

# Dino Detectives

## Science Standard IV

### Objectives 1 & 2

#### Connections

**Standard IV:**

Students will understand how fossils are formed, where they may be found in Utah, and how they can be used to make inferences.

**Objective 1:**

Describe Utah fossils and explain how they were formed.

**Objective 2:**

Explain how fossils can be used to make inferences about past life, climate, geology, and environments.

**Intended Learning Outcomes:**

1. Use Science Process and Thinking Skills
2. Manifest Scientific Attitudes and Interests
4. Communicate Effectively Using Science Language and Reasoning

**Content Connections:**

Math III- 2; Language Arts VIII-6

## Background Information

The land now called Utah has been in and out of water for billions of years. The sandy soil deposits in the Uintah Mountains are from one billion year old flood plain sediments. The rock of Mount Timpanogos contains layers from five hundred million-year old ocean coral reefs. The colors of Bryce Canyon come from mineral deposits of ancient lakes. The red sandstones of Arches and Zion National Parks are fossilized sand dunes from an ancient desert. Indeed, the past environments have been varied. The lands of present-day Utah have been host to every type of animal life known to man. Fossils lay out the story of the ever-changing varieties of plant and animal life. Indications of swamps with massive conifers that are now petrified, ancient seas inhabited by trilobites, and marine corals now fossilized and found high in the Wasatch Mountains tell us much has changed throughout the eons of time.

## Research Basis

Protheroe, N. (2004). *Effective Teaching, Principal*, pp. 58-60.

Nonlinguistic representations include graphic organizers, pictures and pictographs, mental pictures, concrete representations, and kinesthetic activities. "Generating mental pictures of information enhances recall and understanding."

Marzano, R.J., Pickering, D.J., & Pollock, J.E. (2001). *Classroom Instruction That Works: Research-Based Strategies for Increasing Student Achievement*, Chapter 6.

Explicitly engaging students in the creation of nonlinguistic representations has been shown to stimulate and increase activity in the

brain. This is accomplished by creating graphic representations, making physical models, generating mental pictures, drawing pictures and pictographs, and engaging students in kinesthetic activity.

### ***Assessment Suggestions***

- Student maps may be collected and checked for accuracy in placing symbols for fossils in the approximate area in which they would be located.
- The UTIPS Web site ([www.utips.org](http://www.utips.org)) has a multiple-choice and essay test for Standard IV, Objectives 1 & 2. These tests may be downloaded and printed or taken online.

### ***Invitation to Learn***

Ask several students to bring you one of their shoes before the lesson begins. Mix the shoes up and set them at the front where the other students can see them. Tell the rest of the class that they are going to be detectives and determine who the shoes belong to. Ask students to guess who the owner is as you hold up the shoes. Explain that they are going to be Dinosaur Detectives today as they search for clues about what prehistoric life was like in Utah.

### ***Instructional Procedures***

1. Display an overhead *Utah Counties Map*.
2. Give each student a blank *Utah Counties Map*.
3. Using the *Utah Fossil Locality Information*, tell students about each county that fossils have been found in, what type of fossils they were, etc.
4. Students use symbols and/or colors to mark these locations on a blank *Utah Counties Map*.
5. Model how to design symbols and mark the maps on the overhead map.
6. Students create a legend for the map to serve as a key to their symbols or colors.

### ***Curriculum Extensions/Adaptations/Integration***

- Write a report on the way Utah environments have changed over time. The report could be attached to the map the students made and pasted in their science journal.

#### **Materials**

- Utah Counties Map* overhead
- Utah Counties Map*
- Utah Fossil Locality Information*
- Overhead projector
- Colored pencils or crayons

- Students may work with a peer-tutor or in a group to design the symbols and legends and fill in the map together.
- Using cardboard and salt dough, students design a 3D map of Utah as it may have looked millions of years ago when dinosaurs lived here.

## ***Resources***

### **Book**

*Dinosaurs of Utah and Dino Destinations*, by Pat Bagley and Gayen Wharton; ISBN 1566846013

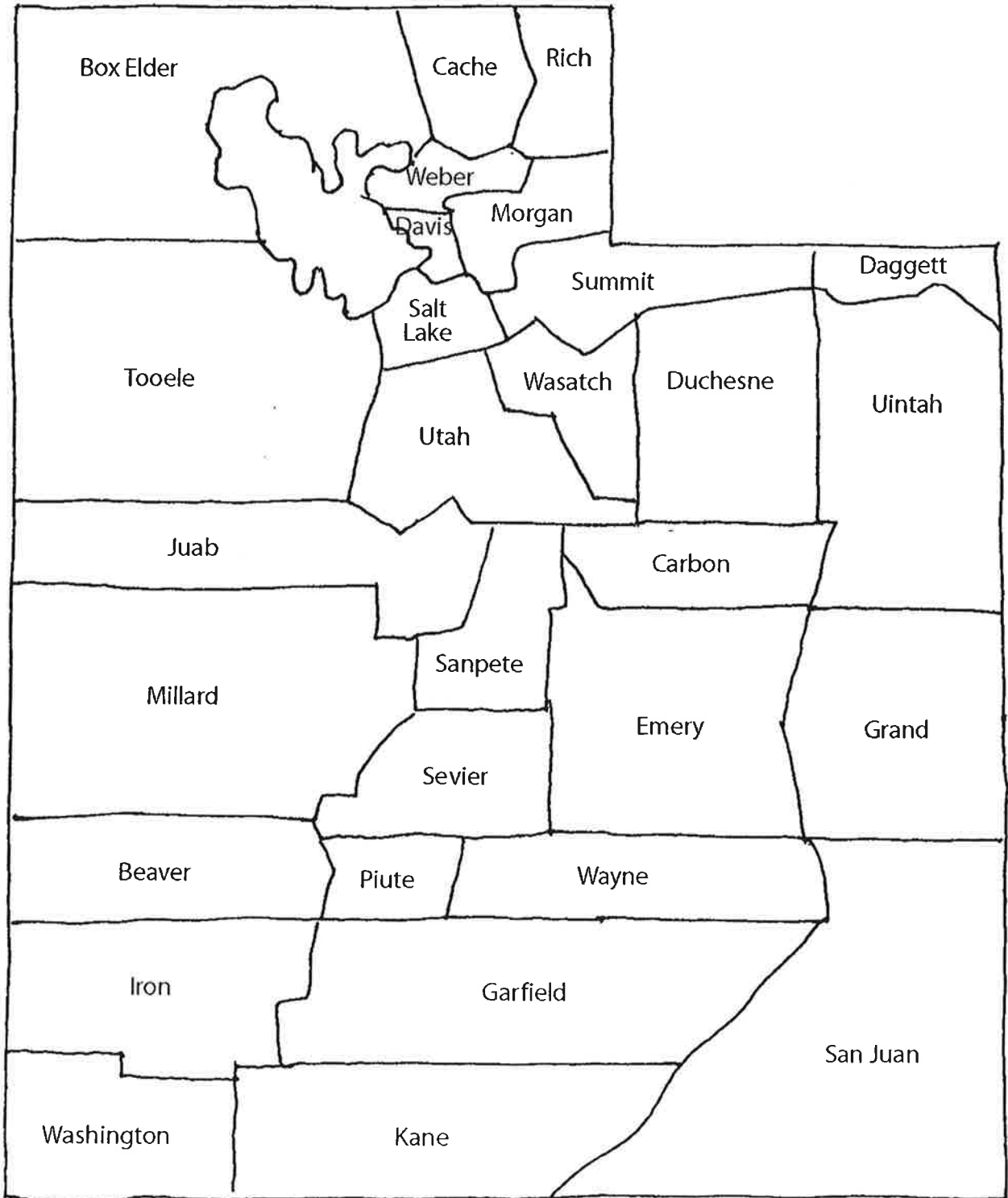
### **Web site**

State of Utah: <http://www.utah.com/dinosaur/index.htm>

## ***Family Connections***

- Visit one of the many sites in Utah where prehistoric fossils have been found.
- Take a trip to one of the museums where fossils are on display for the public.
- Students share the maps they made with their family members.
- There are many dinosaur kits, models, books, videos, and games that can be enjoyed as a family.

# Utah Counties Map



## Utah Fossil Locality Information

The following places are where fossil (clues) have been found in Utah:

*Eastern Uintah County*—fossils of Allosaurus (Utah State Fossil), Stegosaurus, Brachiosaurus, and Diplodocus indicating tropical climate; Dinosaur National Monument.

*Emery County*—Utah Raptor (relatively new discovery); Cleveland-Lloyd Quarry. There are also leaf fossils from the Cretaceous Period

*Carbon County*—massive coal deposits, a fossil fuel, indicating ancient swamps and tropical vegetation.

*Western Millard County*—Trilobites of many varieties in abundance near Antelope Springs indicating ancient shallow ocean during the Paleozoic Era.

*Weber County*—Ogden Canyon has fossils of plants, seashells (gastropods and brachiopods), and corals from the Mississippian and Devonian Periods.

*Wayne County*—Abundant oyster shells west of Caineville.

*Washington, Kane, Grand, Garfield, and Emery Counties*—These counties form a strip of land on which petrified wood is found. Ancient swamps with massive trees that may have been flooded and covered with silica-rich volcanic ash from an eruption that leveled the forests could account for these fossils.

*Box Elder and Cache Counties*—Trilobite, sea shell, and fish fossils.

*Iron County*—Oyster shell fossils from the Cretaceous Period.

*Salt Lake County*—Sea urchin fossils in Emigration Canyon. Other marine fossils.

*San Juan County*—Marine fossils near Chicken Corner Trail.

*Sanpete and Wasatch Counties*—A variety of marine fossils in the Green River Formation.

*Sevier County*—Plant fossils in the Cretaceous Period Black Hawk Formation.

*Summit and Tooele Counties*—Horn Coral.