Activity: Genes and Appearance

Introduction

In this activity, you will change the way a dragon looks by changing its genes.

How do genes determine appearance?

Walraven Creative Commons Flickr
Uploaded by: Carolyn Staudt

As we all know, dragons are fictional animals, but they work well for learning genetics. Dragons have very few heritable traits, and most of those traits are controlled by single genes with a simple dominant-recessive pattern of inheritance. This makes dragons a great organism in which to study genetics.

Dragons do have one example of incomplete dominance; their legs come in three varieties. Incomplete dominance refers to the situation where an organism inherits a blend of the dominant and recessive instead of looking just like the dominant trait.

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Concord Consortium Biologica
Uploaded by: Carolyn Staudt

Observe the dragons above (purple, red, and green) and describe the three leg varieties that result from incomplete dominance.

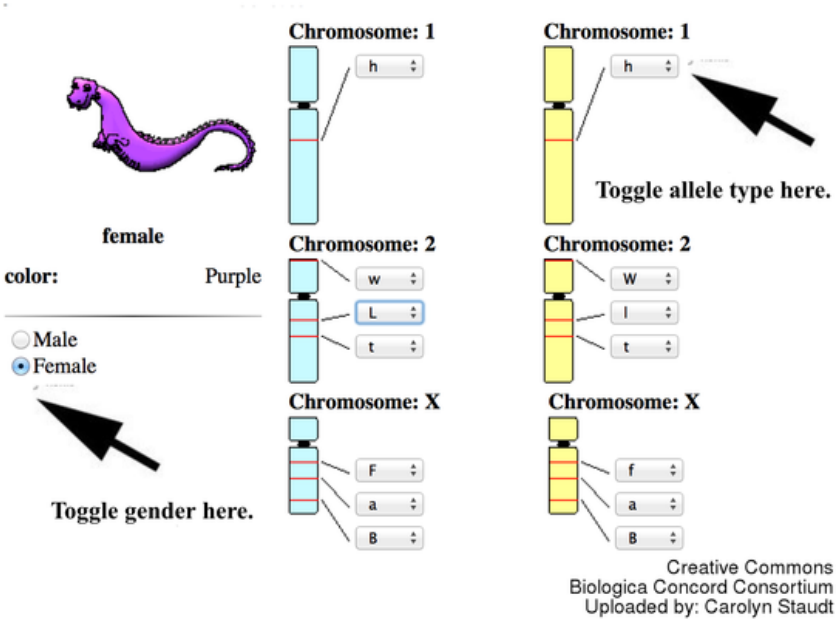
Standards

NSES Life Science – Reproduction and Heredity
Every organism requires a set of instructions for specifying its traits. Heredity is the passage of these instructions from one generation to another.

NSES Life Science – Reproduction and Heredity
Hereditary information is contained in genes, located in the chromosomes of each cell. Each gene carries a single unit of information. An inherited trait of an individual can be determined by one or by many genes, and a single gene can influence more than one trait.

Procedure

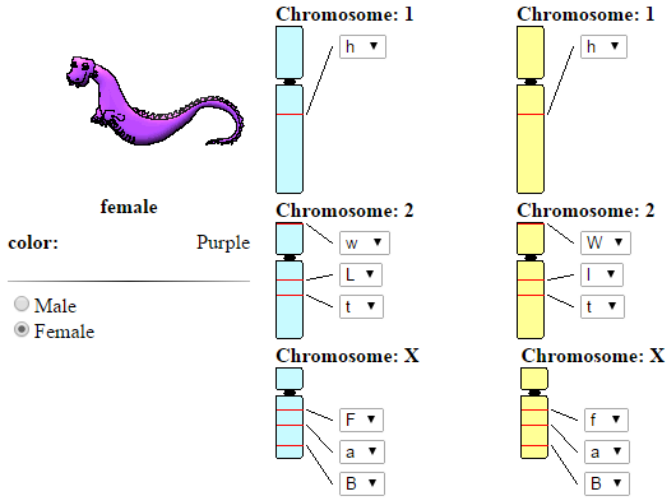
Below, you will find a picture of a dragon alongside a representation of that dragon's chromosomes and genes. Each gene comes in different varieties, called "alleles." You can change a gene from one allele to another by using the pop-up menu. When you change the allele, the dragon may or may not change its appearance (phenotype).



Collect Data I

Dragons have six different traits: horns, wings, number of legs, fire-breathing, color, and type of tail. Make at least five different male dragons.

Click on the snapshot button and describe the method you used to change the alleles in the genes to make **each** of your five male dragons. Click OK to close the snapshot album.



https://models-resources.concord.org/biologica-ui/itsi-dragon-chromosome-view.html

Take a snapshot and upload it to your Snapshot Album by clicking the "*Take a Snapshot*" button. To browse your Snapshot Album, click the album icon. A snapshot must be included for the activity to show as completed.

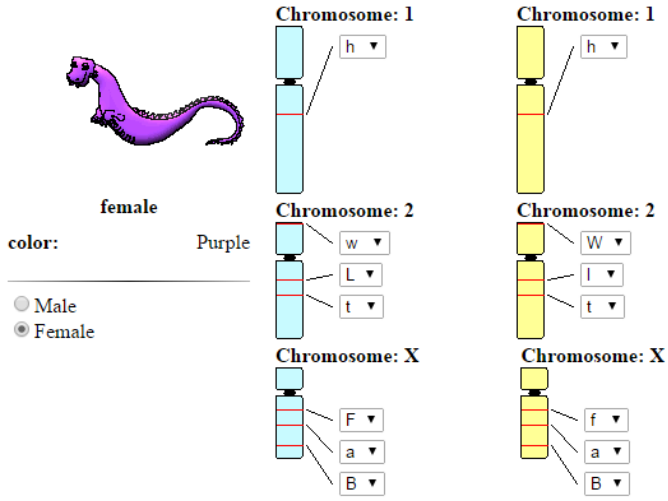
What do you think causes the different phenotypes of these dragons? How does the phenotype depend on its genes (genotype)?

How do you think the color of the dragon is controlled?

Collect Data II

You started with a male dragon. Now try changing alleles in a female dragon. Make allele changes similar to those that you made with the male dragon.

Click on the snapshot button and describe the method you used to change the alleles in the genes to make **each** of your five female dragons. Click OK to close the snapshot album.



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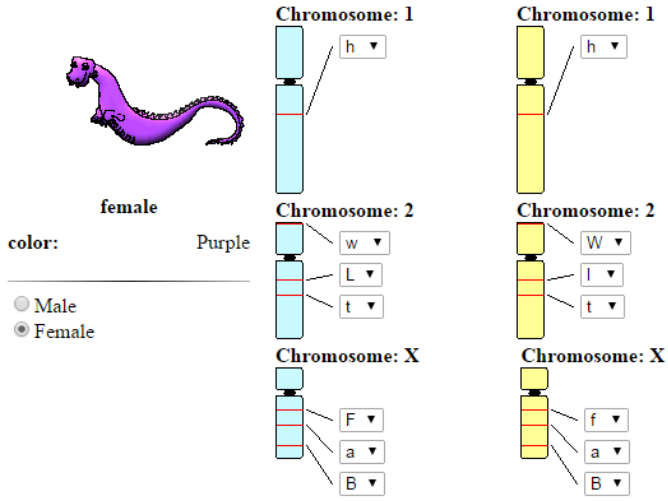
How do the phenotypes of the female dragons differ from the male dragons?

Which dragons - males or females - have more possible colors? Why?

Collect Data III

Play with the dragon model a bit more. Try to make a fire-breathing yellow dragon with horns, wings, a bushy tail, and four legs. (Hint: do you think this dragon will be male or female?)

After you are successful, click on the snapshot button and describe the method you used to change the alleles in the genes to make your dragon. Click OK to close the snapshot album.



https://models-resources.concord.org/biologica-ui/itsi-dragon-chromosome-view.html

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How many different allelic combinations result in dragons with horns?

How did you change the horns gene on chromosome 1 to figure out which allelic combinations produced horns? List all of the allelic combinations that produce horns.

Analysis

Review your snapshot album, descriptions of images and previous responses to help answer the following questions.

1. Can you make a purple male dragon? Why or why not?

2. Describe the allele combinations that resulted in dragon shown below. Explain why these allele combinations resulted in this phenotype.

Conclusion

How do genes determine appearance?

Concluding Career STEM Question

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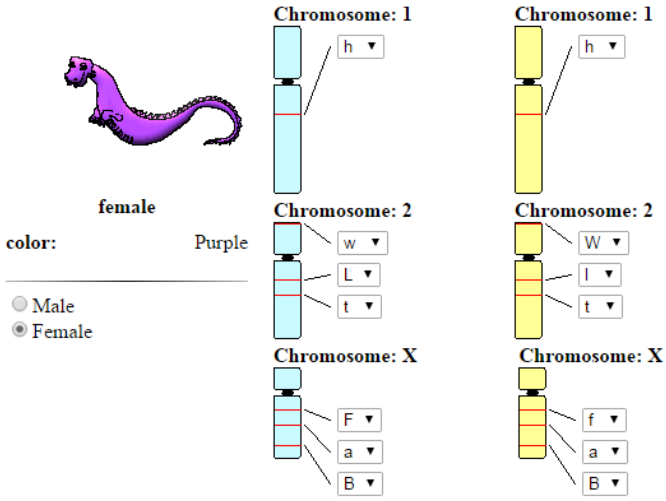
Genetic counselors look at a family's history of diseases to determine the possible outcomes of a couple's children.

What are some diseases that a genetic counselor would look for in a family?

Would you be interested in being a genetic counselor? Why?

Further Investigation

Play with the model again. Try to discover if there is a lethal allele combination.



https://models-resources.concord.org/biologica-ui/itsi-dragon-chromosome-view.html

Take a snapshot and upload it to your Snapshot Album by clicking the "*Take a Snapshot*" button. To browse your Snapshot Album, click the album icon. A snapshot must be included for the activity to show as completed.

Is it possible to make a dead dragon? If so, how?