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Cretaceous Crime Scene: an Adventure in Scientific Investigation

Objectives: This lesson is designed to introduce students to observation, inference, hypothesis formation, and hypothesis testing.
Age Level: Grades 4-7
Time: About an hour
Materials:

- *Cretaceous Crime Scene* presentation (PowerPoint or pdf)
- *Cretaceous Crime Scene* suspect profiles and footprint identification sheet, printed
- Paper footprints & victim
- Tape for applying footprints & victim to floor

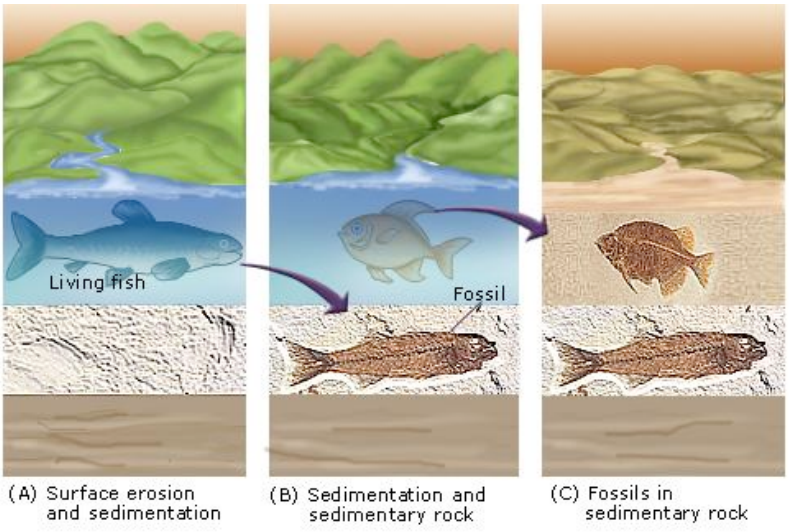
Time: One hour: Allow for 15 minutes+ for an introduction to the topic (see below) and 30-40 minutes to complete the project, with another 10 minutes or so for discussion.

Background

All science starts with a question. In humankind's attempt to understand and explain natural phenomena, we ask questions and then begin trying to answer those questions. The process of finding an answer—an ***evidence-based*** answer—is **science**.

ˆWhat's a Fossil?"

A fossil is **any evidence of past life** – a leaf, pollen, bone, skin,tooth, or a footprint, dung, or the impression of a tail dragging in the sand – **greater than approximately 10,000 years old**. Now, scientists use that age with reservation, because the real age depends on how long it takes for the organic matter to disappear or mineralize. Hard parts of bodies fossilize much more readily than soft parts, such as organs, skin and hair. This is why we know the structure of many dinosaurs and past life, but not much about their flesh, hair or feathers. See the accompanying pdf from the Children's Museum of "How a Dinosaur Fossil Forms". If you have online capability in your room, a good video on what a fossil is and how they are formed is at:
http://teachertube.com/viewVideo.php?video_id=107671



Talk with the kids about fossils – what do you think the fossils of 10,000 years from now look like? How do we know how old fossils are?

For the Cretaceous Crime Scene activity, students will explore answers to the question: Who killed our poor, innocent *Thescelosaurus* (*THESS-il-ə-SOR-əs*) dinosaur? On the floor is a "chalk outline" of the victim's body. Surrounding it are the clues to its killer: footprints of other dinosaurs. By examining the diets of the other dinosaurs, coupled with the relationship of the footprints (which ones are on top of others, therefore telling the sequence of the dinosaurs' appearance at the crime scene), students can formulate an evidenced-based, scientific opinion of who killed *Thescelosaurus*.

Procedure:

Part I – Discussion

1. Introduce the concept of fossils and how footprints, in addition to shells and bones, can be fossilized.

2. Explain that students will examine a crime scene: A plant-eating *Thescelosaurus* has been killed, and it's their job to find the killer.

Part II – The Project

1. Discuss the crime scene and the known suspects using the provided materials.

2. Based on the suspect profiles, ask students to hypothesize on the identity of the killer.

3. Allow students to explore the crime scene, and ask them to make observations about the scene. Based on the footprints, for example, were all of the suspects at the crime scene?

4. If students don't recognize that certain footprints overlap, ask the question of them. Explain that overlap can tell us the relative timing of each dinosaur's passing through the crime scene. What is the sequence of dinosaurs walking through the scene?

Now, with this information, students can reconstruct the sequence of activity at the site. Those dinosaurs that passed through before the *Thescelosaurus* can be released from the suspect list.

Based on the provided map, the sequence of dinosaurs walking through the scene is:

*Triceratops**
Alamosaurus
Tyrannosaurus
Parasaurolophus
Thescelosaurus (VICTIM)
Velociraptor/Dromaeosaurus

**Triceratops* definitely passed through before *Parasaurolophus*, but its timing relative to *Alamosaurus* cannot be determined.

5. Thus, the killer must either be *Velociraptor* or *Dromaeosaurus*. The key is geography! The murder happened in Montana; *Dromaeosaurus* is from North America, but *Velociraptor* is from Asia, so…

THE KILLER IS *Dromaeosaurus*!