Evolution of Populations Modeling

Learning Targets:

- Create a visual representation of a hypothetical evolutionary adaptation that is firmly based in scientific theory; and
- Make careful and deliberate visual decisions in developing your creative solution.

Engage:

Introduction to “then” and “now”…what animals may have looked like millions of years ago:
http://www.brainjet.com/world/43731/heres-what-17-of-your-favorite-animals-used-to-look-like-
centuries-ago/

Introduction to project:

Natural selection is a major force of evolutionary change. However, it is not the only source. You will consider the different forces of evolution and how they can lead to changes in the characteristics that are seen in a population of organisms. You will construct a visual model, in the form of before-and-after drawings, collages, or altered photographs, of an individual from a selected population. The first image will represent the subject prior to that population experiencing an evolutionary pressure, and the second will be a model of an individual from the same population, following the effect of the chosen evolutionary pressure.

Caution: While this is a hypothetical modeling process, it is not a “make believe” or otherwise fantastical circumstance. You will need to make it clear as to why you chose to create the models the way that you did. You will need to provide a justification (a claim supported by evidence and reasoning compatible with modern evolutionary theory) as to why the population has evolved the way it has, and will need to provide descriptions of the selective force that worked to drive the evolution of your population in the direction that you represented.

Preparation:

1. Choose a mode of evolution that you would like to represent: natural selection, genetic drift, gene flow, sexual selection, or ??? (I recommend you choosing a mode that you are least comfortable with so that this activity will help develop your understanding.
2. Using the last page of this handout as a guide. Use the internet, gather visual references of your subject. Include multiple views, close-ups, and interior and exterior shots, in order to give the greatest amount of information possible.
3. Determine how you will create your visual model:
a. Drawing: you can draw your model with pencils, colored pencils or markers. You can either prepare “before” and “after” drawings of your population, or you can use a photograph to stand in for the first image and draw only the second.

b. Collage: You can create your model by building images out of cut or torn paper. You can draw further details on the model later, resulting in a mixed-media creation. In taking this approach, you could either create two separate images, or you can collage over the top of a drawing or photograph that would serve as the “before” record.

c. Digital techniques: You can create and/or alter an image of your selected population using Photoshop or other software.

Creating:

Design your before and after sequence. Your finished work should clearly highlight the adaptations selected. You may opt to label your diagrams or choose other ways to clearly visually highlight the adaptation. This could be done in the manner of medical illustrations. If the adaptation is internal, you could present an interior/exterior view. Will certain features be blown up in detail shots? Will you be able to justify how these adaptations would aid in evolution?

Responding:

Please type up a response to the following questions:

- What evolutionary process did you model?
- How did you model it?
- Why did you choose to represent your evolutionary process in the way that you did?
- Describe the circumstances that have led to the evolutionary process you have represented.
- Is your mode of evolution selective? If so, what is the source of the selective pressure you have represented?
- Is your mode of evolution random? If so, how did the random nature of the process affect the members of your population?
- All modes of evolution require variation to be present in the ancestral population. What is the source of the variation that led to the evolution you have represented?

Presentation:

On Monday, we will present our work in small groups, and then a few to the larger group.

REMEMBER: Although a “typical” individual organism is modeling in this activity, it is the population of a species that is the functional unit for evolution.
**Modeling Evolution Planning Sheet**

Population:

Evolutionary Mode:

What effects does your selected evolutionary mode have on your selected population? Use the following chart to note the features that will change from one stage to the next.

<table>
<thead>
<tr>
<th>Pre</th>
<th>Post</th>
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How will you visually convey those changes? Use the following questions to help you plan your visual model:

- Begin by considering your “pre” evolution mode. Decide which elements should be visually emphasized. How will you emphasize them? Through the use of color? Adjusting the size? By incorporating collage elements? Some combination of the three? Something else?
- If your mode is internal, you could draw an “x-ray” view of the appropriate area. Once you are satisfied with your overall design, tighten the drawing with more deliberate lines and details as needed.
- Begin your “post” evolution mode by taking a second piece of paper and tracing the outline of your original design. (You may use a light box if you wish.) Alter the pertinent details using the same process as above.
- Optional: Neatly label the emphasized features of both drawings.