Investigation Activity

Problem-Solving Skills Focus

— Creating New Animation Characters —

Purpose

To use the principles of genetics to create a series of new characters for an animated movie

Materials and Equipment

2 coins per group of two students

Procedure

1. You are a genetics consultant who has been approached by a movie studio. The studio is developing a new animated science fiction movie about two aliens. The movie's producer wants his alien stars to have a scientific genetic basis. He would like you to provide some background information to his screenwriters and help create the aliens.

   The producer has prepared a table of genotypes and phenotypes for various traits he would like you to use.

Genetic Basis of Aliens

Trait	Phenotype	Genotype	Type of Inheritance
Hair type	curly hair no hair	CC, Cc cc	complete dominance
Nose colour	green red	GG, Gg Gg	complete dominance
Lip colour	pink orange yellow	PP PY (incomplete) YY	incomplete dominance
Antenna type	one brown antenna one brown and one purple antenna one purple antenna	BB BP (codominance) PP	codominance
Body colour	yellow green blue	WW WN (incomplete) NN	incomplete dominance
Eye shape (sex linked)	pop-out eye flat eye	X^EX^E, X^EX^e, X^EY X^eX^e, X^eY	complete dominance sex linked

2. Prepare a table similar to one below to record the genotype of the parents.

Name	Sex	Eye Shape	Nose Colour	Lip Colour	Antenna Type	Body Colour	Hair Type
Alien 1 name	XX						
Alien 2 name	XY						

3. To determine the genotype for each character, flip two coins. Two heads is homozygous for one allele. Two tails is homozygous for the second allele. One head/one tail is heterozygous. (**Note:** Only the X chromosome has the eye-shape gene, which is a sex-linked gene. For eye shape in the female, flip two coins to determine the genotype. For eye shape in the male, flip only one coin.)
4. Using the genetic information from your table, draw and describe your aliens.

Questions

1. You have done such a good job helping design the aliens that the producer wants to write into the script that the two aliens fall in love and have a baby. Prepare a table similar to the one in step 2 above. Create a genotype for a baby alien from the two parents, as follows:
   a) Decide which X chromosome the mother donates. Let heads represent one of her chromosomes, and tails represent the other. If she has X^EX^E or X^eX^e, there is no need to flip because both alleles are identical.
   b) Decide whether the father donates his X or his Y chromosome by flipping. If X is chosen, record the genotype showing the sex-linked trait for eye shape (X^E or X^e) that the father has.
   c) Record XX or XY in the sex column. In the eye-shape column, record the eye shape genotype (X^EX^E, X^EX^e, X^EY, X^eX^e, or X^eY).
2. Other characteristics of the alien baby are determined by flipping two coins. Let heads represent the first allele and tails represent the second allele for each trait. For example, heterozygous curly hair would be heads (C) and tails (c).
3. Draw and describe the baby alien.

Conclusion

Use your data and drawings to help you prepare a summary report for the movie producer.