Article of the Week (AoW) Directions

1. Mark your confusion – either highlighting or underlining.
2. Mark up the text. Annotate the article with comments, questions, inferences, etc. You can use a variety of sentences, phrases, and symbols to show your thinking.
3. Write a developed paragraph response to one of the prompts below.

Scientists say reconstructed dinosaur had body built for swimming

Source: Amina Khan/Los Angeles Times/September 18, 2014

A strange dinosaur fossil dug up in the desert of Morocco and whose parts were flung across two continents has finally been reunited — and its bizarre body parts show it may be the first known semi-aquatic dinosaur.

Dinosaurs were long thought to be landlubbers. But the 95-million-year-old Spinosaurus aegyptiacus, described in a study in the journal Science, features the first-ever dinosaur whose body evolved to live a life partly in the water, and could contradict many assumptions about dinosaur evolution.

"We have to face the fact that the 'Jurassic Park' folks have to go back to the drawing board on Spinosaurus," study co-author Paul Sereno, a paleontologist at the University of Chicago said in reference to its duel with Tyrannosaurus rex in the film "Jurassic Park III."

"It was not a balancing, two-legged animal on land. It would have been something very peculiar," Sereno said.

At 50 feet long, Spinosaurus was likely the largest predatory dinosaur to walk the Earth (9 feet longer than T. rex, which did not live in the same time period). It had a long thin snout with conical teeth that jutted diagonally from its mouth — perfect for snapping at fish. Its nostrils were small and pushed far up on its skull — ideal for breathing while partly submerged. Odd openings at the front of the snout could have housed pressure sensors, rather like the ones on alligators and crocodiles that help them sense movement to hunt in murky water.

The differences from this Spinosaurus and other theropods run from head to toe. Theropods, like T. rex and velociraptor, ran on two powerful legs and had small, spindly arms. By contrast, Spinosaurus had muscular arms with blade-like claws that could have nabbed slippery fish, and shorter legs that were ill-equipped to walk on land. The bones' marrow holes were closed, making them very dense — an adaptation seen in aquatic animals like penguins to control buoyancy in the water. Its feet were wide and flat and might even have been webbed. And the animal's center of mass is pushed far forward — terrible for moving on land but excellent for swimming.

"It's about time that they found a dinosaur that was semi-aquatic," said Hans Thewissen, an anatomist at Ohio Medical University who was not involved in the paper, but has studied whales' transition from land mammals to the sea. After all, he pointed out, dinosaurs were a dominant, highly successful group during their time on the Earth — and it would be strange if they left these prehistoric waters only to fish or marine reptiles (such as the mosasaur or plesiosaur).

"I'm not surprised … but I'm delighted that they found it," he added.

Like other known spinosaur species, Spinosaurus aegyptiacus also sported the bony "sail" on its back, a dramatic display that stayed above the water as it swam. But James Kirkland of the Utah Geological Survey thinks perhaps, in this swimming species, it really might have been used as a sail, to keep moving without alerting other animals to its massive presence. In the water, Spinosaurus would have lived in a predator's paradise, filled with other fearsome meat-eaters — including sharks, coelacanths, sawfish and lungfish.

The first Spinosaurus skeleton was discovered in Egypt in 1912 and described by a German scientist, Ernst Freiherr Stromer von Reichenbach, in 1915. Stromer took the bones home but suffered greatly for his criticism of the Nazis: His three sons were sent to war, where two died, and his unprotected fossil collection was destroyed in an Allied bombing raid in 1944. Aside from the careful drawings Stromer made, and the occasional rare photograph, his discovery was obliterated.

But in 2008, lead author and University of Chicago paleontologist Nizar Ibrahim was working in Morocco when a Bedouin fossil hunter approached him with a cardboard box of sediment-encrusted bones. Ibrahim looked in the box, noting a strange bladelike fossil with a red line running through it.

Later, he was visiting a museum in Italy when colleagues told him about some strange fossils in the museum basement, sent from Morocco. "My jaw dropped," Ibrahim said — it was a rich collection of leg, foot and rib bones — and the same strange spines with the red line running through. Ibrahim had already wondered if the bones were Spinosaurus. Now he suspected the two collections, spread across two continents, had come from the exact same animal. But the researchers didn't know where the bones had been found — and without that key context, it would be impossible to tell the time period, and the location, in which it had lived.

On a hunch, Ibrahim decided they needed to find the man with the box. He didn't have his name or number, but recalled that the man had a mustache. Armed with that paltry bit of information, they returned to Erfoud — a Moroccan oasis town of more than 20,000 people — and searched for him, with no luck.

"Toward the end of our mission impossible," Ibrahim said, "we were just sitting in a cafe in Erfoud, sipping mint tea and I just saw all my dreams going down the drain … and at that very moment just when everything seemed to be lost, a person walks past our table."

Sure enough, it was the man with the mustache.

Fossil hunters are loath to reveal their dig sites, for fear that others will try to get a piece of the action. But Ibrahim persuaded the man to take him to the spot in the Kem Kem beds, explaining that he was a scientist and that he hoped to return the fossil to its home country, Morocco.

Ibrahim also traveled to the Stromer family castle in southern Germany, where Stromer's granddaughter gave Ibrahim the paleontologist's sketches of the fossil. Armed with those drawings, the new fossil and by filling in a few missing pieces from related species, the authors were able to reconstruct a model of the Spinosaurus skeleton.

Lindsay Zanno, a paleontologist at the North Carolina Museum of Natural Sciences in Raleigh, cautioned that the fact that the skeleton was assembled from many different sources casts a little doubt on the reliability of the reconstructed skeleton — both in size and shape.

"We have to be very careful about presuming that we know exactly what this animal looked like," Zanno said.

That said, she added, "I really didn't expect there to be this much compelling evidence … I find the proportions of this animal to be really bizarre."

Ibrahim, who is half Moroccan and half German, says he feels that he's helping to complete Stromer's century-old legacy. The bones will be returned to Morocco, he said, to help jump-start the country's museum program.

Respond to one of the following prompts. Use the space below or a separate sheet of paper.

1. Should we care that a new species of dinosaur has been discovered? Why or why not?
2. What is your theory of why the dinosaurs became extinct? Explain.
3. Choose a word, phrase, sentence, or paragraph from the article and respond to it.