of eyes A				
Position of eyes S				
Size of eyes L				
Eyelash length X				
Eyebrow shape B				
Eyebrow position N				
Size of nose Z				
Shape of lips T				
Size of ears G				# II.
Size of mouth M				
Freckles F				
Dimples D				

Data Table 2: Child #2

Trait	"Female"	"Male"	Offspring's	Offspring's
	Contritubtion	Contribution	Genotype	Phenotype
Shape of face R				
Cleft in chin C				
Hair H				
Widow's peak W				
Spacing of eyes E				
Shape of eyes A				
Position of eyes S				
Size of eyes L				
Eyelash length X				
Eyebrow shape B				
Eyebrow position N				
Size of nose Z				
Shape of lips T				
Size of ears G				
Size of mouth M				
Freckles F				
Dimples D				

For your lab report:

- 2 sketches- one of each child (per group) 5 pts
- 1 set of data table 1 and 2 (per group) 5 pts
- Answers to questions below (per person) (20pts-5 pts each)

Qu

.est	ions- to be done individually and IN YOUR OWN WORDS!!!!
1.	Would you expect that there would be an offspring identical to yours in the class? Explain.
2.	a. What are <u>all</u> of the possible phenotype combinations of the parents of a child with wavy hair?
	b. What about the genotypes of those parents?
3.	How might it be possible for you to show a trait that neither of your parents show? Explain in terms of what we've been discussing in class about genetics.
4.	Do you think that you would have some genetic traits similar to your grandparents? Explain in terms of what we've been discussing in class about genetics.