

Geology Project



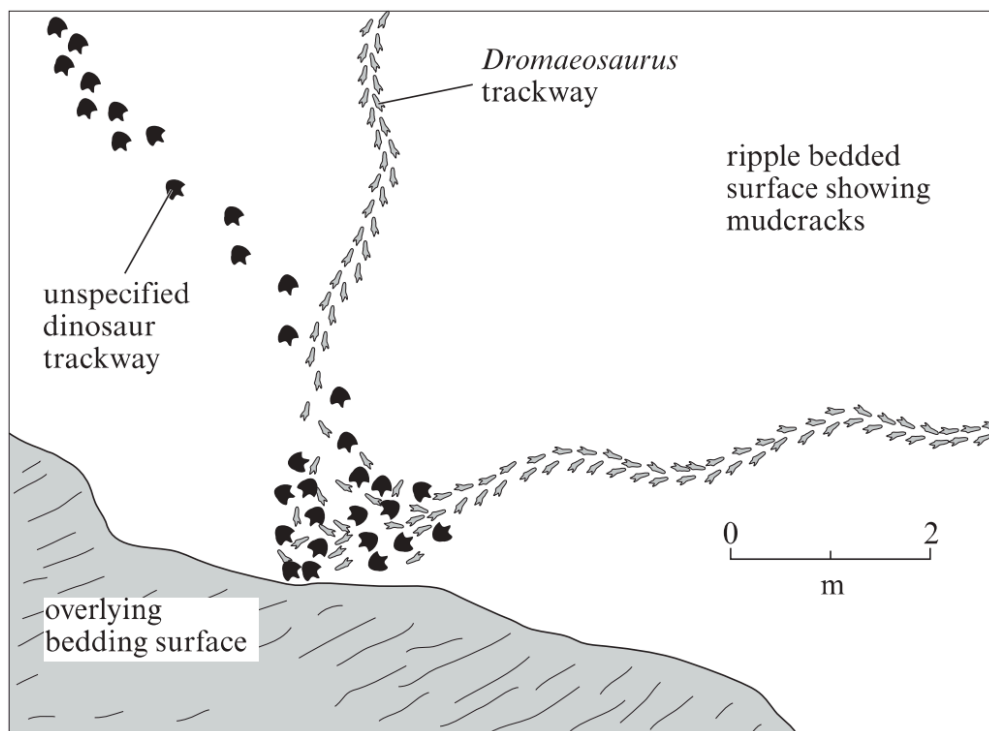
The principle of uniformitarianism to interpret Dinosaur adaptations.

In Geology we often have to use evidence from the present to try and interpret what may have happened in the past, known as the “Principle of Uniformitarianism”. Below is a summer project designed to give you a flavour of what the course entails.

Task 1 - Scenario Interpretation

A mining operation has exposed a rock surface, which appears to have dinosaur tracks on it. A simplified diagram of the scene has been added below.

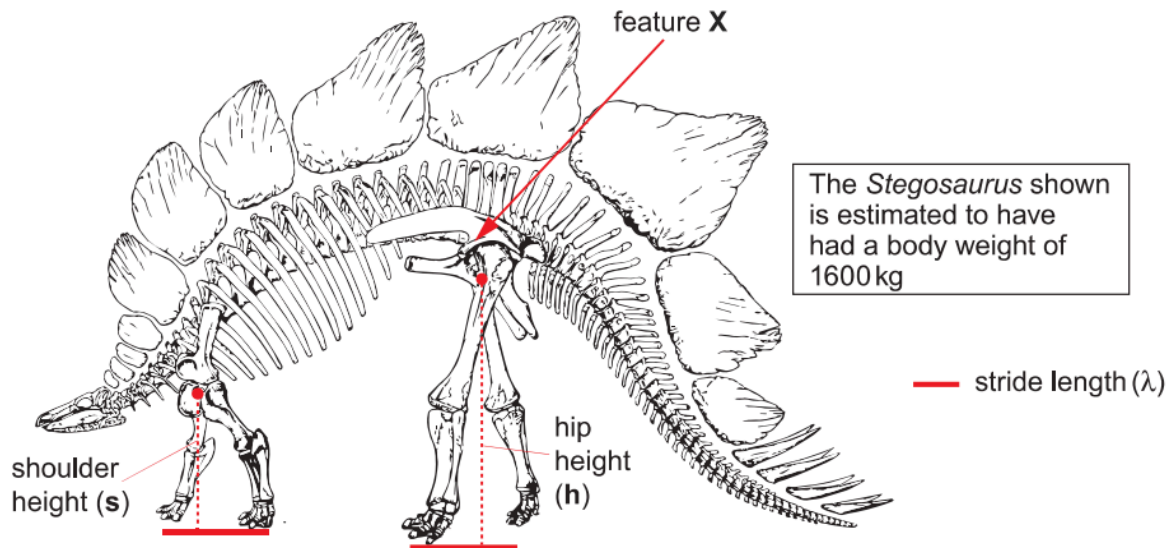
The ripple bedded surface showing mudcracks has been interpreted as representing an ancient lake bed that has dried up. Unfortunately the “overlying bedding surface” in the bottom left corner of the scene has obscured the rest of the footprints, and there is no way for the rock to be removed without causing too much damage to the rest of the scene.



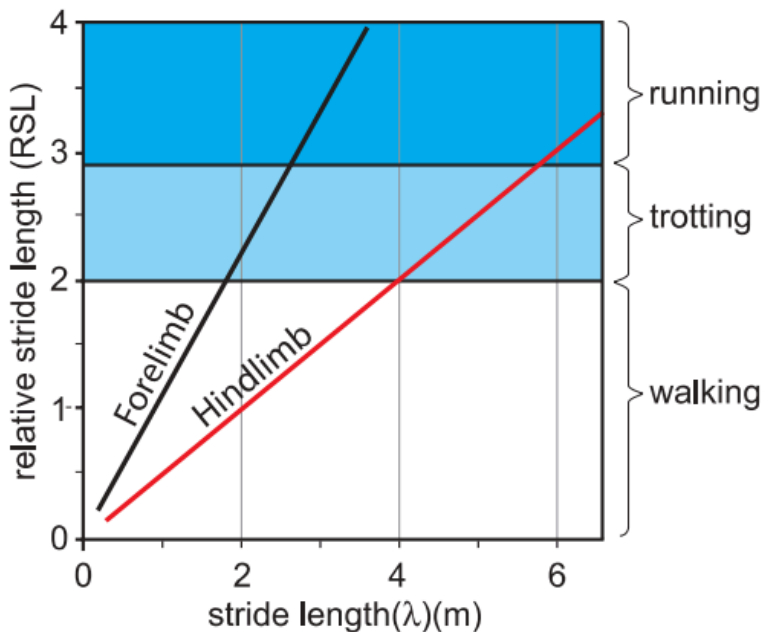
Your challenge is to come up with **two** theories as to what this scenario may be showing regarding the dinosaurs. What does the evidence suggest was happening when these footprints were preserved?

Task 2 - How fast could a Stegosaurus run?

Below is a diagram of a *Stegosaurus* skeleton, highlighting the shoulder and hip height measuring points. Palaeontologists can use this information to work out how fast an organism could move. In this particular case, they can work out if a *Stegosaurus* can actually run!



Below is a graph that shows how the stride length and **relative** stride length of the forelimbs and hindlimbs of a *Stegosaurus* can be used to determine the dinosaur's gait (i.e. whether it walked, trotted or ran).



Stride length (λ) = the distance travelled by a forelimb or hindlimb during each stride.

Relative stride length (RSL) = the stride length (λ) relative to the shoulder or hip height ($\frac{\lambda}{s}$ or $\frac{\lambda}{h}$).

Running involves all 4 limbs being in the air at the same time.

Could you complete the table below by inserting the appropriate relative stride length and gaits, using the graph and formula above.

Stride length (λ) of forelimb and hindlimb (m)	Relative stride length of limbs (RSL)		gait (walking, trotting or running)
	forelimb ($\frac{\lambda}{s}$)	hindlimb ($\frac{\lambda}{h}$)	
1	1.1		walking
		•	walking
2	2.2		•
		1.0	walking
3	3.3		•
		1.5	walking

Question - Could you explain why the data (diagram, graph and table) **might** suggest that *Stegosaurus* was unable to run fast?

Task 3 - Independent Research



Please could you research **one species** of dinosaur -you can pick any dinosaur **except** *Tyrannosaurus Rex*. You need to find the following pieces of evidence:

1. When did the dinosaur species evolve and become extinct?
2. What was the geographical distribution of the dinosaur?
3. Was it a carnivore, herbivore or omnivore?
4. What type of environment(s) did the dinosaur live in?
5. What adaptations did it have to survive in that environment? Please note that this will be dependent on whether the dinosaur was a predator or a prey organism.
6. Any other information that you can find out about the organism that you think it interesting.

I hope you enjoy the summer work, and I look forward to reading through your research in September!