

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.

Traits	Dominant (both heads)	Hybrid (one head, one tail)	Recessive (both tails)
Shape of face	round (RH)	round (Rh)	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)

Figure 1

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)

Figure 1 (continued)

Data Table 1: Child #1

Trait	"Female" Contribution	"Male" Contribution	Offspring's Genotype	Offspring's 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				

Data Table 2: Child #2

Trait	"Female" Contribution	"Male" Contribution	Offspring's Genotype	Offspring's 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				

