

# TRACE FOSSILS

## KEY DEFINITIONS

- **Trace fossil** = are fossils preserving **the activity of the organism** rather than the organism itself. They are evidence of **fossil behaviour** of the lives of the organism. They include **tracks, trails**, burrows, borings and excrement (**coprolites**).
- **Coprolites** = fossilized **excrement**.
- **Tracks** = **footprints** of the organism left behind in sediment from **when it moved**.
- **Trails** = are the **impressions of whole animals travelling**. This may be part or all of the **animal dragging** along the **surface of the substrate**.
- **Resting traces** = are a type of trail as the **whole body** of the animal **comes to rest**.
- **Bioturbation** = refers to **burrowing or working** the sediment in a way that **disrupts the bedding**. This is caused by the activity of living organisms.

Trace fossils provide glimpses of the nature and **behaviour** of ancient organisms in the geological record. They also help **determine palaeoenvironments**. Trace fossils have an exceptionally long fossil record, with evidence of some of the first **multicellular organisms**.

Many trace fossils may seem similar but are formed by different organisms. E.g. a burrow may have been inhabited by a **bivalve, crustacean or worm**.

If they were filled then the trace fossil may be seen on the **base of the infilling sediment**.

**Crustacean** = an arthropod of the large, mainly aquatic group Crustacea, such as a crab, lobster, shrimp, or barnacle.

**Bivalve** = is a class of marine and freshwater molluscs that have laterally compressed bodies enclosed by a shell consisting of two hinged parts. E.g. a clam, mussel or scallop.

## HOW TO MAKE A TRACE FOSSIL





An organism walks across a soft, fine sediment, leaving the imprint of its feet. There is then a very small chance that a different sediment will infill these impressions before they are destroyed by water currents or wind. If they are infilled and buried, the trace fossil is found on the base of the infilling sediment.

### Trace fossil morphology

Skolithos (Tube worm, vertical burrow)	Diplocraterion (U-shaped burrow)	Thalassinoides (Branching burrow)
Rusophycus (Trilobite resting trace)	Cruziana (Trilobite walking tracks)	

## TYPES OF TRACE FOSSILS

Most trace fossils are found in low-energy environments where sediments are soft and very fine-grained (clay, mud or silt). This commonly includes marine environments. Although some terrestrial fossils can be found, they are rare. High-energy environments would immediately destroy any traces. Terrestrial environments are susceptible to weathering and erosion before fossils can be preserved.

Type of trace	Description	Conditions	Example	Picture
<b>Tracks</b>	Found on the <b>base of bedding planes</b> , imprints formed as the organism <b>moved across</b> sediment.	Soft or muddy, fine-grained, terrestrial or marine sediment	Usually the imprints of legs or feet.	
<b>Trails</b>	Traces made by the <b>whole or part</b> of the organism when <b>at rest or travelling along</b> sediment.	Soft or muddy, fine-grained, terrestrial or marine sediment	Resting positions showing <b>Gill or leg structures</b>  A <b>trilobite</b> <b>dangling its tail</b> behind it  <b>Starfish</b> impression	
<b>Burrows</b>	Vertical <b>U-shaped, stacked or branching</b> burrows. Maybe for <b>dwelling, locomotion, protection or feeding</b> .	The substrate must be soft sand or mud to allow for burrowing. Burrowing can <b>mix layers of sediment</b> by <b>bioturbation</b> .	U-shaped <b>Diplocraterion</b> , vertical <b>Skolithos</b> or branching <b>Thalassinoides</b> .	
<b>Excrement (coprolites)</b>	Faecal pellets ( <b>&lt;10mm</b> ) and coprolites ( <b>&gt;10mm</b> ) Evidence of <b>large animals</b> in the environment.	Quick burial is required to prevent <b>decay</b> or break up by currents	Dinosaur dung. Can be rich in <b>phosphate</b> .	
<b>Root structures</b>	<b>Woody looking</b> impressions in rocks or preserved as <b>lignite</b> .	<b>Shallow marine, deltaic or terrestrial conditions</b> .	Root often branching from trees or other plants	

# INTERPRETING PALAEOENVIRONMENTS

A track of a dinosaur can give use information about that animal that made it -

<b>Shape of the soft parts</b>	These are left as impressions in very fine sediment. The familiar three toes can often be seen along with impressions with claws.
<b>Patterns of scales on the skin</b>	Only rarely preserved in very fine sediments
<b>Weight</b>	Can be estimated by looking at the size and length of the feet.
<b>Running or walking speed</b>	This can be calculated by estimating the height of the animal based on its foot length. Generally, steps further apart mean that the animal was moving fast.

