Shape of Life
The Story of the Animal Kingdom

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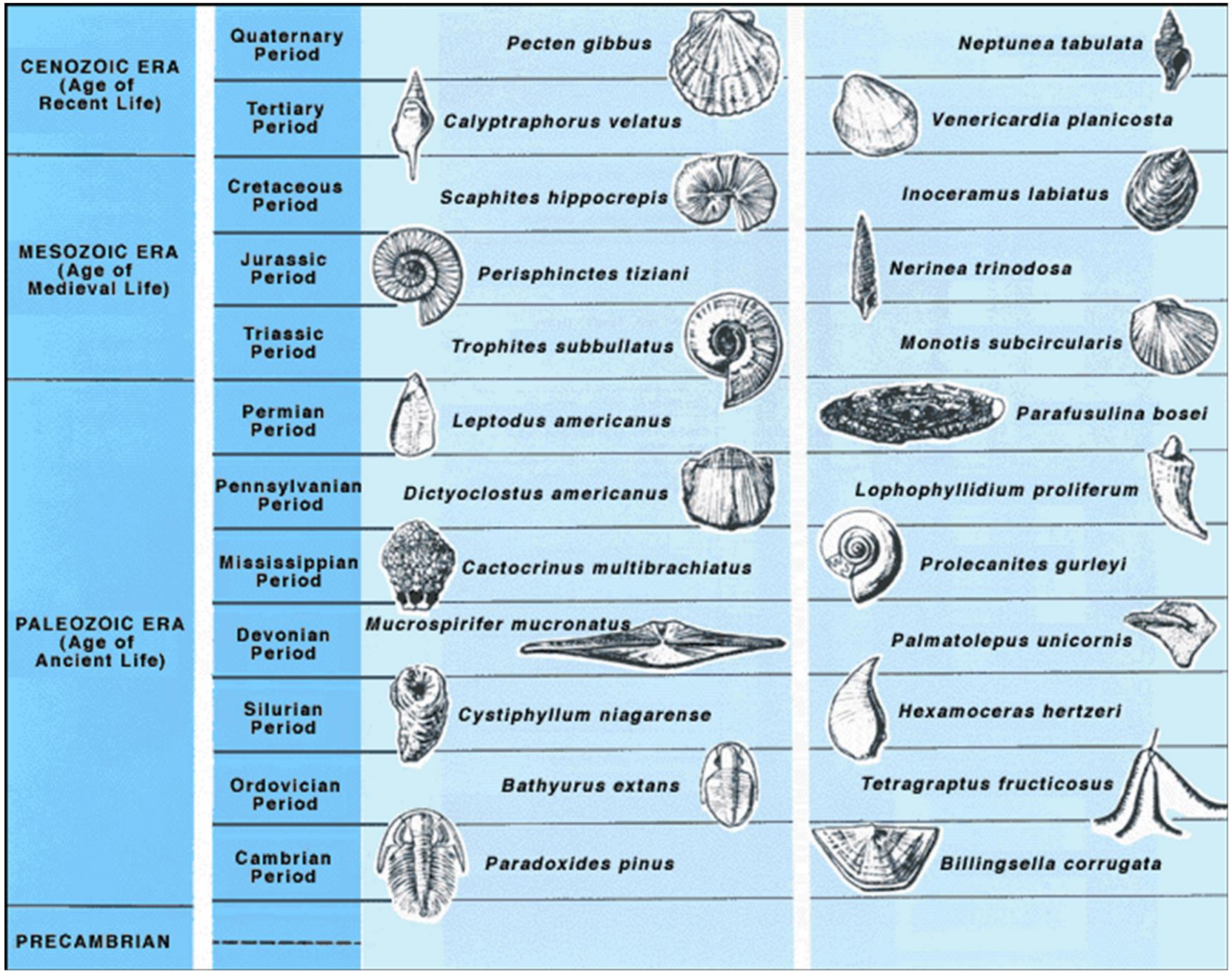
Student's Edition



Source: United States Geological Survey, https://pubs.usgs.gov/gip/geotime/fossils.html

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Name_____ Period/Class_____ Date_____

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How can we use fossil records and rock layers to tell and interpret Earth's history?

Part One: Tell a Story About Earth's History

1. Determine what layers of sediments represent (e.g., volcanic eruption, ocean sand and shells, coal rich layer, etc.).

Sediment A	Sediment B	Sediment C	Sediment D	Sediment E

- Which layer has index fossils?

- Which index fossil is it? Era: Time Period:

2. In your group, brainstorm about the storyline you want the layers to support. You may want to use the "Major Earth Event Card Key" from the previous lesson for ideas.
   - Will you add other fossils? If so, where? What do they represent.
   - How thick will you make the layers and what might that represent?
   - Jot your ideas down on a separate piece of paper with group names. (You will use this later in this lesson.)

Part Two: Create a Representation of Earth's History

Materials: plastic cup or other container, 1-3 cm layers of different sediments, one layer of sediment with intermixed "index fossils" (macaroni, hole punches, etc.) spoon, spray bottle, metric ruler, "other fossils" (jelly beans, small cereal, small clay pieces, etc.)

Suggested procedure:

1. Gather your cup (or container), spoon and metric ruler.

2. Use spoons and the metric ruler to add alternate layers of sediment. Don't exceed 3 cm in depth.

3. After each layer you add, use spray bottles to lightly dampen sediment and tamp down with hand or spoon.

4. Include at least one layer of the sediment with intermixed "index fossils."

5. Add additional fossils (objects representing fossils) to one or more layers.

Rules:

- DO NOT exceed 3 cm.
- Don't add like layers next to each other.
- Don't add more than five layers.

6. Exchange with another student pair.

Part Three: Interpreting a Representation of Earth's History

1. On a separate sheet of paper, draw a scale diagram of your geologic site. *Note: By looking at this illustration, another geologist needs to be able to know the type of layer, thickness of layer and types of fossils uncovered.* Label:
   - Oldest layer
   - Youngest layer
   - Name of index fossil and time period in which its found

2. Use the spoon to look for other fossils. (You might want to separate into separate piles.) Be sure to take accurate data on which layer each type of fossil was found in. (Add to your diagram.) Based upon its location compared to the index fossil, where might it fit into the geologic timescale?

3. Based on the sequence of the layers, what might you infer this representation is telling you about Earth's history?

4. Meet with the group you exchanged with. Compare your group's interpretation with the intended story about Earth's history. How did the Law of Superposition and presence of index fossils help you understand the representation? What did you misinterpret? Why?

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Note: These are approximations as of 2018. Per the nature of science, dates may change as new discoveries are made (and more quickly than this lesson is updated).

YEARS AGO	EVENT
Carbon dioxide level is 385.5 parts per million	X years ago (measurement from 2009)
IPCC report links human to climate change	X years ago (published in 2007)
Ocean pH is 8.09	X years ago (measurement from 2000)
First Earth Day	X years ago (1970)
Carbon dioxide level is 279 parts per million	Over 250 years ago (1750)
First modern humans	200,000 years ago
"Lucy"	3,200,000 years ago
Beginning of most recent ice age	2.6 million years ago
Non-avian dinosaur extinction	66 million years ago
Early flowering plants	120 million years ago
Archaeopteryx (first bird)	140 million years ago
Modern continents form	175 million years ago
Early mammals	210 million years ago
Early dinosaurs	247 million years ago
"The Great Dying"-Permian extinction event	251 million years ago
Siberian Traps volcanic eruptions	252 million years ago
Carboniferous Period	354 million years ago
Oxygen level near present	400 million years ago
Great mountain ranges form	425 million years ago
Time of the Burgess Shale	508 million years ago
Middle of the Cambrian explosion	550 million years ago
Protective ozone layer in place	600 million years ago
First snowball Earth	635-800 million years ago
First supercontinent-Rodinia	1.1 billion years ago
First breathable air	2.4 billion years ago
First modern cell	2 billion years ago
Evidence of photosynthesis	3.7 billion years ago
First evidence of life	3.8-4.2 billion years ago
Oceans form	4.2 billion years ago
Formation of Earth	4.6 billion years ago

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(Far right column is millions of years ago)