

Sea Monsters

By Stephen Fraser

A new wave of fossils reveals the oceans' prehistoric giants.

Way back when *Tyrannosaurus rex* shook the ground, another giant reptile lurked in the prehistoric oceans. A 50-foot predator, *Mosasaurus* was a real sea monster.

Mosasaurus and *T. rex* never battled or even met. But the marine giant is now stealing some of the spotlight that *T. rex* and its fellow dinosaurs have enjoyed for so many years. A new wave of findings has drawn some amazing portraits of the aquatic denizens of the Age of Reptiles.

"Over the last 10 to 20 years, we have begun to look more closely at fossils found in marine sediments," says Mike Everhart, a paleontologist at the Sternberg Museum of Natural History in Hays, Kan. "In doing so, we've discovered that some of these creatures were very large, very scary predators—something you wouldn't want to share your ocean with!"

From Land To Sea

Only a few reptiles—turtles, sea snakes, and saltwater crocodiles—inhabit today's oceans, which are dominated by mammals and fish. But the seas of the Mesozoic Era (251 million to 65 million years ago) swarmed with reptiles, some of them as big as whales. Marine reptiles were actually the first big prehistoric reptiles discovered by fossil hunters.

The earliest marine reptiles evolved from land reptiles roughly 240 million years ago (mya). Earth's climate was getting warmer then, and so were the oceans, which favored the evolution and spread of the *ectothermic* (cold-blooded) reptiles.

Unlike most of today's reptiles, the prehistoric marine reptiles were *viviparous*—the females produced live offspring instead of eggs. "The reason is simple," says Mike Caldwell, a paleontologist at the University of Alberta in Canada. "If you give live birth you can live anywhere in oceanic environments and are not bound to come ashore to lay eggs." One fossil of a prehistoric marine reptile, now on view in a German museum, shows the animal giving birth.



Simon Danaher
Mosasaur

No longer tied to the land, the marine reptiles could fully adapt to living in the ocean and compete with sharks and other big fish. "The interesting fact is that just about every animal in the ocean is a predator—from the smallest minnow to the biggest mosasaur—while almost all land animals are *herbivores* [plant eaters]," says Everhart.

Three Groups

Paleontologists have sorted the prehistoric marine reptiles into three main groups.



Thomas Miller
Ichthyosaurr

Ichthyosaurs. The first group was the *ichthyosaurs*. The earliest ones had long, supple bodies and probably rippled through the water like eels. Later ichthyosaurs evolved fins and tails and "looked like our present-day dolphins," says Caldwell. Ichthyosaurs were built for speed.

The largest known marine reptile was a whalelike ichthyosaur, *Shonisaurus*. It was as long as two school buses.

Plesiosaurs. Next to evolve, about 200 mya, were the *plesiosaurs*. Plesiosaurs moved like turtles: They flapped their paddle-like limbs to propel themselves through the water.



Chris Butler/Photo
Researchers, Inc
Pliosaur

Plesiosaurs had small heads, broad bodies, and short tails. Over time, many of them evolved fantastically long necks. One of them, the 14-meter (46-foot) *Elasmosaurus*, had a neck that was half the length of its entire body and contained 72 *vertebrae* (bony segments). Today's mammals—even giraffes—have just seven neck vertebrae.

The long-necked plesiosaurs were slow swimmers. They probably cruised just below the ocean surface, swinging their long necks to angle their heads beneath unsuspecting fish and snap them up.

Another group of plesiosaurs, the *pliosaurs*, evolved in a whole different direction. Their necks remained short, but their bodies grew bulkier with heads like those of crocodiles. "These guys were the big, hulking monsters of the group, with huge teeth and a bonecrushing bite," says Everhart. They preyed on fish, ichthyosaurs, and other plesiosaurs.

Mosasaur. The ichthyosaurs and pliosaurs disappeared about 90 mya. Replacing them at the top of the food chain were the *mosasaurs*, huge lizards related to today's Komodo dragons. Mosasaurs had long heads, short necks, and long, sinuous tails, which they used to propel themselves like snakes. "More than likely, mosasaurs were very aggressive animals, capable of pursuing and killing all kinds of prey," says Everhart.

If mosasaurs were still alive, "ocean travel would be safe in larger vessels," he adds. "But you wouldn't want to go fishing, sailing, surfing, windsurfing, or just plain swimming anywhere mosasaurs lived."

Endless Questions

Along with the dinosaurs, the giant marine reptiles became extinct 65 mya. But their fossilized remains are abundant around the world.

“Mosasaurs were first discovered in Europe, but the most and some of the best have been found here in Kansas, which used to lie under a prehistoric sea,” says Everhart. “The first major fossil I ever collected turned out to be a mosasaur that I named *Tylosaurus kansasensis* in 2005.”

What remains to be learned about the prehistoric ocean-goers? “Did they have a four-chambered heart like a crocodile or a three-chambered one like a lizard? Did they live together in family groups like whales or porpoises? Did they care for their young? How long did they live?” says Everhart.

“It is an endless list of biological questions,” adds Caldwell.

Name: _____ Date: _____

1. How many millions of years ago did the earliest marine reptiles evolve from land reptiles?

- A 240
- B 251
- C 65
- D 200

2. How does the author describe prehistoric marine reptiles, in general?

- A Less threatening than a T. rex
- B Similar to modern-day sea crocodiles
- C Large, scary predators
- D Not as threatening as we once thought

3. Which of the following conclusions about prehistoric marine reptiles is supported by the passage?

- A They evolved and adapted over time.
- B They were large, dangerous predators.
- C They are still mysterious to us in many ways.
- D All of the above

4. Read the following sentences: "Along with the dinosaurs, the giant marine reptiles became extinct 65 mya. But their fossilized remains are abundant around the world."

The word **remains** means

- A Stays in the same place
- B Stays behind
- C On reserve, storing it for future use
- D Traces or parts of something

5. What would be another good title for this passage?

- A T. rex vs. Mosasaurs
- B New Fossil Findings, But No New Information
- C Prehistoric Residents Under the Sea
- D Using Fossils to Uncover the Past

6. How are ichthyosaurs different from plesiosaurs?

7. Why might experts believe mosasaurs were “very aggressive animals, capable of pursuing and killing all kinds of prey”?

8. The question below is an incomplete sentence. Choose the word that best completes the sentence.

It makes sense that prehistoric marine reptiles were viviparous _____ it allowed them to live anywhere in oceanic environments

- A however
- B on the other hand
- C because
- D but

9. Answer the following questions based on the sentence below.

The first group of ichthyosaurs moved like eels to move through the water.

What? ichthyosaurs

(did) What? _____

How? _____

Why? _____

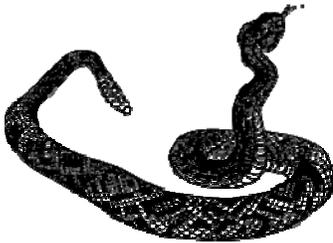
Directions: Read the vocabulary word and definition below to complete questions 10a, 10b, and 11.

Vocabulary Word: sinuous (sin • u • ous): curvy or winding.

10a. Read the sentences below and underline all forms of the word **sinuous**.

1. The river turns in a sinuous manner, curving around rock outcroppings and large patches of trees.
2. The dancing could be described as sinuous, as the dancers moved gracefully across the stage, twirling about.
3. The road is sinuous and doesn't follow a straight path.
4. Snakes move in a sinuous manner.
5. I got lost because the path they sent me on was so sinuous that I couldn't remember how to get back to where I started.

10b. Which animal moves in a more sinuous way?



11. Would you describe the roads and paths of a typical mountain as sinuous? Why or why not?

Teacher Guide & Answers

Passage Reading Level: Lexile 1100

Featured Text Structure: Descriptive – the writer explains, defines or illustrates a concept or topic

Passage Summary: The “Sea Monsters” article discusses how fossil findings have revealed new information about prehistoric marine reptiles. It chronicles how marine reptiles evolved and adapted from land reptiles and describes the three main groups of prehistoric marine reptiles.

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- D Using Fossils to Uncover the Past

6. How are *ichthyosaurs* different from *plesiosaurs*?

Suggested answer: Ichthyosaurs were faster swimmers than plesiosaurs.

7. Why might experts believe mosasaurs were “very aggressive animals, capable of pursuing and killing all kinds of prey”?

Suggested answer: They were large animals that had evolved or adapted from the previous prehistoric reptiles, thus capturing the best and strongest of their features. Their long heads may have helped them capture their prey as well.

8. The question below is an incomplete sentence. Choose the word that best completes the sentence.

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- C **because**
- D but

9. Answer the following questions based on the sentence below.

The first group of ichthyosaurs moved like eels to move through the water.

What? ichthyosaurs

(did) What? **moved**

How? **lik eels**

Why? **to move through water**

To the Teacher: ReadWorks recommends that you teach this vocabulary word to the whole class out loud using the four steps listed below.

Vocabulary Word: **sinuous** (sin · u · ous): curvy or winding.

Step 1: Introduce the word

- a. Teacher writes the word on the board and divides it into syllables: (sin · u · ous)
- b. Teacher says: “This word is sinuous. What is the word?” [All students reply together out loud: “sinuous.”]

Step 2: Provide a child-friendly definition

- a. Teacher says: “Something which is sinuous is curvy or winding.”
- b. Teacher says: “In the passage, the tails of the mosasaurs are described as being long and sinuous. Because the tails were curvy, the mosasaurs were able to propel themselves like snakes. ”
- c. Teacher says: “What is the word?” [All students reply together out loud: “sinuous.”]

Step 3: Practice the word

Teacher provides examples and additional opportunities to repeat the word. Read the first sentence out loud to your students. Begin reading it again and when you come to the vocabulary word prompt students to say the vocabulary word out loud. Then, finish reading the sentence out loud to your students.

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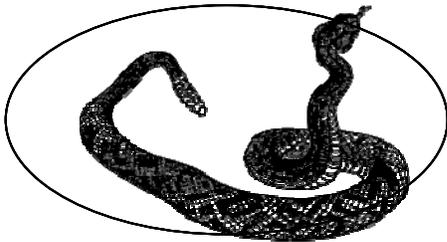
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Step 4: Check for student understanding

To the Teacher: This step can be completed as a whole class activity or as an independent practice.

10b. Which animal moves in a more sinuous way?



11. Would you describe the roads and paths of a typical mountain as sinuous? Why or why not?

Suggested answer: Yes, because usually the roads and paths of a mountain tend to curve around the mountain in a winding manner.

Suggested Additional Vocabulary: lurked, denizens, marine, sediment, swarmed, predator, herbivore, supple, propel, vertebrae