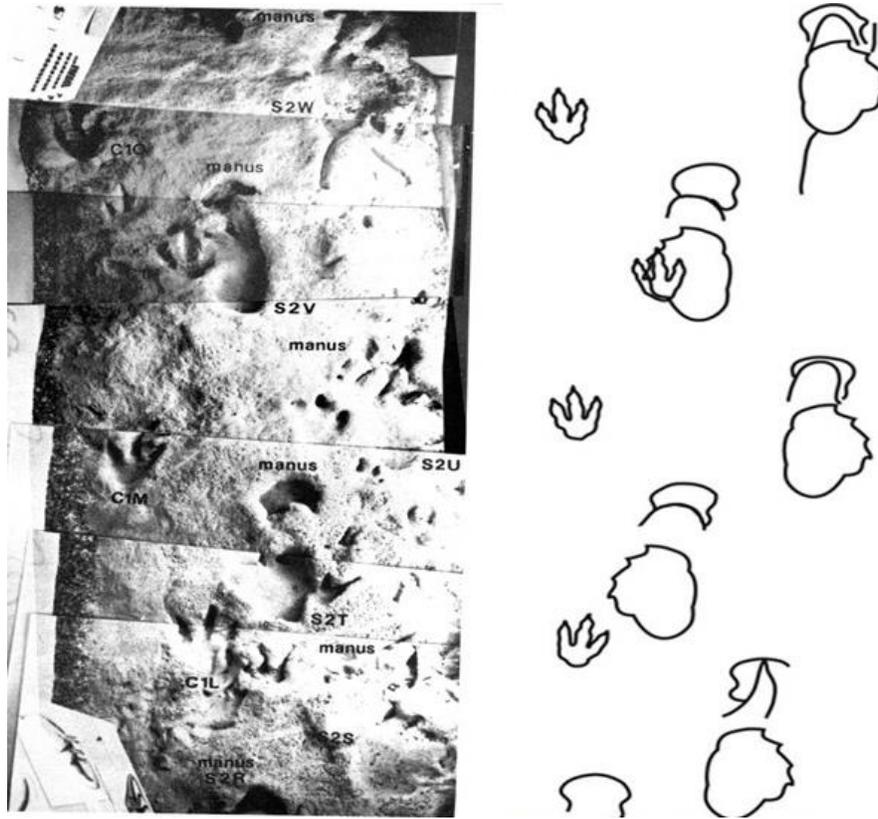# Sidewalk Dinosaur Tracks

Photo montage and outlines of dinosaur trackways (TMM 1921) from a limestone bed exposed by the Paluxy River, near Glen Rose, TX. Average theropod footprint length is 53.3 cm (21.0 in) and average sauropod hindfoot print length is 76.5 cm (30.1 in).

Concepts: Trace fossils are not preserved body parts (like fossilized bones), but can show evidence of an organism's shape or activity. One example is a dinosaur footprint left in mud millions of years ago that has turned to stone.

Learning Objectives: Collect and analyze data from dinosaur trackway reproductions to estimate the hip height of a dinosaur and hypothesize how it was moving.

Vocabulary:
>   Print or Track – Imprint left on ground by a single foot (footprint)
>   Trail or Trackway – Line of tracks left by an animal
>   Step – Distance between where foot was picked up and where it was placed down
>   Stride – Distance between two successive placements of the same foot
>   Gait – Pattern of movement of the limbs (for example, walk or trot)
>   Manus – Front foot or "hand"
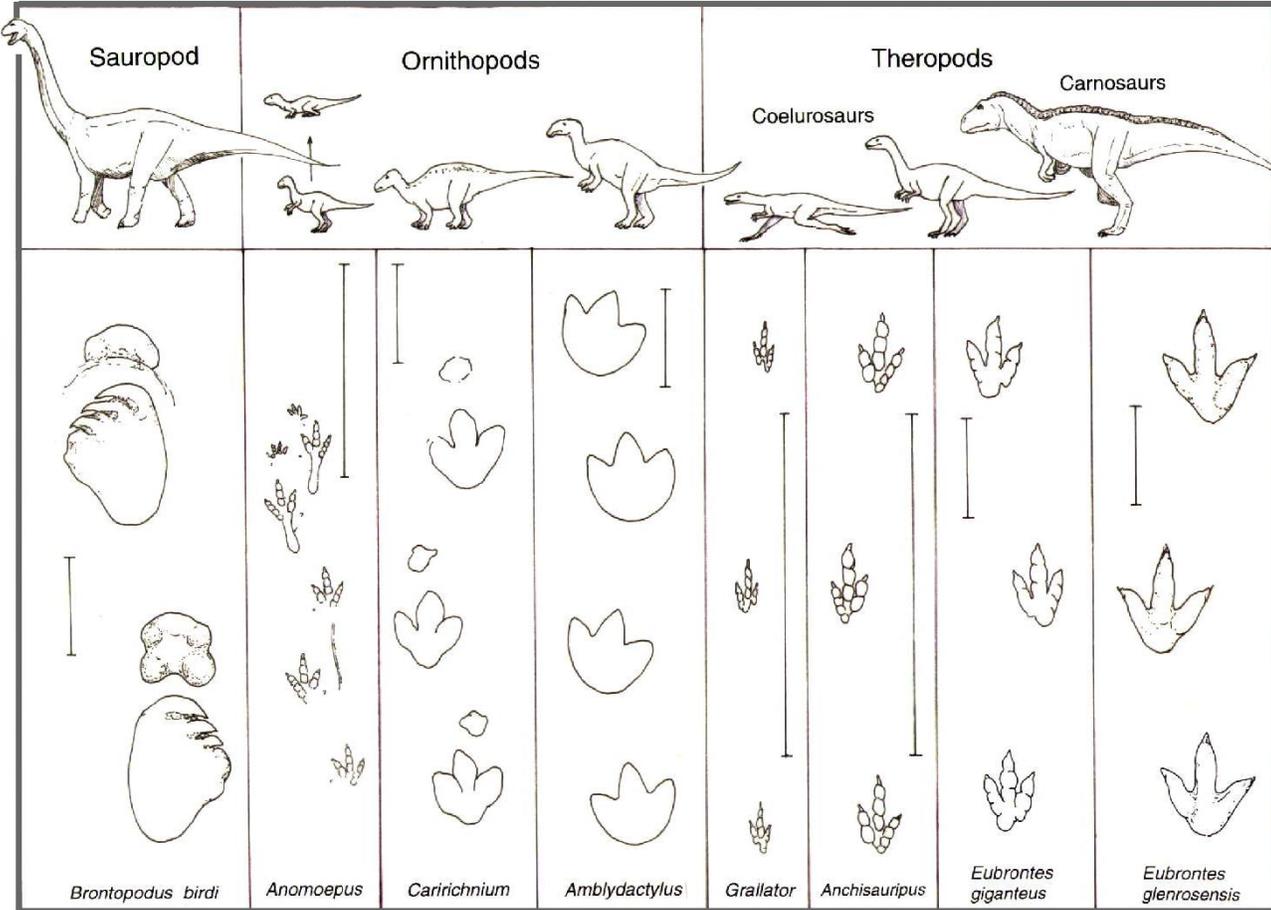>   Pes – Hind foot

Materials Needed: Chalk for drawing trackway, tape measure (at least 12 ft.), calculator, pencil

Sidewalk Dinosaur Tracks

Activity Instructions:

1. Look at Figure 1 and decide which type of dinosaur trackway you will create. On your sidewalk or driveway, chalk a series of left and right footprints (tracks). Simple outlines work just as well as detailed drawings. *You will need a minimum of four hind footprints in your trackway to complete the calculations in this activity.* Draw the footprints freehand – they do not have to be *exactly* the same length, just close enough to model natural tracks. There can be slight differences between left and right feet, or small differences in the footprint, depending on the conditions when the track was made (think about squishy mud and the dinosaur changing the way it was moving).

Figure 1: Common types of dinosaur tracks and track makers. Scale bars = 50 cm (19.7 in).

Theropod dinosaurs were bipedal, walking on their hind legs. Sauropods walked on all four column-shaped limbs, but the front feet were smaller than the hind feet. Ornithopod trackways indicate that this group of dinosaurs were bipedal or quadrupedal, depending on the species and behavior.

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Sidewalk Dinosaur Tracks

Figure 2: Measurements used in describing and analyzing tracks and trackways.
(After Lockley, M. G. 1991. Tracking Dinosaurs. Cambridge University Press. Cambridge, England)
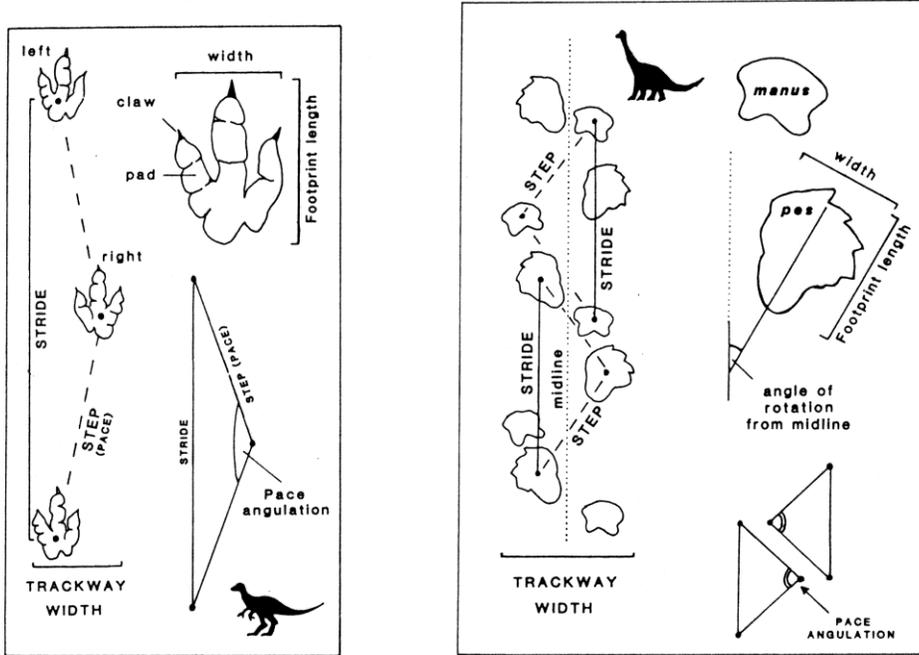
2. Look at Figure 2. You will take only two of the illustrated measurements of the trackways made by the HIND feet of your dinosaur: Footprint length and stride length. We typically use the metric system in science, but in this activity, we will measure in inches because most tape measures used at home in the US are in inches. To convert your answers to centimeters, 1 inch = 2.54 cm.

A. Average Footprint Length
Measure the length of each of the footprints in your trackway. Add the lengths of all the footprints together to get the sum. Divide the sum by the number of footprints you measured. The calculated number is the average footprint length.

Footprint 1 Length = _____ in

Footprint 2 Length = _____ in

Footprint 3 Length = _____ in

Footprint 4 Length = _____ in

Average Footprint Length = _____ in

B. Height at Hip
To get an idea of the length of the dinosaur's hind leg without having fossilized bones to measure, you estimate the height at the hip. Multiply the Average Footprint Length by 4.

Your dinosaur was _____ inches tall at the hip.

C. Average Stride Length

Measure at least 2 strides within the trackway and calculate the average stride length.

Stride 1 = _____ in

Stride 2 = _____ in

Average Stride = _____ in

*When an animal moves from a walk to a run, it covers more ground with each step. So, the stride length increases as the animal picks up speed. When an animal's height at the hip is known – or can be estimated from footprint length – then it is possible to calculate **relative stride**, which can help us predict the animal's gait.*

D. Relative Stride

The relative stride (RS) is calculated by dividing Average Stride by the Height at Hip:

Average Stride ÷ Height at Hip **= _____ (RS)**

RS less than 2.0 = walk
RS between 2.0 and 2.9 = trot
RS more than 2.9 = run

Your dinosaur was: (circle one)   walking   trotting   running

Online Dinosaur Tracking Resources:

Dinosaur Valley State Park, Glen Rose, TX (https://tpwd.texas.gov/state-parks/dinosaur-valley/dino-tracks)

Natural History Museum (London) – Dinosaur footprints: how do they form and what can they tell us? (https://www.nhm.ac.uk/discover/dinosaur-footprints.html)

An Overview of Dinosaur Tracking by Glen J. Kuban (http://paleo.cc/paluxy/ovrdino.htm)

Where Dinosaurs Walked: Eight of the Best Places to See Prehistoric Footprints – Smithsonian Magazine (https://www.smithsonianmag.com/travel/where-dinosaurs-walked-8-places-prehistoric-footprints-180956982/)

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