

Task A-2 Verdecchia Lesson Plan Format

Name: Carlos Verdecchia Date: 9/27/06 Age/Grade Level: 15-16/10th grade

of Students: 29 # of IEP Students: 1 # of GSSP Students 4 # of LEP Students: 0

Subject: Advanced Biology Major Content: Natural Selection Lesson Length: 90 minutes

Unit Title: Evolution - Animal Behavior Lesson Number and Title: 2 - Natural Selection

Context

- Explain how this lesson relates to the unit of study or your broad goals for teaching about the topic.
This lesson unifies, in practice, Darwin's idea of how changes (traits) and survival of organism occurs in nature. One of the main goals is for the students to understand that those changes usually occur at a slow rate and change is determined by environmental pressure to survive.

- Describe the students' prior knowledge or the focus of the previous lesson.
Students were exposed to the theory of evolution in middle school. In our prior class we discussed the studies of Darwin and his ideas on the force driving species modification, natural selection.
- Describe generally any critical student characteristics or attributes that will affect student learning (other than what you described in the Teaching and Learning Context).
Today, many people do not agree with the theory of evolution. Some people see a great conflict between the theory of evolution and the creation of man as is written in different religious documents. This topic is troublesome with some students because of their pre-conceptions about how evolution and religion conflict each other. The teachers must be prepared to deal with such controversial topics and address the class as a moderator and as a source of information which will help the students clear up some common misconceptions about evolution.

Objectives

State what students will demonstrate as a result of this lesson. Objectives must be student-centered and observable/measurable.

1. Show how environmental pressures determine the "fitness" of a variation
2. Predict the outcome of continuous predation on the number of survivor species

Connections

Connect your goals and objectives to appropriate Kentucky Core Content and/or Program of Studies. Use no more than two or three connections, and if not obvious, explain how each objective is related to the Program of Studies and/or Core Content.

This lesson relates to the following KY core content.

SC-HS-3.5.1 Students will

- predict the impact on species of changes to 1) the potential for a species to increase its numbers, (2) the genetic variability of offspring due to mutation and recombination of genes, (3) a finite supply of the resources required for life, or (4) natural selection;

Species change over time. Biological change over time is the consequence of the interactions of (1) the potential for a species to increase its numbers, (2) the genetic variability of offspring due to mutation and recombination of genes, (3) a finite supply of the resources required for life, and (4) natural selection. The consequences of change over time provide a scientific explanation for the fossil record of ancient life forms and for the striking molecular similarities observed among the diverse species of living organisms.

This lesson also addresses the Ky Program of Studies where the students will understand:

- BC-U-1 the survival of any given species is not assured. There are a variety of factors (e.g. reproductive success, mutation, availability of resources, competition) that may determine if a species flourishes, declines, or eventually becomes extinct.
- BC-U-3 some organisms have greater adaptive capabilities than others, giving them a greater chance of survival under changing environmental conditions. These adaptations may be patterns of behavior as well as physical characteristics.

Assessment Plan

In tabular format, organize how each objective will be assessed. Include copies of assessment instruments and rubrics (if applicable to the lesson plan).

Objective/Assessment Plan Organizer

Objective Number	Type of Assessment	Description of Assessment	Depth of Knowledge Level	Adaptations and/or Accommodations
1	Formative	Oral questions per group	1,2	none
2	Summative	Written questions, prediction and conclusion	2	none

Resources, media and technology

- List the specific materials and equipment needed for the lesson. Attach copies of printed materials to be used with the students.

Power point presentation with review notes from prior class

Lab material -- environment fabrics, color papers

Handout lab

- If appropriate, list technology resources for the lesson including hardware, software, and Internet URLs, and be sure to cite the sources used to develop this lesson. (If you or your committee feel the technology observed in the lessons does not fairly represent your use of technology, provide additional documentation. See Standard IX.)

Power point

Students also have access to my web site where they can print class notes

Procedures

Describe the strategies and activities you will use to involve students and accomplish your objectives including how you will trigger prior knowledge and how you will adapt strategies to meet individual student needs and the diversity in your classroom.

- Take roll and enter them in the computer

The class will start with a revision of Thomas Malthus (1766-1834) ideas from yesterday's lesson. According to Malthus, people were born at a faster rate than they were dying, so there had to be some outside control on the growth of human population (disease, war, famine).

Review Darwin: These ideas influenced Darwin who observed that high birthrate and a shortage of life's supplies force organisms into competition for survival (survival of the fittest). In 1831, after a five-year voyage around the world, Charles Darwin collected and examined hundreds of animals and plants specimens. He found evidence that many species of organisms no longer existed. In order to explain how species vanished from the Earth, Darwin introduced the new concepts of fitness, adaptation and common descent.

Natural selection occurs because organisms vary in their heritable traits, and because some of these traits allow organisms to survive and reproduce better than others.

- Lab student handout will be passed to each student. This simulation lab will demonstrate how natural selection operates. We will be using different colored paper chips to represent prey and a piece of fabric as a background (the environment).

The predator (students) will hunt (selected chips) to show that the best adapted, by color, are not hunt as frequent as others that are poorly adapted (more visible). Thus, the best adapted survive and reproduce to pass on their traits.

- After counting the numbers from the second predation, students will predict third generation findings. Then students must agree as a group on a prediction. Each group will write their prediction on a card to be tested the next day.

- Finally, each group will present their current results and prediction to the rest of the class.

STUDENT HANDOUT

THE CHIPS ARE DOWN: A NATURAL SELECTION SIMULATION

Objective: students will use models to explain how various traits may increase the ability of organisms to survive.

Materials:

- Different types of colorful floral fabrics
- Containers with paper chips of assorted colors

Introduction

The process of natural selection occurs because organisms vary in their heritable characteristics, and because some variants survive and reproduce better than others. As a result, the genetic structure of a population changes through time, which is a factor in evolution. Although evolution may be defined in terms of genetic change, natural selection occurs by the interaction of the environment and whole organisms, and not directly on their genome. The genome is affected by mutations.

In this exercise, we want to reinforce the concept with a demonstration of how natural selection works. It is far too time-consuming to observe natural selection at work in natural populations, so we will use artificial populations consisting of paper chips.

Procedure

1. Spread out the fabric habitat given to you by your teacher on the table top.
2. Count out ____ chips of each of the ____ colors for a total of 100 as your initial population.
3. Appoint one person as the prey (chip) **distributor**. That person should spread the chips out randomly over the entire fabric, making sure the chips do not stick together. The other members of the group should have their backs turned during this procedure.
4. The **predators** (other members) should turn around and take turns picking off the prey (chips) one by one until only 25% remain. **COUNT CAREFULLY**. Predators are to take the first chip they see and follow each chip to the discard area with their eyes so as not to see more chips, and keep track of the number of chips they get.
5. Carefully shake off the fabric to remove **survivors** (remaining 24 chips).
6. Group the **survivors** according to color. Count and record these numbers.
7. Assume each survivor produces three offspring. Using the reserve chips, place three chips of the same color with the survivors (i.e., take the number of survivors multiplied by 4).
8. Mix these chips together and re-distribute them as in step 3.
9. Repeat the entire process one more times.
10. Each student must write down a prediction of how many chip of each color would remain if a third generation of prey being preyed upon. After coming to a group consensus, each group must write their prediction on a 4" X 6" card.
11. Repeat steps 3 through 6 one more time. Count and record these numbers and compare them to each group estimates.

STUDENT HANDOUT**DATA**

Fabric description:	COLORS					
Number at start-->	16	16	16	16	16	16
# after 1st predation-->						
# after 1st reproduction-->						
# after 2nd predation-->						
# after 2nd reproduction-->						
# after 3rd predation-->						

REVIEW QUESTIONS:

1. Study your survivor populations.

- Was 1 color of paper chip represented more than others in the first generation of survivors? _____
- Were shades of that color or similar colors also present? _____
- What, if any, change occurred between the 1st and 2nd, and again between the 2nd and 3rd generation of survivors?

2. Compare the original and survivor populations. Is there any color from the original population that is NOT represented in the survivor population? If so, what color (or colors)?

3. Examine your survivor chips and the fabric from which you took them. How do you think the colors of the survivors are related to their habitat?

4. Write a conclusion as to which colors survived in the habitat and which did not, and **why**. Relate your results to a natural situation example in nature.

RUBRIC

DATA

Fabric description	COLORS					
	2pts	2pts	2pts	2pts	2pts	2 pts
Number at start-->	16	16	16	16	16	16
# after 1st predation-->						
# after 1st reproduction-->						
# after 2nd predation-->						
# after 2nd reproduction-->						
# after 3rd predation-->						

REVIEW QUESTIONS:

1. Study your survivor populations.

a) Was 1 color of paper chip represented more than others in the first generation of survivors? _____

2 pts – read and interpret data correctly – answers varies

b) Were shades of that color or similar colors also present? _____

2 pts – read and interpret data correctly – answers varies

c) What, if any, change occurred between the 1st and 2nd, and again between the 2nd and 3rd generation of survivors?

2 pts - read and interpret data correctly – answers varies

2. Compare the original and survivor populations. Is there any color from the original population that is NOT represented in the survivor population? If so, what color (or colors)?

2 pts - read and interpret data correctly – answers varies

3. Examine your survivor chips and the fabric from which you took them. How do you think the colors of the survivors are related to their habitat?

2 pts - interpret data and relate to fabric color. Students must make the connection that chips with similar color to the fabric will survive more frequent than those color chips that stand out.

4. Write a conclusion as to which colors survived in the habitat and which did not, and **why**. Relate your results to a natural situation example (animal or plant) in nature.

4 pts – Students must relate their results to the characteristics of their habitat (fabric color). Students must give 1 example in nature that relates to this exercise. Example: light color moths have a higher survival rate than dark color moth in the presence of light bark trees. Light color moths blend in with the color of the

bark, thus birds cannot easily detect them. Black color moths are easily seen on light bark trees, thus birds prey more often on them and their survival rate decreases.

Total points for the lab – 26 points	
Far below standard	< 16
Approaching standard	16 to 22
Meeting standard	> 22
Exceeding standard	26 + additional detailed examples on question 4

Questions

The following questions will be asked to each group participants during the lab model exercise.

Questions	Groups			
	1	2	3	4
1. What is the main different trait in these organisms? <i>Color of the organism</i>				
2. What factors in the environment is determining which animal (paper chip) survives the best? <i>The ability for an organism to blend in with the environment</i>				
3. What is the environmental pressure that determines the survival rate of the organism? <i>The ability for predator to prey on the one they can see</i>				
4. Why is a larger number of 1 or 2 color organisms left at the end of 2 nd predation? <i>Those color produce more offspring, since they survive better</i>				