Fossil Kit II

Lesson Plan

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FOSSIL KIT II

OBJECTIVE

Fossil Kit I takes students on an interactive journey into the fascinating world of fossil exploration and identification. Genuine fossil replicas will be utilized to give students an up close look at the beauty and importance of fossils.

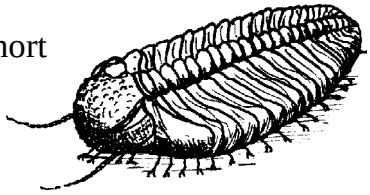
Upon completion of this activity, students should be able to (1) understand the basics of fossil formation; (2) grasp the importance of fossils to scientists; and (3) identify at least six important fossils and understand some of their basic anatomy.

MATERIALS PROVIDED

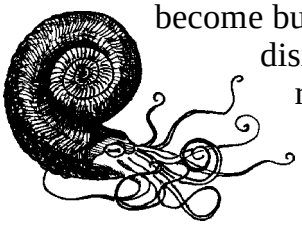
- Information on the development of fossils
- Detailed information on four important fossils
- 4 Fossil Replicas
  - Ammonite
  - Crinoid
  - Dinosaur Egg
  - Trilobite
- Suggested exercises and projects
- Suggested reading list
- General Fossil Information

GENERAL INFORMATION ABOUT FOSSILS

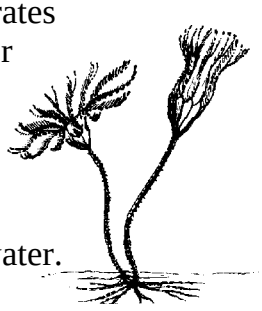
What is a fossil? A fossil is any trace of a once-living organism preserved in rock, a relic of the Earth's past. Much of what we know of our planet's history comes from fossilized plants and animals, some of which may be 600 million years old or even older. The tooth of an extinct bear, the claw of a dinosaur, and a flower from a prehistoric plant preserved in amber are all fossils.



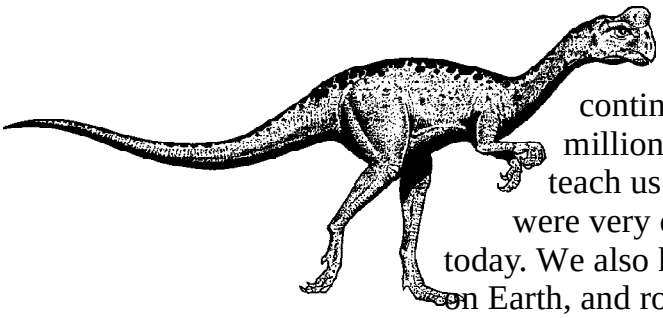
When living things die, their bodies usually decompose in a short time. But sometimes a plant or animal's body parts become buried out of reach of the factors that cause disintegration, and transform into a durable, rock-like substance that survives for millions of years. This is how fossils form. Generally, a living creature's soft parts do not fossilize; just the harder, more durable parts are preserved. So you are much more likely to see the skeleton or teeth of an animal in fossil form, instead of all the muscles, internal organs or skin.



Animal fossils are divided into two basic groups: invertebrates and vertebrates. The invertebrate category consists of animals with no internal spinal column. Some animals from this category are worms, snails, coral, insects and shell fish. The vertebrate category, on the other hand, consists of animals with an internal spinal column. These are considered to be more advanced than the invertebrates. Fish, reptiles, birds and mammals are some of the animals considered to be vertebrates. Because vertebrates have an rigid internal skeleton, fossilized remains have been found for many specimens.



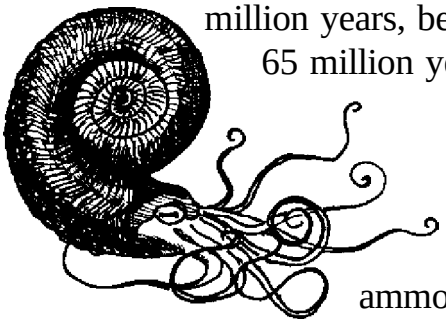
Scientists who study fossils are known as paleontologists. Over the past two or three centuries, they have learned much about the Earth's past by studying fossils. For example, they often find fossils of sea creatures in rocks that today are on dry land, far from any bodies of water. Sometimes such fossils occur high up on mountain slopes. This tells paleontologists that hundreds of millions of years ago, what is now dry land and mountains was once water—perhaps beneath a river delta, or bottom of a lake or sea.



Studying fossils from different places around the world, paleontologists have also helped to confirm that the Earth's continents slowly change their positions over millions of years of time. Pretty neat, huh? Fossils teach us that the plants and animals of Earth's past were very different from those we see alive around us today. We also know that there were once dinosaurs alive on Earth, and roughly when humans first appeared on Earth, and how long ago sabertooth cats lived. No people existed to see these things; we know about them just from fossils. It is amazing what fossils can teach us!

AMMONITE

Ammonites were ancient marine mollusks belonging to the cephalopod class, related to today's squid and octopus. Each ammonite produced a hard, multi-chambered shell to protect its soft tissue. They existed on Earth for about 330 million years, becoming extinct at the end of the Cretaceous Period, 65 million years ago.



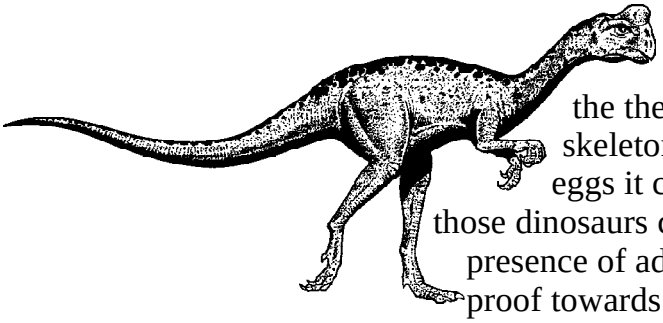
Fossil ammonite shells are common in North America. Such shells are virtually the only ammonite remains available for study; soft body parts are very rarely preserved. Scientists study how a living ammonite might have lived by examining its closest living relative, the hard-shelled chambered nautilus. Like the nautilus, ammonites probably used their shell for flotation as well as protection, becoming buoyant by replacing fluid inside the shell's chambers with gas. This enabled them to maneuver through ocean waters.

Because they are plentiful and occur in great variety, ammonites help paleontologists to date the Earth's rocks. When the same kinds of ammonites are found in rocks at different places, we know that those rocks were created at about the same time, millions of years ago, regardless of how far apart the places might be.

OVIRAPTOR EGG

In the past, dinosaur eggs have been considered novelties in museums, hardly worthy of scientific study. Over the years, there have been many misconceptions about the eggs of these giant prehistoric beasts. In old films, the eggs were depicted as gigantic spheres, some even too big to lift by hand. In reality, however, the largest known dinosaur egg is smaller than a basketball. These ancient eggs come in a variety of shapes: spherical, oval and tapered elongated bodies.

Even though dinosaur eggs have been available for study for over a hundred years, there still is much that is unknown about this field. Many different methods of study are currently being conducted, but much of the information is either incomplete and/or not yet published.



The fossilized eggs of dinosaurs are far less common than the fossilized bones of the these prehistoric creatures. If the fossilized skeletons of young hatchlings are found near the eggs it can be theorized, with some certainty, that those dinosaurs came from those eggs. But the mere presence of adult bones near the eggs is not concrete proof towards the identification of the eggs. The fossilized bones could be from a dinosaur which died either before or after the eggs were laid, having no relationship, other than proximity, to the eggs.

To determine information about a fossil egg's origin, scientists study the macro structure (shape and size; contours and thickness of the shell) of the egg. To study the micro structure of the shell (the inside) they use a scanning electron microscope to study the egg's basic structure. The texture of the shell is also an important factor in determining the origins of the egg. Chemical analysis, a relatively new method of study, is also being used to research the chemical make up of the shell. When more than one egg is found at a location, it is important to study the positions in which they are found relative to the other eggs in the clutches or nests.

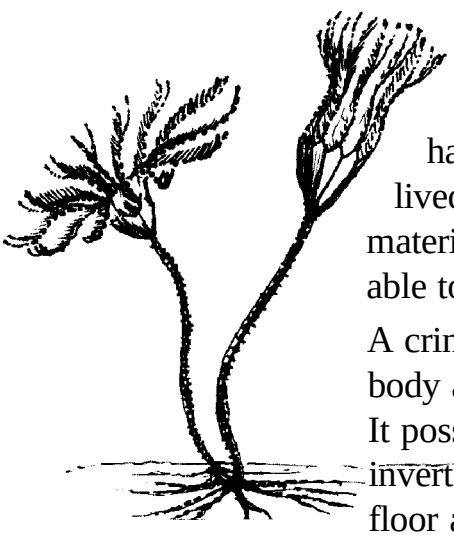
Much has been learned through this extensive study of dinosaur eggs, but there is much more to be learned. A substantial amount of data is being analyzed in hopes of shedding additional light on the cause of the extinction of these fascinating creatures.

The best example of a case of inaccurate identification is with that of the *Protoceratops* Egg and the *Oviraptor*. In 1923, scientists gave the name *Oviraptors philoceratops* (egg eater) to a dinosaur they found lying on top of a nest that they thought were *Protoceratops* eggs. The scientists made the assumption that the *Oviraptors* were present at the site because they were raiding the nests of the *Protoceratops*. A recent discovery, however, has proved that assumption to be wrong. An egg similar to what was thought to be a *Protoceratops'* was found containing an almost complete skeleton of an *Oviraptor* embryo. This discovery proves that the *Oviraptors* were present at the site, not to eat the eggs, but instead to incubate and protect them.

Oviraptor existed from 88 million years ago to 70 million years ago.

CRINOID

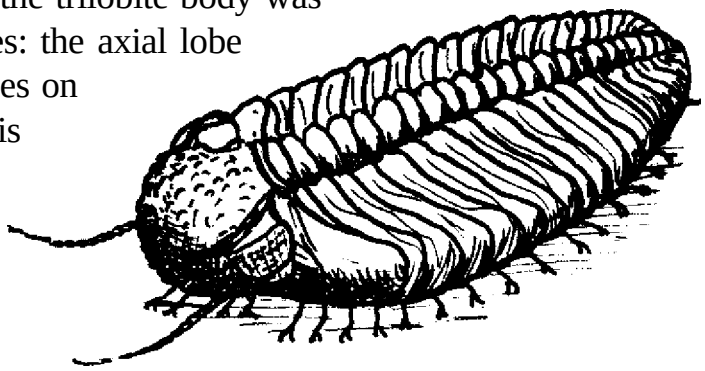
Crinoids are flower-like marine animals belonging to the echinoderm phylum. Fossil crinoids are abundant at various sites around North America . They lived from the Ordovician Period to the present, with large numbers living during the Paleozoic Era. Crinoids varied greatly in size and shape and may have been beautifully colored. Although most species lived on the ocean bottom, attaching themselves to material on the deep sea floor, some ancient forms were able to crawl or swim.



A crinoid, or “sea lily” is made up of a root, a stem, a body and arms, and looks very much like an ocean flower. It possesses no internal spinal cord and is considered an invertebrate. The root attaches to an object on the sea floor and helps to keep the crinoid from being moved. The stem is generally the longest part of the crinoid; fossil crinoids have been found with stems up to 50 feet long. The body contains the vital organs, including the mouth, the anus, the gonads, the podia and the water inlet. The arms or tentacles, spread like an opening flower to catch passing food. Crinoids resisted extinction since their appearance more than 500 million years ago.

TRILOBITE

Trilobites were ancient sea creatures that roamed the ocean's depths from the beginning of the Cambrian Period (570 million years ago) to the end of the Permian Period (245 million years ago). They belong to the most abundant and diverse phylum of all time, Arthropoda. Among the arthropods that exist today are insects, lobsters and crabs, spiders, and scorpions.



The word "trilobite" reminds us that the trilobite body was divided longitudinally into three lobes: the axial lobe down the middle and two pleural lobes on either side. The front of the trilobite is called the "cephalon," or head; the rear is called the "pygidium," or tail; and in between lies the "thorax," or chest, to which were attached its numerous legs. An exoskeleton, or skeletal shell, covered the entire body and supported and protected the muscles and internal organs.

To protect its underside, a trilobite could roll itself up; many are found fossilized in this state. As it grew, a trilobite shed its exoskeleton many times. Thus, a single trilobite could have left many such exoskeletons behind for fossilization.

Trilobites were among the earliest life forms to possess vision. A trilobite usually had two crescent-shaped eyes that gave it a 360-degree visual field on the ocean floor. The amazing preservation of the eyes in some specimens has enabled scientists to dissect these ancient sensory organs and study their structure.

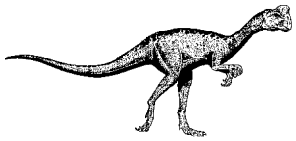
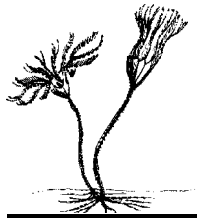
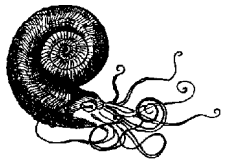
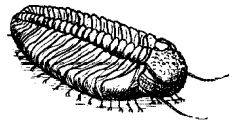
Trilobites existed for more than 300 million years, during which time they evolved into over 10,000 species. Their fossils come in a multitude of interesting shapes and sizes, from the tiny *Shumardia,* less than 5mm long, to the giant *Uralichas,* more than 700mm long. Some were spiny and rough, whereas others were almost perfectly smooth.

EXERCISES TO ACCOMPANY EACH FOSSIL CAST

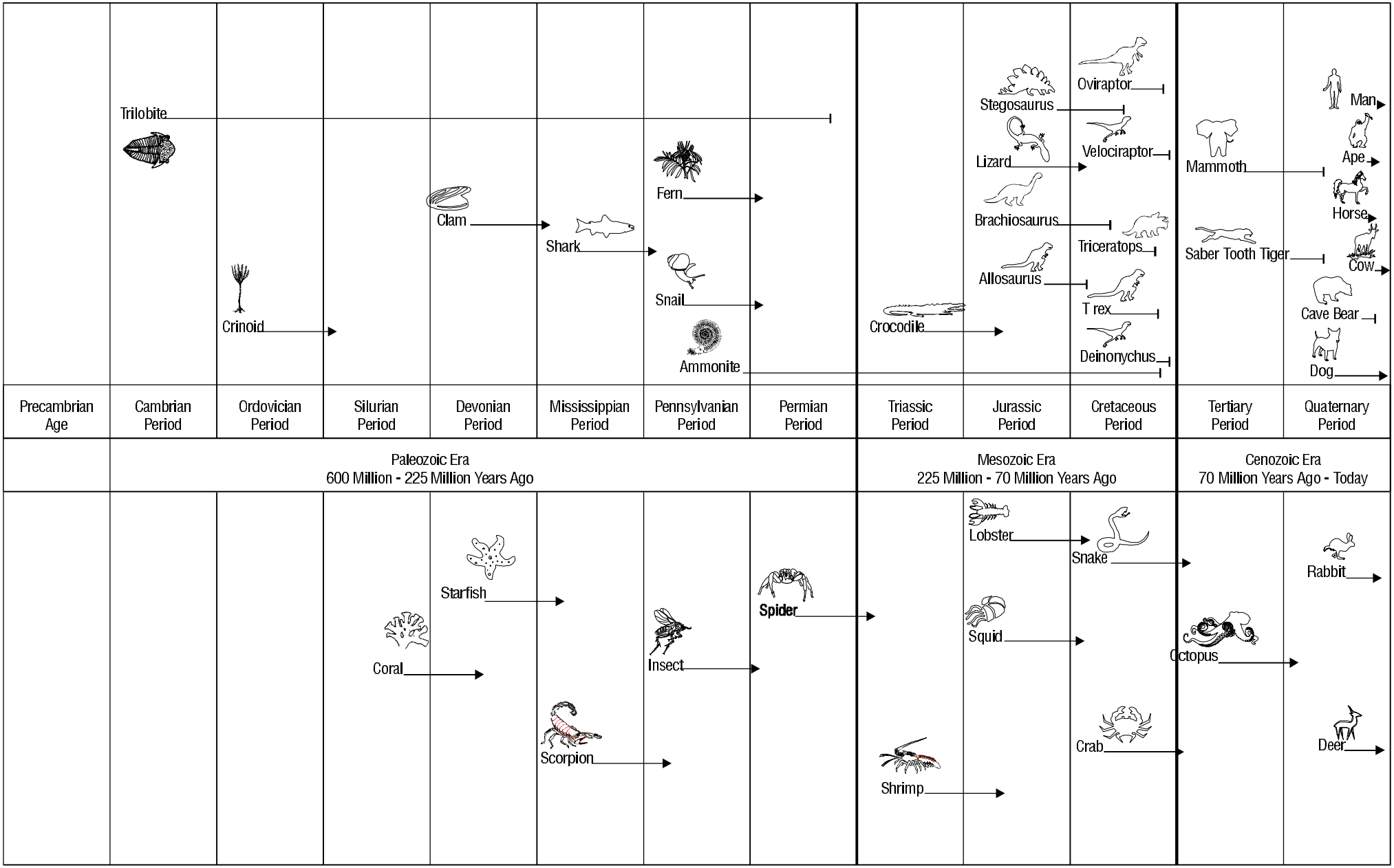
A. Split your class into 4 paleontology groups
   1. Pass out a fossil cast to each group.
   2. Ask each group if they can identify the piece you just gave them just by sight and touch.
   3. Pass out a set of fossil reading material, the timeline and the fossil exercise sheet to each group.
   4. Instruct each group to read through the fossil information and correctly identify the fossil currently in their possession. Have them write the correct name next to the corresponding diagram on the exercise sheet.
   5. From the information included on their fossil and the information on the timeline, have them determine in which time period(s) their fossil existed. Instruct each group to write the period on their exercise sheet.
   6. Instruct them to write whether the fossil is an invertebrate or vertebrate on the exercise sheet.
   7. From the timeline, ask them to determine 2 other animals and/or plants that were alive during the same time period(s) as their fossil. Have each group write their answers on their exercise sheet.
   8. Instruct each member of the group to draw a picture that shows what life was like during the time period that their fossil existed. Have them use other plants and animals from this time period to illustrate their picture. Have them look on their timeline for other fossils in the appropriate time period.
   9. Have each group contemplate whether their fossil exists in any form today.
   10. Ask if they can name any animals alive today that would have anything in common with their fossil cast. Have them list their answers on their exercist sheet.

B. Rotate the fossils between groups so that each group gets a fossil they have yet to study. Repeat steps A1 - A10 for each remaining fossil cast.

EXERCISE SHEET

	Name	Time Period	Vertebrate Invertebrate	Names of other plants & animals alive during same period
				
				
				
				

Time Line



Still Exists

Extinct

Origin and extinction dates are approximate and should only be used for general estimates.

SUGGESTED READING LIST

Alexander, R. McNeill (1989) *Dynamics of Dinosaurs and other Extinct Giants*. New York: Crown Publishers, Inc.

Arduini, P.; Teruzzi, G. (1986) *Guide to Fossils*. New York: Simon & Schuster.

Larson, P. L. (1988) *What is an Ammonite?* Hill City, South Dakota: Black Hills Institute of Geological Research, Inc.

Larson, P & Farrar, R. (1989) *What is a Trilobite?* Hill City, South Dakota: Black Hills Institute of Geological Research, Inc.

Norman, David (1985) *The Illustrated Encyclopedia of Dinosaurs*. New York, NY: Crescent Books.

Pellant, C. (1990) *Rocks, Minerals & Fossils of the World*. Boston: Little, Brown and Co.

Pinna, Giovanni (1990) *The Illustrated Encyclopedia of Fossils*. New York, NY: Facts on File, Inc.

Turek, T.; Marek, J. & Benes, J. (1988) *Fossils of the World*. New York: Crown Publishers, Inc.

EDUCATIONAL KITS AND SUPPLIES

0275-3 Fossil Kit I	$75.00	Shipping $8.00
0250-3 Fossil Kit II	$75.00	Shipping $8.00
0400-3 Fossilworks (6 fossil molds)	$50.00	Shipping $8.00
0470-3 Animal Tracks	$50.00	Shipping $8.00
0930-3 Dino Traces, Velociraptor	$55.00	Shipping $8.00
0931-3 Dino Traces, Triceratops	$55.00	Shipping $8.00
0932-3 Dino Traces, Tyrannosaurus rex	$55.00	Shipping $8.00
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