

Name _____
Literacy Lab #29 - Dinosaur Skeletons

Date _____
Earth Science - Breed - 2012/2013

Directions: Take a few minutes to read the article below either online (or on the back of this page.) Write responses to the statements or questions below. Cut/copy/paste is not allowed – use your own words and thoughts, based in research if needed.

Read more: <http://www.sciencedaily.com/releases/2012/02/120216111227.htm>

Fact-finding: List three facts that you learned in this article.

1.

2.

3.

Vocabulary: List and define three unfamiliar words in the space below.

Implications: What are your feelings about this “discovery”? Express your feelings (tactfully) about whether this is an advancement of science or a bad idea.

Why Do Dinosaur Skeletons Look So Weird?

ScienceDaily (Feb. 16, 2012) — Many fossilized dinosaurs have been found in a twisted posture. Scientists have long interpreted this as a sign of death spasms. Two researchers from Basel and Mainz now come to the conclusion that this bizarre deformations occurred only during the decomposition of dead dinosaurs.

More or less complete and articulated skeletons of dinosaurs with a long neck and tail often exhibit a body posture in which the head and neck are recurved over the back of the animal. This posture, also known from *Archaeopteryx*, has been fascinating paleontologists for more than 150 years. It was called "bicycle pose" when talking with a wink, or "opisthotonic posture" in a more oppressive way of speaking.

The latter alludes to an accessory symptom of tetanus, well known in human and veterinarian medicine. Usually, an "opisthotonic posture" like that is the result of vitamin deficiency, poisoning or damage to the cerebellum.

Basically, the cerebellum is a brain region that controls fine muscle movement, which includes the body's antigravity muscles that keep the head and tail upright. If the cerebellum ceases to function, the antigravity muscles will clench at full force, tipping the head and tail back, and contracting the limbs.

A syndrome like that as a petrified expression of death throes was discussed for the first time about 100 years ago for some vertebrate fossils, but the acceptance of this interpretation declined during the following decades. In 2007, this "opisthotonus hypothesis" was newly posted by a veterinarian and a palaeontologist. This study, generously planned, received much attention in the public and the scientific community.

Now, five years later, two scientists from Switzerland and Germany have re-evaluated the revitalized "opisthotonus hypothesis" and examined one of its icons, the famous bipedal dinosaur *Compsognathus longipes* from the "Solnhofen Archipelago" (Germany). It is widely acknowledged that this 150-millions-years-old land-living dinosaur was embedded in a watery grave of a tropical lagoon.

"In our opinion, the most critical point in the newly discussed scenario of the preservation of an opisthotonic posture in a fossil is the requirement that terrestrial

vertebrates must have been embedded immediately after death without substantial transport. But consigning a carcass from land to sea and the following need of sinking through the water column for only a few decimetres or meters is nothing else" says sedimentologist Achim Reisdorf from University of Basel's Institute of Geology and Paleontology.

Biomechanics in Watery Graves Convinced that the back arching was generated, not by death throes, but by postmortem alterations of a decaying carcass, the researchers made experiments with plucked chicken necks and thoraxes, immersed in water. Submersed in water, the necks spontaneously arched backwards for more than 90°. Ongoing decay for some months even increased the degree of the pose. Thorough preparation and dissection combined with testing revealed that a special ligament connecting the vertebrae at their upper side was responsible for the recurved necks in the chickens. This ligament, the so-called Ligamentum elasticum, is pre-stressed in living chickens, but also in dead ones.

"Veterinarians may often have to do with sick and dying animals, where they see the opisthotonic posture in many cases. Vertebrate palaeontologists, however, who want to infer the environment in which the animals perished and finally were embedded have to elucidate postmortem processes and biomechanical constraints too" says palaeontologist Michael Wuttke from the Section of Earth History in the General Department for the Conservation of Cultural History Rhineland Palatinate in Mainz (Germany).

"A strong Ligamentum elasticum was essential for all long necked dinosaurs with a long tail. The preloaded ligament helped them saving energy in their terrestrial mode of life. Following their death, at which they were immersed in water, the stored energy along the vertebra was strong enough to arch back the spine, increasingly so as more and more muscles and other soft parts were decaying" conclude the researchers. "It is a special highlight that, in the Compsognathus specimen, these gradual steps of recurvature can be substantiated, too. Therefore, biomechanics is ruling the postmortem weird posture of a carcass in a watery grave, not death throes."

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Journal Reference:

1. Achim G. Reisdorf, Michael Wuttke. **Re-evaluating Moodie's Opisthotonic-Posture Hypothesis in Fossil Vertebrates Part I: Reptiles—the taphonomy of the bipedal dinosaurs Compsognathus longipes and Juravenator starki from the Solnhofen Archipelago (Jurassic, Germany).** *Palaeobiodiversity and Palaeoenvironments*, 2012; DOI: [10.1007/s12549-011-0068-y](https://doi.org/10.1007/s12549-011-0068-y)

Note: If no author is given, the source is cited instead.

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