Crazy Traits

VSVS Training Manual

2018-2019 VINSE/VSVS Rural

Introduction

- ***Learning Goals: Students distinguish between the terms allele genotype, and phenotype, and can describe their role in inheritance. Students describe the role of dominant alleles, recessive alleles, incomplete dominance, and codominance in determining phenotype*** Write the following terms on the board: **heredity, gene, dominant gene, recessive gene, allele**
- Talk to students about traits, or the things that distinguish us from other people.
  - Some examples include hair color, height, and eye color.

- Genes are the basic units of heredity and are located on DNA.
  - Your traits are determined by the genes you inherit from your parents.
  - For each trait, you get at one gene from your mother and one gene from your father.
  - Different forms of the same gene are called alleles.
  - There are at least 2 alleles for each gene (one from each parent)
  - The **Dominant** allele covers up the appearance of the **Recessive** allele.

- .

Introduction cont.

- The traits you end up with are determined by two factors:
  1. **the genotypes of your parents**
  2. **the allele from each parent you inherit**

- **Genotype** is the combination of alleles that an individual has for a certain trait
- **Phenotype** is the physical expression of a genotype

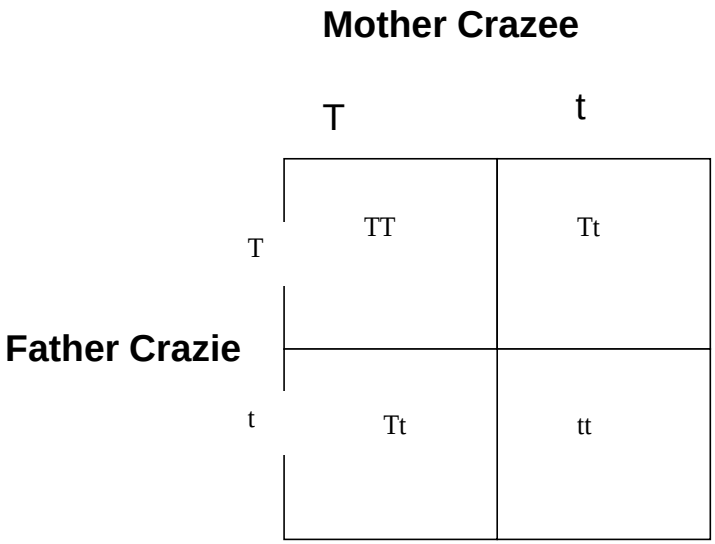
Setting Up

- Show students the pictures of the mother and father. Tell them that the parents both have the genotype Tt for all traits.
- In other words, the parents for all of the creatures will look the same.

- First, we will identify the gender of your creature. Find the red female coin (X on both sides) and the **black male coin** (X on one side, Y on the other).
- Place the two coins in the cup and roll them onto the table. Record your results under gender on the observation sheets.

Determining genotypes for your creature

- ***Learning Goals: Students distinguish between the terms allele genotype, and phenotype, and can describe their role in inheritance. Students understand and use Punnett Squares as a visualization tool for predicting the likelihood that an offspring will have a particular genotype.***
- You will need the **blue egg coin** with a capital **T (Dominant allele)** on one side and a lower case **t (Recessive allele)** on the other side.
- You will also need the **green sperm coin** with a capital **T** on one side and a lower case **t** on the other side.
- Students will flip sperm and egg coins to determine the allele for each trait your creature inherits from each parent
- Draw the Punnett square on the board, and have the students help you to fill it in.
- Ask students: For the sperm coin what are the chances of getting a T, or getting t? *50 % or ½.*
- Is this percentage the same for the egg coin? *Yes, both parents had the same genotype*.



Determining the genotype for a trait

- The first trait you will roll for is skin color.
- Place the egg and sperm coins in the cup.
- Shake the cup and toss the two coins onto the lab table.
- The side that lands up on each coin represents the sperm and egg that unite during fertilization.
- Record the inherited allele from each parent and genotype in column 4 of the first row of Table 1. (Rows 1-3 have already been entered)
- Repeat this procedure for traits 2 through 13.

Trait	**Genotype of mother for the trait**	**Genotype of father for the trait**	**Genotype of offspring (examples)**	**Phenotype of offspring**
Gender	XX	XY	**XX**	**Female**
Skin color	Tt	Tt	**TT**	
Leg	Tt	Tt	**Tt**	
Foot	Tt	Tt	**tt**	
Arms	Tt	Tt	**Tt**	
Hands	Tt	Tt	**Tt**	
Eye Color	Tt	Tt	**tt**	

Determining the phenotype for a trait

- After the genotype for each trait has been determined, it is time to match the genotype to the phenotype.
- Remember the **ph**enotype is the **ph**ysical appearance of a genotype.
- Look at the key on the Instruction Sheet (look at the next page for an example). Match the genotype for your creature with the corresponding phenotype on the key.
- Fill out the fifth column on the table of the observation sheet.

To fill out the fifth column of this table

Use this key

Trait	Genotypes and Phenotypes		
Gender	XX: female	XY: male	
Skin color	TT: red	Tt: purple	tt: blue
Leg	TT: short	Tt: short	tt: long
Foot	TT: webbed	Tt: webbed	tt: talons
Arms	TT: long	Tt: long	tt: short
Hands	TT: paws	Tt: paws	tt: claws
Eye color	TT: red	Tt: one red, one green	tt: green

Trait	genotype of mother	genotype of father	genotype of offspring (determined by flipping a coin	Phenotype of offspring
Gender	XX	XY	**XX**	**Female**
Skin color	Tt	Tt	**TT**	**red**
Leg	Tt	Tt	**Tt**	**short**
Foot	Tt	Tt	**tt**	**talons**
Arms	Tt	Tt	**tt**	**short**
Hands	Tt	Tt	**Tt**	**paws**
Eye Color	Tt	Tt	**tt**	**green**

For example, if you flipped the coins and got TT for skin color, TT corresponds to red skin color

Building your creature

- ***Learning Goals: Students distinguish between the terms allele genotype, and phenotype, and can describe their role in inheritance. Students describe the role of dominant alleles, recessive alleles, incomplete dominance, and codominance in determining phenotype.***
- Have the students set the parts on the part sheets included with the lab.
    - Tell students that they will be using these parts to create offspring from these parents.
    - They will be returning all parts to the sheet at the end of the lesson.
    - They will need to make sure that ALL parts get returned.

Building Hints:

1. The female bodies have the rounded part closest to the head. The male bodies have the pointed part closest to the head.
2. Put the skin on, then attach the head and leg.
3. Next find the correct foot, place the foot on the base and put the creature in the base.
4. Finish matching the correct traits with the body parts.

Female example

Male example

Thinking about what you observed

1. Have students compare their creatures with other creatures from the class. Set a time limit, or have VSVS team members hold up the creatures for the class to see.

2. Ask students: Do any of them look exactly alike? Why or why not? Remember that everyone started out with identical parents!

   Some look similar, but no two are alike. For two to look exactly alike, every single flip of all three coins would have to be the same for both creatures.

3. Have students report whether their creatures were male or female. Write the totals on the board.

   What number would we have expected? *50%*

   Is the counted total 50%? *It may be, but it may not be.*

   Our prediction was made because there was a 50% chance of getting a female, and a 50% chance of getting a male. But we need a large sample for this prediction to be true.

Dominant and Recessive Traits

Tell students to look at the Table on their Instruction sheet.

–Ask students: Which traits are **dominant traits**? Which traits are **recessive traits**?

Make two columns on the board, one for dominant and one for recessive. The answers are below**.**

Dominant	Recessive
short legs	long legs
webbed feet	talons
long arms	short arms
paws	claws
unibrow	separate eyebrow
trumpet beak	crusher beak
elephant ears	mouse ears
long antenna	short antenna
knob antenna shape	star antenna shape
no wings	wings

Not all of the traits are dominant or recessive.

Students should notice that two traits aren't dominant or recessive. Skin color is an example of incomplete dominance and eye color is an example of codominance.

PTC Tasting: Optional Activity

- ***Learning Goals: Students describe the role of dominant alleles, recessive alleles, incomplete dominance, and codominance in determining phenotype***
- Place the small piece of paper on your tongue.
  - What happened?
- How many in the classroom can taste something?
- How many cannot taste anything?

- The ability to taste PTC is an inherited **trait**.
- Most of the students in the class should be “tasters.”
- TT and Tt are both tasters, tt is a non taster.
- Write down the number of students who could taste the PTC and the number who could not.
- Ask students which trait they think is dominant and which is recessive.

Clean - up

Important: As students finish with their creatures, have them take the creature apart and place each part on the parts sheet to make sure they return every part.
One volunteer will lead the optional activity while the other volunteers go around the room for clean up!