

# Teachers Guide for Savage Ancient Seas

## A 60 minute lesson at the State Museum

### Grades 3-5

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### Description

Students will observe and make deductions (using the special traveling exhibit SAVAGE ANCIENT SEAS and related permanent exhibits at the South Carolina State Museum) about a series of fantastic fossil animals from the 70 million year old seaway of western North America and compare them with the animals and environments of the Devonian Period of Ohio at 360 million years ago.

### Objectives

Students will:

- Define fossil.
- Describe the environments inhabited by mosasaurs, plesiosaurs, arthrodires and other animals of the ancient seas and the geographic locations of those ancient seas.
- Describe the special structures that allow these animals to survive in their ancient worlds.
- Classify important animals in the exhibits according to major vertebrate and invertebrate groups and give examples of living animals that resemble those of ancient times.
- Create a time line that places these groups in the correct sequence and relate it to the students' own time and that of other well-known prehistoric animals.

### Before Your Visit

If this is the first trip to the Museum for some of the students, you may want to discuss the following questions:

- What is a Museum?
- Why are we going to the State Museum?

### Vocabulary

Preparing students for the lesson may require some special terms:

**Ammonite** – an extinct invertebrate animal, related to squid, but possessing a hard, coiled or straight, chambered shell. Where the inner chamber wall meets the outer wall, a complex lacy pattern is developed.

**Amphibian** – vertebrate animals that have a two-stage life cycle. Eggs are generally laid in the water and hatch into an aquatic form that gradually transforms into an adult which is capable of spending time on land. Modern amphibians include frogs, toads and salamanders.

**Arthrodire** – a placoderm, or armored fish, with an extra set of joints in the skull. Placoderms are generally considered extinct with the possible exception of the ratfish (also known as chimera).

**Bird** – a vertebrate animal that has feathers, lays eggs and may be a dinosaur in disguise.

**Carnivore** – a meat-eating animal.

**Cartilage** – the flexible material that forms the support for our nose and external ears and is the material forming the skeleton of sharks; gristle.

**Cephalopod**- “head-foot”, the group of invertebrate animals that includes squid and octopus.

**Fish** – vertebrate animals that have scales and live in the water, using gills to breathe.

**Fossil** – traces or remains of prehistoric life.

**Herbivore** – a plant-eating animal.

**Invertebrate** – an animal that does not have a backbone. Many different animals are included such as worms, spiders and snails.

**Mammal** – vertebrate animal that has fur, generally gives live birth and produces milk to feed the young.

**Marine**- referring to salt-water environments.

**Mosasaur** – a marine lizard of the Cretaceous Period, with a large head, no visible neck and four broad flippers. Related to modern monitor lizards, the most famous of which is the Komodo dragon.

**Nautiloid** – an invertebrate animal, related to squid, possessing a coiled or straight, chambered shell. Only a single type of this animal survives today but they were very common in prehistoric times. The inner chamber wall meets the outer shell wall in a straight line.

**Plesiosaur** – a marine reptile of the Cretaceous Period, with a small head, very long neck, a short, pointed tail and four flippers.

**Pliosaur** – a marine reptile of the Cretaceous Period, with a short-necked, a large head, a short, pointed tail and four flippers.

**Prehistoric** –the time before the invention of written languages, approximately 5,000 years ago.

**Reptile** – vertebrate animal that has scales, breathes air with lungs and generally lays eggs.

**Vertebrate** – animals with internal skeletons. The vertebrae are the bones which make up the backbone. There are five groups of vertebrates: fish, amphibians, reptiles, mammals and birds.

**Xiphactinus** – a large fish of the Cretaceous Period. Related to the modern Arapaima found in the Amazon River of South America. They have bony tongues.

## Activities

- Explore the wide variety of animals that live today. How many vertebrate and invertebrate animals are the students familiar with? Which of these animals has a fossil record?
- Form molds and casts using plaster, clay or playdough. Use shells or chicken bones to make impressions.
- Make a geologic time line.
- Today, there are no completely-marine reptiles, other than sea turtles (which return to the land to lay their eggs). But the marine iguana of the Galapagos Islands gathers food in the ocean, returning to land to rest, sleep and reproduce. What features allow it to have this unusual life style? What does it eat? How far can it swim to find food?
- Draw or find a map of North America and sketch in the position of the Cretaceous Seaway that supported the animals of the Savage Ancient Sea.
- Find pictures of dolphins, sharks and mosasaurs. These animals each belong to a different vertebrate group. How are they alike and why? How are they different? Why?

## **Books for Students**

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Arnold, Caroline, ill. by Laurie Caple (2000). *Giant Shark: Megalodon, Prehistoric Super Predator*, Calrion Books, NY.

Chandler, Fiona, Sam Toplin, and Jane Bingham, (2000). *Prehistoric World*, Usborne World History.

Lindsay, William (1994). *Eyewitness Books: Prehistoric Life*. Dorling Kindersley.

Pellant, Chris (1994). *Fossils of the World*. Thunder Bay Press, San Diego (easy-to-do science projects).

Taylor, Paul D. (1990) *Eyewitness Books: Fossils*. Alfred A. Knopf.

Troll, Ray and Matsen, Brad, (1996). *Raptors, Fossils, Fins and Fangs*. Tricycle Press.

Zimmerman, Howard (2001). *Beyond the Dinosaurs*, Byron Preiss Visual Publications, Inc., Atheneum Books for Young Readers.

## **Books for Teachers**

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Taylor, Paul D., (1990). *Eyewitness Books: Fossils*. Alfred A. Knopf.

## **Websites of Interest**

[www.nhm.org/sas/home.html](http://www.nhm.org/sas/home.html)

[www.oceansofkansas.com](http://www.oceansofkansas.com)

[www.savageancientseas.com](http://www.savageancientseas.com)

[www.fernbank.edu/museum/savageseas/seahome.html](http://www.fernbank.edu/museum/savageseas/seahome.html)