California State Standards 8 LS-4-2

Lesson Plan:
Grade Level:
Grade 8

Phylogenetics: How Does It Work?

Overview	Phylogenetics has affected almost every area of biology, including the basic one: how we classify organisms. Find out how it works and what its advantages are by going to springerlink.com/content/k176638503p63017/fulltext.pdf **Concepts:** Present-day life forms are descended from past life forms; all life is related. Classification is based on evolutionary relationships Evolutionary relationships may be represented by branching trees (phylogenies or cladograms).
In the Classroom	Brief Module Summary, Objectives, Technical Requirements, Hyperlink for students, how to navigate and lesson plan for teachers. **Handouts for students:** What did T Rex taste like?
At Safari West	Have your students bring a copy of the Safari West Species List and a pencil or pen. Pick several example animals and ask the students to determine which pairs are more closely related to each other on the cladogram. Have each student or pair choose their own pair of animals to diagram on a cladogram. Common ancestors should be clearly marked.
Back in the Classroom	Have each pair or each student share their cladogram and defend their diagram.

continued

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continued...

What Did T-Rex Eat?

Brief Module Summary

The module begins by introducing the three domains of life: bacteria, archaea and eukaryotes, and explains that all living things share a common ancestor. By understanding this single unifying concept, students are able to understand the evolutionary history and relationships of all living things. Students are introduced to the process of illustrating evolutionary relationships with branching diagrams called cladograms. Students learn that once a cladogram has been constructed for a group of organisms, it can be used to answer all kinds of interesting questions based on the shared inherited features of those organisms.

Objectives

During this module students will learn that:

- All living things are related by common ancestry.
- Branching diagrams, called cladograms, are used to illustrate evolutionary relationships.
- Cladograms are based on shared, inherited features.
- Cladograms refine our ability to understand and interpret evolutionary history.

Life Science, Content Standard C: Biological Evolution

- The great diversity of organisms is the result of more than 3.5 billion years of evolution that has filled every available niche with life forms.
- The millions of different species of plants, animals, and microorganisms that live on Earth today are related by descent from common ancestors.
- Biological classifications are based on how organisms are related. Organisms are classified into a hierarchy of groups and subgroups based on similarities which reflect their evolutionary relationships.

Technical Requirements

The on-line version requires Internet access. Google Chrome worked as a browser. Firefox and Internet Explorer (Microsoft Edge) would be the other option.

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Phylogenetics: How Does It Work?

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Macintosh computers

Requirements:

- A Javascript-enabled web browser.

Works best if using:

- Monitor set to 800 x 600 resolution or greater
- Operating System : 7.6.1 or higher
- Connection speed : TI or above

Macintosh computers

Requirements:

- A Javascript-enabled web browser.

Works best if using:

- Monitor set to 800 x 600 resolution or greater
- Connection speed = TI or above

Link for students to use: https:/ / ucmp.berkeley.edu/ education/ explorations/ tours/ Trex/ navigation.html

How to Navigate

Students move at a self-selected pace by clicking on buttons or responding to questions. Complete navigation instructions are given at the beginning of the first section. Commonly used navigation features include:

more... "More" buttons exchange text on the page to provide additional information.

NEXT ► "Next" buttons move to the next page.

Students can progress by answering questions. If students select an incorrect response to a question, they receive a message encouraging them to try again. If they select the correct response, they automatically move to the next page.

Words that are highlighted in purple and underlined are words that are defined for the student. By clicking on these words, a separate window is launched that defines or further explains that word.

This suggested lesson plan draws on the experiences of teachers

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Phylogenetics: How Does It Work?

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How to Navigate continued

who have used What Did T. rex Taste Like? in a variety of classroom settings.

They found that usually students benefit most if:

- Students work in teams of two per computer to allow students to read and share ideas with one another as they proceed.
- There is time for class discussion of major concepts.

The suggested lesson plan incorporates activities that may be used before and after students complete the module to give students a more complete experience. Links to resources are embedded within the lesson plans where they are mentioned.

See Assessment Materials for keys to tests and focus questions.

Day 1. Introduction

- Describe the objectives and activities of the lesson to students.
- Give students the What Did T. rex Taste Like? Pre-Test .
- Use the Student Brainstorming Activity to initiate discussion of the following major concepts:

  a. Organisms share features inherited from a common ancestor.

  b. The more closely related any two organisms are, the more shared features they will have in common.

  c. Shared features can be used to in terpret the evolutionary history of living things.

  d. Shared features are the basis for constructing cladograms.

Day 2. Begin the Module

- Explain to students how they will navigate through the module.
- Encourage students to explore the pages thoroughly, taking the time to understand each page before moving ahead to the next.
- Student s complete folders 1-3 in the module.

Day 3. Culmination

- Students complete folders 4 and 5 in the module.
- Students complete the Special Assignment as a culminating activity.
- Students complete the Post-Test.