

**Topics:** Evolution, change and natural selection

## Overview

Evolution is a key concept for understanding biology. Evolution reveals the diversity of species and predicts changes. Students will describe the voyage of the Beagle, express the pattern Darwin observed among organisms of the Galapagos and recognize his contribution to science.

## Time Allotment

Two 90-minute periods

**Grades** 9-11

## Learning Objectives

On completion of this lesson, students will be able to:

- Describe evolution and Natural selection
- Explain the basic concepts in Darwin's theory of evolution

This lesson addresses Va. SOLs: Bio 2b, 8c, 8d, and 8e

## Materials

Per student:

- Computer lab or Laptop computers with Internet access for each students
- 4 sets of Michael Jackson picture (*When he was a teenager to the present*)

For group activity:

- 5 classroom chairs
- A CD player with music CD of teacher's choice.

## Media Components

- Laptops or computer lab with Internet access
- An LCD projector and a movie screen or whiteboard
- Print resources retrieved from AllPosters.com (Michael Jackson pictures)
- Life Science: Evolution. Discovery Channel School. 2002. unitedstreaming. 26 June 2008  
<<http://streaming.discoveryeducation.com/>>  
Video Clip used: Clip 1: Charles Darwin
- Website for activities: <http://teacher.scholastic.com/activities/explorations/adaptation/index.htm>.

## Teacher Preparations

- Download Michael Jackson's pictures (*when he was 15 years old to the present*) from AllPosters.com. Make at least 10 copies of each selected pictures.
- Obtain laptops for each student and the teacher and an LCD projector
- CD player and [a smooth jazz] CD (e.g. Bonney James or Kenny G)
- Download, preview, and cue video
- Preview website

## Introductory Activity

1. Hand out four different pictures of Michael Jackson from his early age to the present to students.  
Focus: Ask student to identify the singer and arrange the picture of the singer when he was very young to his current picture.

Activity: Ask students to share with a partner his or her observation about the picture.

Follow-up: Have one of the students to be a spokesperson for each group and share their observation with the class. Discuss the transformation of the singer with the class.

2. Focus: Write the word “Change” on the chalkboard.

Activity: Give each group a plain sheet of paper and ask them to do a “Roundtable” exercise. With the plain sheet of paper, each member of the group will write a synonym of the word “CHANGE”. One person will write a synonym and pass the sheet to the other person until the teacher says “STOP.” A spokesperson from each group will then read their synonym loudly in class.

Follow-up: Based on the synonym listed, the teacher then asks each group to define the word “CHANGE”.

## Learning Activities

1. **Focus:** Teacher now writes the word “TELEVISION” on the chalkboard.

Activity: Ask students to list the gradual changes that have occurred in the development of the television since it was black and white. *Possible answers might be, Color TV, High definition, Flat screen, Plasma, Tivo, Cable, Pocket TV etc)*

2. **Focus:** Explain or say: Unlike the rapid changes in technology today, people living in the olden days believed that living things remain unchanged. It was not until a philosopher called Charles Darwin came up with a theory that “Species change over time. Over long periods, natural selection causes changes in the characteristics of a species, such as in size and form. New species arise, and other species disappear”.

**Activity:** List the following questions on the board: Who is Charles Darwin? How many careers had he attempted before going on his career changing voyage? What was the name of the ship that Darwin sailed on and where was it heading? **SAY:** This video clip will tell us a little bit about him.

Play Darwin’s Voyage to Galapagos Clip #1. Start from the beginning at the portrait of Darwin when he was young, when you hear “the Beagle change his calling” and the faded map of the world is about to appear.

**Follow-up:** Now, who is Darwin, how many careers had he attempted before going on a voyage? What is the name of the ship and where is the ship heading? Therefore, Darwin was born in Europe and not in America. He tried many jobs and was unsuccessful before he went on Voyage to the Galapagos.

3. **Focus:** Now let us find out Darwin’s observation in Galapagos Island. Make a list of evidence shown in the video that Darwin used to support his theories of Evolution and Natural Selection. Note how horse breeding helps support his theory.

**Resume** video where it was paused

**Stop** the video at the end when you hear “Darwin concept of evolution has been a unifying concept in biology” and a kangaroo running on grassland.

**Follow-up:** Darwin made several observations while in Galapagos Island, he collected several specimens, which helped him support his theory when he returned to London in 1836.

What other evidences was mentioned in the video clip to support Darwin theory? Why do people prefer breeding fast horses? How did the process, of selective breeding, support Darwin's concept of Natural selection?

## Learning Activities

**1. Focus:** Before Darwin proposed his theory, there was another philosopher called Thomas Malthus. Darwin used Malthus work on population growth, which states, "high birth rates and a shortage of life's basic needs would eventually force organism into competition for resources". He coined the word "struggle for existence" which means that members of each species compete regularly to obtain food, living space, and other necessities of life. In this struggle, the predators that are faster or have a particular way of ensnaring other organisms can catch more prey. Thus, Darwin called the ability of an individual to survive and reproduce in its specific environment fitness or survival of the fittest. Fittest as Darwin proposes is the result of adaptation that increases an organism chance of survival. Ask students to list some adaptation showed by a millipede, a frog, a butterfly, and a pill bug. Tell students that survival of the fittest can be demonstrated using the musical chair.

**Activity:** Musical chairs

Have six students to volunteer as dancers. Arrange five chairs alternately so that three chairs face one side and the other two faced the opposite side. Tell the volunteers that they will dance around the chairs while you play a jazz music and as soon as the music stops, they should quickly sit on a chair. The person who cannot find a seat will be eliminated.

Step 1: Play the music and watch the students as they danced around the chair.

Step 2: Now, quickly shift your eyes away from the students and press pause on the disc player and stop the music.

Step 3. Look at how students struggle to get a seat and how one student was unable to secure a seat.

**Follow-up:** Explain to the class that the chairs represent resources and the students are the organisms competing for limited resources. Now, who is the strongest organism in this game? What happens to the student who was unable to secure a seat? How can you explain this game in terms of Darwin's theory of natural selection? (Play the game again and remove a chair each time until you have two students and a chair and see how they will struggle for the single chair) (HOTS: Ask the students why the winner succeeded? Was it luck or was there some skill (noting the shift of the teacher's eye) that helped to determine the winner?)

## Culminating Activities

**Focus:** Okay, now that we know what we mean by struggle for existence and natural selection, let us take a virtual tour and follow Darwin footsteps by going to the Galapagos online. Here, we will learn more about adaptation, biodiversity, and natural selection.

**Activity:** Go to <http://teacher.scholastic.com/activities/explorations/adaptation/index.htm> and click on level 1. The challenge now is that you are on Galapagos Island, there are four clues that will find on the Island that will help you identify the mystery animal on the Island. With your mouse, click level 1 and follow the instructions. As soon as you are able to identify your mystery animal, go back using the back button and select level 2 where you will match the five different tortoises to the Island where they inhabited.

**Follow-up:** Have students discuss with the class on how they identify their mystery animals and what clue helped them. Also, have students discuss how they match each of the tortoise to different Island, what differences did they observed in the shape of the tortoise shell, and what factor(s) did they use to determine

the habitat of each tortoise found on the Galapagos Island. Have student's prints out the map of Galapagos and each tortoise. Have them paste the picture of each tortoise on the Island that it inhabits.

### Assessment

(note: The teacher should create a participation or discussion rubric to evaluate the culminating activities.)  
Have students study the effects of individual variations by planting a pinto bean garden.

- Obtain some pinto bean seeds and ask students to measure and observe them, placing the seeds into categories such as short, long, wide, and thin.
- Have them write hypotheses that predict how each category of bean seed will grow.
- Plant 3 or 4 beans from each category
- Have students to observe the plants each day, recording their observation (*measuring height and shape of leaves*).
- After 4-5 weeks, have them write a brief summary of plant growth using the data collected over the 4-5 weeks period.
- Have them construct a data table and draw a smooth line graph or bar graph to illustrate the changes that occurred over 4-5 weeks.
- Students may be further challenged to use a PowerPoint to presents their projects.

### Community Connections

#### Life Science

Students can learn different perspectives in a situation that can have possible evolutionary implications.

- Teacher can give students a situation (e.g. pesticide use on lawns or crops, use of biotech foods, habitat destruction and endangered species).
- Teacher can give each student a role after dividing them into teams (such as farmers, parent with young children, environmental activist, politician etc).
- Ask student to define the point of view for his or her role and to seek out scientific arguments and evidence that might support or refute it.
- As students find information to support their role, have them consider evolutionary, economic, health, political, and ethical implications of the situation.
- Have them dress in their roles for a town meeting to discuss the implication of the situation from each point of view.
- Have the students (as a town) make a decision on the situation after listening to all sides.

#### Art

- Have students tell stories through photo essays or iMovie.
- Have them download pictures from the Internet or using magazine, painting, photographs to show chains of events on the use of technology as it affect modern art.

#### History and Economics

- Have students to dress up in different costumes to show fashion trends since 1960.

### Cross-Curricular Extensions

- Have a farmer or a university professor with experience in animal breeding to visit the class and discuss how technology has help to improve agricultural practices.



## EVOLUTION: CHANGES OVER TIME

Oluwole "Wally" Adesina  
Albemarle County Public Schools



- Invite a veteran teacher to the class to discuss how technology has changed the way teacher present their lessons in class in the present millennium. In addition, how it has improves student learning and achievement.

### **About the Author**

This teacher is a Biology/Ecology teacher at Western Albemarle High School in Albemarle County, Virginia.

This lesson was written as part of the Fall 2005 WVPT NTTI for the Virginia Enhancing Education Through Technology Ed Tech Grant awarded to the Shenandoah Valley Technology Consortium (SVTC).