

<b>Name:</b>	<b>Bill Witherspoon</b>	<b>Program Number and Course Name</b>	<b>2834 SB5C FOSSILS AND EVOLUTION</b>
<b>Grade Level and Subject Area:</b>	<b>HS Biology</b>		

### Lesson Plan

#### **Key Standard(s) Addressed:**

SB5 Students will evaluate the role of natural selection in the development of the theory of evolution.

SB5(b) Explain the history of life in terms of biodiversity, ancestry, and the rates of evolution.

SB5(c) Explain how fossil and biochemical evidence support the theory.

#### **Related Standard(s) Addressed:**

SCSh3 Students will identify and investigate problems scientifically.

SCSh3(c) Collect, organize and record appropriate data.

SCSh3(d) Graphically compare and analyze data points and/or summary statistics.

SCSh3(e) Develop reasonable conclusions based on data collected.

#### **Essential Question(s):**

How does fossil evidence support the theory of evolution?

#### **Equipment and Materials:**

For every two students: 14 sheets representing geologic periods, each with pictures of organisms that lived at the same time, and a map of the continents as positioned at that time; a tray of 5 fossils from a single period; and an "artist's view" picture of the period with living organisms. For every student: a picture guide to the fossil collection, a worksheet for their fossil notes and sketches, and a "tree of life" diagram.

**Assessment/Evaluation:** The opening activity allows a formative assessment of the ease with which students can make observations about fossil life forms and their changes through time. The completed worksheet leaves the classroom teacher with a summative assessment of how well the students were able to gather information from the tree of life diagram, as well as (with the sketch) how carefully they observed the fossils.

#### **Overall Agenda:**

Introduce students to the geologic record of fossil change over time; allow each student to work with 5 fossils representing a single geologic period; require students to interpret a tree diagram showing the diversity and ancestry of life forms.

#### **Sponge (Introduction) Activity:**

The key standards are shown in a Power Point slide, followed by a photo of the Grand Canyon. The photo frames the assertion that fossils demonstrate evolution over time, because, when studied from the bottom of a stack of rock layers to the top, the fossils near the top most resemble present-day organisms.

**Allotted Time: 5 minutes**

**Opening/Lecture:** Working in pairs, students are introduced to the geologic time scale as they arrange the 14 geologic period pictures in chronologic order based on the pictures of organisms and maps of continents. This part has also been posted as a pre-activity for instances when the school has only 45 or 50 minutes available for the class period.

**Allotted Time: 15 minutes (omit for 45-minute class period)**

**Work Period:** Power Point slides are used to demonstrate an example for completing the first five blocks of the worksheet. Then each pair of students works with a tray of fossils (including a few casts) of 5 organisms that lived during one of the geologic periods. They sketch each fossil and identify it using a picture guide.

Students analyze the fossil groups using a "tree of life" diagram that shows relationships between groups and the relative abundance of each group through time.

**Allotted Time: 60 minutes (for 90-minute class); 30 minutes (for 45-minute class).**

**Closing/Summarizing Activity:** Students use the "artist's view" picture and the "Tree of Life" diagram to answer questions in the final block of the worksheet regarding the dominant life forms in the geologic period their tray of fossils represents. Trays with fossils can be retrieved as they are doing this.

**Allotted Time: 10 minutes.**

**Differentiation Strategy:** Students of varying abilities will progress at different rates through the activities. Partial completion of the opening activity (e.g. getting the 3 piles separated correctly) and the work period (e.g. completing only 2 or 3 out of the 5 fossils in their tray) can be considered success for students who find the activities especially challenging. The requirement to sketch the fossil allows students with better drawing as opposed to verbal abilities to be successful. Students who complete the entire activity well ahead of their classmates are invited (though not required) to take a second tray in order to learn about a different geological period.

**Homework:** Post visit activities working with cladograms (a variation on the tree diagram used in the program) are provided in the curriculum center; some students will be able to do these as homework, but in general this will work best as a class activity.