

Genetics of *Reebopsus imaginarius*

In this activity, you will model meiosis, fertilization, development and birth of a baby Reebop (*Reebopsus imaginarius*). Reebops have 16 chromosomes ($2n=16$) and 8 different traits are controlled by 8 different genes on those chromosomes.

Procedure:

1. You should have two envelopes, each with a set of chromosomes. Take the maternal chromosomes out and use the information in Table 1 to complete Table 2.

Table 1: Allele key

Antennae	AA 2 antennae	Aa 2 antennae	aa no antennae
Body segments	BB 3 body segments	Bb 3 body segments	bb 2 body segments
Tail	TT curly	Tt curly	tt straight
Nose	NN red nose	Nn orange nose	nn yellow nose
Legs	LL blue legs	Ll blue legs	ll red legs
Sex	XX female	Xy male	
Eyes	EE 2 eyes	Ee 2 eyes	ee one eye
Humps	HH 1 hump	Hh 1 hump	hh 3 humps

Table 2: Parental genotypes and phenotypes

Trait	Mom's Genotype	Mom's Phenotype	Dad's genotype	Dad's phenotype
Antennae				
Body segments				
Tail				
Nose				
Legs				
Sex				
Eyes				
Humps				

2. Do the same for the paternal chromosomes.

3. Now turn the chromosome cards face down, so that you cannot see the genotypes (letters) on them. Line up the Mom Reebop's chromosomes (pink) and Dad Reebop's chromosomes (blue) into homologous pairs.

4. Randomly take one chromosome of each pair from the Mom's chromosomes and place them in the 'female gamete' pile. Repeat for each pair of the Dad's chromosomes and place them in the 'male gamete' pile.

- a) What process did you just model?
- b) How many chromosomes does each gamete have? 5. Mix the female gamete and male gamete piles to form a 'baby chromosome' pile.
- c) What process did you just model?
- d) How many chromosomes does the zygote have?

6. Put the remaining chromosomes back into the envelopes.

You have modeled sexual reproduction.

- e) What is the advantage of sexual reproduction?
- f) In sexual reproduction, each parent donates to the offspring half the chromosome number (in this case, 8) that the adult cells contain (in this case, 16). How is it possible for a parent to donate only half its chromosomes to an offspring?

7. Complete Table 3 for your baby Reebop.

Table 3: Baby genotype and phenotype

Trait	Allele from Mom	Allele from Dad	Baby's Phenotype
Antennae			
Body segments			
Tail			
Nose			
Legs			
Sex			
Eyes			
Humps			

- g) What kind of inheritance governs nose color and how can you tell? (Hint: Look at the heterozygote)
- h) What do you notice about the features that your baby has? Is it identical to either parent?
- i) Compare your baby to that of other groups. Are there any babies that are identical?
- j) Are any babies the same as their parents?
- k) How much genetic material does each parent provide?
- l) What are the advantages of increased diversity in a population?