Unit 7 - Evolutionary History

Content Area: **Science**
Course(s):
Time Period: **Full Year**
Length: **Full Year**
Status: **Published**

Unit Overview

In the Evolutionary History unit, students will take on the role of student paleontologists investigating a Mystery Fossil, which serves as the anchor phenomenon for the unit. This fossil is based on a real cetacean (whale) fossil excavated in Pakistan in 2000. The students' task is to determine the Mystery Fossil's evolutionary history so that they can accurately place the specimen in a museum exhibit. To gain an understanding of how paleontologists determine relationships between species, students use the Evolutionary History Simulation to analyze real fossil evidence and explore relationships on an interactive evolutionary tree. With a fossil collection at their fingertips, students identify similarities and differences among the skeletal structures of both extinct and living species. Students also use the Natural Selection Simulation to revisit principles of natural selection, applying this concept to understanding how one species becomes two. They read several articles about evolution, speciation, and natural selection, and they create models to show their thinking. By the end of the unit, students can use their analysis of skeletal structures to determine where they should place the Mystery Fossil in the museum, according to what type of organism the evidence shows it to be most closely related to—whales or wolves.

Enduring Understandings

Species inherit their body structures from their ancestor populations.
In populations separated into different environments, natural selection causes different changes to happen to each population. When the environment is mostly the same over time, body structures stay stable. When the environment changes over time, body structures may change due to natural selection.
Over many generations and very long periods of time, many small changes can build up to large differences in body structures.
Among any three species, the two species that separated most recently are the most closely related to each other.

Essential Questions

Why do species, both living and extinct, share similarities and also have differences?
Why do different species share similar structures?
How does an ancestor population evolve into descendant species with differences in their shared structures?
How did descendant species from a common ancestor become very different from one another?
When you compare different species, how can you tell which species are more closely related than others?

Learning Objectives

Species inherit their body structures from their ancestor populations.
Body structures that are shared between two species are evidence that these two species inherited the shared structures from a common ancestor population.
In populations separated into different environments, natural selection causes different changes to happen to each population. This causes descendant species to end up with differences in their shared structures.
When the environment is mostly the same over time, body structures stay stable. When the environment changes over time, body structures may change due to natural selection.
Over many generations and very long periods of time, many small changes can build up to large differences in body structures.
Among any three species, the two species that separated most recently are the most closely related to each other.
When two species share a structure that is not shared with a third species, this can be evidence that the first two species are more closely related to each other than to the third species.
Sort species using similarities and differences
Read an article about related species and common ancestors, and trace similar structures back to common Ancestors in the Simulation.
Analyze similarities among the Mystery Fossil, wolves, and whales, and show their understanding in a visual model.
Revisit the Natural Selection Simulation, read articles about examples of speciation, and model speciation in the Natural Selection Simulation.
Explore evolution and deep time through a card sort and in the Sim.
Create models to show how small changes can add up to larger changes over deep time, and apply their understanding to the evolutionary history of the Mystery Fossil species.
Investigate evolutionary relationships using a physical model.
Explore the key common features of whales and wolves in the Sim, then analyze evidence about the Mystery Fossil to draw a final conclusion about the Mystery Fossil.

Standards: Content

MS-LS4-1	Analyze and interpret data for patterns in the fossil record that document the existence, diversity, extinction, and change of life forms throughout the history of life on Earth under the assumption that natural laws operate today as in the past.
MS-LS4-2	Apply scientific ideas to construct an explanation for the anatomical similarities and differences among modern organisms and between modern and fossil organisms to infer evolutionary relationships.
MS-LS4-3	Analyze displays of pictorial data to compare patterns of similarities in the embryological development across multiple species to identify relationships not evident in the fully formed anatomy.

Standards: Interdisciplinary

Assessment Evidence

Formative	Teacher observations, Class discussions, Lab Activities, Key concepts and vocabulary

	quizzes, Warm Ups, Open Ended Responses, Modeling, Simulations, Innovators Monthly Research
Summative	In correlation with the NJSLS, students must demonstrate the following as summative assessments: MS-LS4-1. Analyze and interpret data for patterns in the fossil record that document the existence, diversity, extinction, and change of life forms throughout the history of life on Earth under the assumption that natural laws operate today as in the past. MS-LS4-2. Apply scientific ideas to construct an explanation for the anatomical similarities and differences among modern organisms and between modern and fossil organisms to infer evolutionary relationships MS-LS4-3. Analyze displays of pictorial data to compare patterns of similarities in the embryological development across multiple species to identify relationships not evident in the fully formed anatomy Other summative assessments will include but are not limited to: lesson activities, summative tests, lab skills, demonstrations, and vocabulary quizzes
Alternative & Benchmark	Alternative assessments as required by student IEP/504/I&RS - Read to the student and chart oral responses. Word banks, sentence frames, oral responses, graphic organizers, observations, and anecdotal notes. Benchmark – LinkIt Benchmark Assessment, Teacher Generated Assessments
Assessment Evidence Resource	

Instructional Resources

Smartboard, Computers, Websites and digital interactives/models, Multi-media presentations, Video Streaming, Amplify Digital Curriculum, Generation Genius, BrainPop, Mystery Science, Microsoft 365, Primary and Secondary Source Documents, Lab Materials as needed, Amplify Readings, Labs, Simulations

Instructional Resource List

Curricular Mandates

Below are the curricular requirements as defined in NJ Administrative Code and Statute

	Amistad		Diversity, Equity, and Inclusion
	Holocaust		LGBT and Disabilities (Grades 6-12)
	Climate Change		Asian American & Pacific Islander

Social Emotional Learning (SEL) Competencies

NJ Social and Emotional Learning Competencies & Sub-Competencies

	Self-Awareness		Relationship Skills
X	Responsible Decision-Making		Social Awareness
	Self-Management		

21st Century Skills & Themes

X	Global and Cultural Awareness	X	Technology Literacy		Planning and Budgeting
X	Creativity and Innovation		Financial Institutions		Risk Management and Insurance
X	Information and Media Literacy		Digital Citizenship		Economic and Government Influences
X	Critical Thinking and Problem Solving		Credit Profile		Career Awareness and Planning
	Civic Financial Responsibility		Financial Psychology		