

# Paleontology

## 5<sup>th</sup> Grade

Introduction 5-10 minutes	Introduce students to the science known as Paleontology and its definition.
Geologic Time Scale 15-20 minutes Measuring tape at least 50ft long tabs	Students will develop a concept of time throughout the Earth's history. This will be done by relating feet to years as well as significant events.
Trace Fossils Casting materials Molds Water Drying paper Tooth picks cups	The students will see that fossils may not necessarily be the body of a creature but a trace of their lives. Students will create castings like a real paleontologist.
Strata and Relative dating 20-30 minutes Example of strata with appropriate color order drawn on White Board Building blocks with colors that are included in drawing. Two different colors per group	Students will come to understand that certain layers of Earth represent various time periods and can be dated due to the fossils found. These layers can be used to identify the age of layers elsewhere. Students will understand this way of dating periods of time and the organisms associated with it.
Fossilization 10 minutes Terrarium Sand Toy animal whole body Identical Toy animal skeleton	Students will learn various ways fossilization occurs and will view a demonstration of conditions appropriate for fossilization.
Fossil hunt 25-35 minutes boxes with Microfossils box to deposit microfossils in pictures or guides of possible finds Pencils Recycled Paper Magnifying glasses Ice cube trays	Students will learn that the majority of research is based upon microfossils and students will search for some tiny fossils themselves. In addition they will attempt to identify and take a count.
Ethics	Students come to understand how to be respectful to relics of the past and why.

## **Introduction**

Introduce yourself and the purpose of the class. The intention is to have each student to be an acting Paleontologist to some degree and develop a better understanding of the science itself. Paleontology by definition is the science of studying the forms of life existing in previous geologic time periods (long ago) by using fossils.

## **Geological Timescale**

One thing that paleontologists have been able to figure and make educated guesses regarding is the age of the Earth from life forms that have come and gone. Request students mention some creatures they know of that once existed and no longer do.

Express that there are many additional organisms that existed previous to and after the ones mentioned. The earth has been around for quite some time and Paleontologists found a way to record this information, and how many years it took for us to get to the present.

Often times millions and billions of years need to be discussed (to give a better understanding of millions and billion it is possible to use the comparisons of one million sheets of paper would be stacked as high as a 30 story building, while one billion would equal ten times the height of Everest).

So periods of transition were given special names that would describe the presence of certain types of life starting with the basic life forms on up.

The students will now be given an opportunity to see the history of the world and the time it has been in existence as well as some of the things that have occurred.

Using a tape measure, inches will be compared to years. Choose two students to help “unwind” time. One will be wrapped in time while the other will help keep the “present” in place. Ask student being wound in time to spin when appropriate and the other to hold the tip of the measuring tape or the present on top of the head. Starting at present work backward in time telling the years ago represented and the significant “event” representing the mark. Tab human start and large periods of animals for discussion at end. Explore and admire the significant gaps in time.

NOTE: Each “years ago” is not in addition to the previous number. The length state is the mark for the particular “years ago”.

.001 inches End of Most Recent ice age 10, 000

.5 inches First Humans 5 million

5 inches mammal and Birds abundant 50 million

6 inches Dinosaur extinction 65 million

35 inches earliest land animals amphibians 350 million

40 inches earliest land plants 400 million

3.75 ft first primitive fish 450 million

25 ft first fossil algae, fungi, bacteria 3 billion

38 ft Earth begins 4.57 billion

## **Trace Fossils**

Share with students that although there are many fossils that are made from the remains of creatures, there are also many other indications of the presence of life that are not the body of the creature but an imprint of it.

Take students to see the display filled with the prints local to the Barstow Formation. Question how these casts may have been created. Explain that Paleontologists very carefully create a mold identical to the original by filling it with a special material that will form to the print. The new print is then pressed into another material that will form to create a print as close to identical as the original.

Students will attempt to replicate this last step by using molds and plaster to create their own. Each student may make one if time allows, if not have groups do a demo one. Create groups in accordance to the number of casts. Provide a cup with plaster and water to each group. Demonstrate ahead of time, the ideal consistency and the importance of quickness. Have students carve their initials in the casts they make.

## **Strata and Relative Dating**

The timescale is helpful in the way that if certain fossil evidence is found in strata or layers of earth it can then be aged. A particular site maybe able to provide information as to where to find older or younger fossils and whether will be above or below depending on geologic activity.

The timescale then allows for relative dating and can even share information about the placement of certain landmasses at different times like in the instance of Pangaea.

To prepare activity the students will be divided into groups of 4 or 5 depending on the number of students. The teacher will draw a strata on the board; color coordinated with the Lego blocks available. The strata will show a particular order. Each group of students will be given a portion of Strata from their particular continent. The continents will be told to them once split (any continent is fine as well as repeating continents).

The goal of the student Paleontologists is to as a group of scientist from various continents piece together the strata's found in the appropriate order. While this is occurring label each color progressively different "years ago" with corresponding creatures. See real timescale. In the interest of providing more geological knowledge label years out of order to discuss irregular activity that would add an extra challenge to creating a hypothesis.

Once students have pieced together the strata, show it to the class and ask investigative questions such as: What was the purpose of matching the color /strata formation? What would the scientists actually be using other than the rock layer to inform them of the date? (Fossils). In regards to different countries what does this mean as far as placement of landforms?

Inform the students that these are some of the challenging questions paleontologists must approach to propose definitive information.

## **Fossilization**

Prepare by having the skeleton already buried. In order to demonstrate the transformation; verbally walk students through the process. Place terrarium with sand in front of room. Sand will be representative of inorganic, mineral material found in landscapes.

Place whole animal in terrarium and share a story about the Mohave Desert once being a lush marsh filled with water and an abundance of creatures. Provide descriptions of the Giant Elephant, Cat and Camel like animals as well as the midget horse like creatures that once lived in abundance.

As the mountains grew to the west it kept the moist weather from the Ocean reaching what is today's Mohave Desert. In this instance there was much migration away from the area and populations diminished. As certain animals die they usually rot away because the body is primarily organic material and is useable by many other organisms but the skeleton being primarily minerals take longer to diminish, and can be covered over with dirt (sediments) trapping the skeleton.

Years later Paleontologists searched and uncovered new fossils. The skeletons are sometimes preserved from this process or the Bone/ whatever else has been "buried" will have its material replaced with the inorganic, and it will not be the creature at all but a rock in the form of said organism.

To exemplify the replacement of materials, you may have four students step forward and propose that two are composed of mineral materials "a sand Man" and the other two are animal, organic material. With students standing two in front two in back. Express that were the organic represented by the front row and were laid down and being pressed by gravity the above inorganic material would slowly begin to fill in the gaps as the organic slowly rotted away. Have inorganic students push through once through the other will become soil. This process also creates fossils.

## **Fossil Hunt**

With their new understanding of fossils they will now be given an opportunity to search for themselves. Ask students to give a description of the size of some of the fossils they have seen i.e. bigger than a breadbox, penny, etc. Inform them that they will be hunting for some of the most informative fossils, microfossils. The students will be divided into groups of 4 and will sift through dirt from a particular stratum to see what and how many fossils they can find. Make students aware that they may encounter things they are not very familiar with due to the fact that these fossils are significantly older than they are. So in order for them to get an idea they will use their abbreviated guide.

The sequence should occur and be explained ahead of time. First, pass out the fossil dirt, empty bin and guide; have them find as many fossils as possible within a given time. They will place them into the empty bin. Next, take away fossil dirt and replace with ice cube trays. They are to place fossils that are similar together in one space, etc. While this is going on everyone else can be trying to identify what is found. They are to log this information on their (science) paper and include a count. To close they are to pick one fossil per group, pass it around while informing the class of its name. Allow all groups to share.

## **Ethics**

Ask students if they learned more today about the value of fossils and what they can learn from them. Also ask how they can be respectful of these relics and those not yet discovered. Inform them that the DDC attempts to teach the concept of Leave No Trace.

## **Background on Geologic Time Scale**

Scientists have good evidence that the earth is very old, approximately four and one-half billion years old. Specific rock formations are indicative of a particular type of environment existing when the rock was being formed. For example, most limestone represent marine environments, whereas, sandstones with ripple marks might indicate a shoreline habitat or a riverbed.

The Law of Superposition, which states that in an undisturbed horizontal sequence of rocks, the oldest rock layers will be on the bottom, with successively younger rocks on top of these, helps geologists correlate rock layers around the world. This also means that fossils found in the lowest levels in a sequence of layered rocks represent the oldest record of life there.

Relative dating tells scientists if a rock layer is "older" or "younger" than another. This would also mean that fossils found in the deepest layer of rocks in an area would represent the oldest forms of life in that particular rock formation. In reading earth history, these layers would be "read" from bottom to top or oldest to most recent.

By using this information from rock formations in various parts of the world and correlating the studies, scientists have been able to establish the [geologic time scale](#). This relative time scale divides the vast amount of earth history into various sections based on geological events (sea encroachments, mountain-building, and depositional events), and notable biological events (appearance, relative abundance, or extinction of certain life forms).