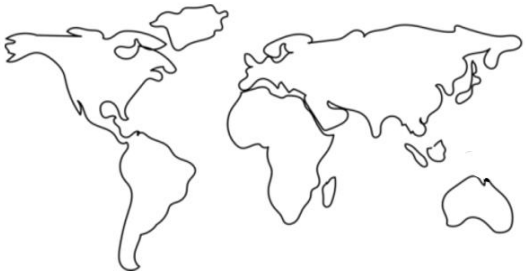
Anchoring phenomenon: The puzzle of animal fossils: Why do we find fossils from the same animals on different continents?



POGIL® Activities that support the anchoring phenomenon:

ESSActivity 1 – You Rock! How Are Different Kind of Rocks Made?
Processes and materials of the rock cycle are analyzed and a model created.

ESSActivity 2 – Earth's Layered Structure
Density, sinking and floating are concepts used to help students interact with and accurately diagram a model of the Earth's layers.

ESSActivity 3 – Movement Inside the Earth (Plate Tectonics)
The movement of magma inside the Earth causes movement of crust on the surface of the Earth

LSActivity 9 – The Fossil Record:
How Have Animals Changed Over Earth's Long History?
Comparative ages of fossils in layers of rock and increasing complexity of animals in the fossil record

LSActivity 8 – Seeing the Past: Imagining How Species Change Over Time
Evolutionary trees used to examine living and extinct species in the fossil record

ESSActivity 5 – Where Are Tectonic Plate Boundaries Located?
Volcanoes and earthquakes along with other landforms tell us where plate boundaries are located.

ESSActivity 6 – Shuffling the Continents
Ancient rock and fossil evidence help us understand how Earth may have looked long ago.

POGIL® Activity	**NGSS Performance Expectation**	**Learning Outcomes**
ESSActivity 1	**MS-ESS2-1** Develop a model to describe the cycling of Earth's materials and the flow of energy that drives this process.	1. I can use a rock cycle diagram to describe how different types of rocks are created from existing materials. 2. I can draw a labeled model to show what happens to rock when various physical processes occur.
ESSActivity 2	**MS-ESS1-3** Analyze and interpret data to determine scale properties of objects in the solar system.	1. I can draw and label an accurate diagram that shows the three main layers of the Earth, including each layer's two parts. [includes the terms continental crust, oceanic crust, upper mantle, lower mantle, outer core, and inner core] 2. I can describe how the density of different substances affects each substance's floating and sinking

		behavior. [using descriptions of relative densities - not numerical density values] 3. I can describe how the density of Earth's materials changes as you travel from the surface of the Earth to the center of the Earth. [finding patterns in numerical density values of Earth's layers; relating those patterns to position relative to the Earths' surface and center] The concepts developed in this activity (density/sinking/floating/structure of the Earth) are the foundational for students to develop the concepts of plate tectonics, mantle rock convection, boundary collisions, subduction, uplift, etc.
ESSActivity 3	**MS-ESS2-2** Construct an explanation based on evidence for how geoscience processes have changed Earth's surface at varying time and spatial scales.	1. Using a cross-section drawing of the layers of the Earth that includes magma flow patterns, I can predict where these features are likely to occur: mid-ocean ridges, ocean trenches, and uplift mountain ranges. 2. I can describe the differences and similarities between convergent and divergent plate boundaries. 3. I can write an accurate definition of the term plate tectonics
LSActivity 9	**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.	1. I can identify which fossils are older, based on the age of rock they are found in. 2. I can describe how the complexity of animals has changed over a long, long period of time, based on fossil evidence.
LSActivity 8	**MS-LS4-1**	1. I can identify which species are extinct and which are still living, based

	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.	on analysis of various forms of evolutionary trees for the same set of species. 2. I can create an accurate evolutionary tree, based on data about the presence/absence of fossil species and living species in layers of sedimentary rock.
ESSActivity 5	**MS-ESS2-2** Construct an explanation based on evidence for how geoscience processes have changed Earth's surface at varying time and spatial scales.	1. I can interpret labeled diagrams to create an explanation of the processes occurring at five different types of tectonic plate boundaries. 2. I can estimate the locations of many tectonic plate boundaries by examining a world map that plots the locations of significant earthquakes.
ESSActivity 6	**MS-ESS2-3** Analyze and interpret data on the distribution of fossils and rocks, continental shapes, and seafloor structures to provide evidence of the past plate motions.	1. I can use diagrams of ancient rock and fossil evidence to identify similarities between land masses. 2. I can manipulate a model of continental land masses to hypothesize how the Earth must have looked long, long ago and the directions that land masses moved to create the continents we see today.