

Unit 6: The History of Life
AP Biology
5 Class Meetings

Revised June 2019

Essential Questions

- How did the diversity of life on Earth begin?

Enduring Understandings with Unit Goals

EU 1: The evolution of prokaryotes, followed by the evolution of eukaryotes, led to a vast array of complex organisms on Earth.

- Describe the evolution and diversification of prokaryotes.
- Explain how the origin of eukaryotes led to the diversity of life on Earth.

EU 2: The colonization of land by plants and fungi transformed terrestrial environments, enabling them to support a variety of microscopic and macroscopic organisms.

- Evaluate the changes to biogeochemical cycling and biotic interactions following the introduction of land plants and fungi.
- Describe the origin and diversification of animals.

Standards

Next Generation Science Standards (NGSS):

- **HS-LS4-1.** Communicate scientific information that common ancestry and biological evolution are supported by multiple lines of empirical evidence.
- **HS-LS4-2.** Construct an explanation based on evidence that the process of evolution primarily results from four factors: (1) the potential for a species to increase in number, (2) the heritable genetic variation of individuals in a species due to mutation and sexual reproduction, (3) competition for limited resources, and (4) the proliferation of those organisms that are better able to survive and reproduce in the environment.
- **HS-LS4-3.** Apply concepts of statistics and probability to support explanations that organisms with an advantageous heritable trait tend to increase in proportion to organisms lacking this trait.
- **HS-LS4-4.** Construct an explanation based on evidence for how natural selection leads to adaptation of populations.
- **HS-LS4-5.** Evaluate the evidence supporting claims that changes in environmental conditions may result in: (1) increases in the number of individuals of some species, (2) the emergence of new species over time, and (3) the extinction of other species.

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Common Core State Standards:

- **RST.11-12.1** Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.
- **RST .11-12.8** Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information.
- **WHST.9-12.2** Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.
- **WHST.9-12.9** Draw evidence from informational texts to support analysis, reflection, and research.
- **SL.11-12.4** Present claims and findings, emphasizing salient points in a focused, coherent manner with relevant evidence, sound valid reasoning, and well-chosen details; use appropriate eye contact, adequate volume, and clear pronunciation.
- **MP.2** Reason abstractly and quantitatively.
- **MP.4** Model with mathematics.

MSMHS Academic, Civic, and Social Competencies

Competency 1. Read and write effectively for a variety of purposes.

Competency 2. Speak effectively with a variety of audiences in an accountable manner.

Competency 3. Make decisions and solve problems independently and collaboratively.

Competency 4. Apply scientific knowledge and concepts to a variety of investigative tasks.

Competency 5. Contribute to a positive learning environment with respect and responsibility.

Unit Content Overview

- Conditions of the Earth that made life possible
- Protocells
- Fossil evidence
- Diversification of prokaryotes
- Evolution of eukaryotes
- Endosymbiont theory
- Protists
- Evolution of multicellular organisms
- Fungi
- Early land plants
- Chemical cycling and biotic interaction

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- Origination of animals
- Cambrian explosion

Interdisciplinary Connections

- ECE Marine Science: fossil record, early marine life

Daily Learning Objectives with *TWPS Activities*

Students will be able to...

- Describe the diverse structural and metabolic adaptations that have evolved in prokaryotes.
 - *In a rapidly changing environment, which bacterial population would likely be more successful, one that includes conjugation or one that does not? Explain.*
 - *Explain how prokaryotes, though small, can be considered giants in their collective impact on Earth and its life.*
- Summarize our understanding of the evolution of eukaryotes and explain why Kingdom Protista has been abandoned.
 - *Explain why eukaryotes are considered to be “combination” organisms and summarize the role of endosymbiosis in eukaryotic evolution.*
 - *Justify the claim that photosynthetic protists are among the biosphere’s most important organisms.*
- Explain how plants and fungi have affected biotic interactions by increasing the amount of available energy and nutrients for other organisms.
 - *Explain the ways in which land plants and terrestrial fungi have affected the physical environment.*
- Explain how the activities of animals, including humans, can lead to evolutionary change.
 - *Which came first, the chicken or the egg? Explain using evolutionary principles.*

Instructional Strategies/Differentiated Instruction

- **HLP:** Academically Productive Talk
- **HLP:** Writing to Learn (TWPS)
- **HLP:** Effective Feedback
- Daily Warm Up Activities
- Power Point Lecture with note-taking
- Flexible grouping
- Foldables

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- Exit slips
- Graphic Organizers
- Creating authentic connections for students
- Rephrasing and restatement of information and concepts
- Student use of headphones
- Independent reading
- Outlining of text
- Reading and Accountable Talk Discussion of Text
- Laboratory exercises

Assessments

FORMATIVE ASSESSMENTS:

- “I like big brains and I cannot lie...” Project
 - MSMHS Rubric 4: Scientific Research
- Close reading and interpretation of text
- Outlining of textbook
- Warm Up Activities
- Exit slips
- Oral questioning
- Accountable Talk Discussions
- Daily Think-Write-Pair-Share (TWPS)
- Daily check-ins with students
- Practice FRQs
- Practice MCQs
- Homework/Reading checks

SUMMATIVE ASSESSMENTS:

- Quiz on EU 1
- Quiz on EU 2
- “I like big brains and I cannot lie...” Project
- Unit Test

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Unit Task

Unit Task Name: “I like big brains and I cannot lie...” Project

Description: Students will use information from this unit on the origin of life on Earth (EU 1), as well as the phylogenies of plants and animals (EU 2) in order to draw conclusions about the ratio of brain and body sizes among organisms. Students will be given a set of data regarding the deviation from expected brain size and the rate of mortality among species. Using this data, students will infer relative costs and benefits of larger brains, hypothesize how natural selection might favor larger brains, graph the given data, and draw conclusions based on their data. Students will present their work as a scientific poster to be scored using MSMHS Rubric 4: Scientific Research.

Evaluation: MSMHS Rubric 4: Scientific Research

Unit Resources

- Textbook (Biology in Focus AP Edition. Campbell et al. 2014. Pearson Education, Inc)
- Interactive Science Notebook
- MSMHS School-wide Rubrics
- Lab Supplies
- Graphing calculators
- Internet databases
- Laptops