

Questions for any rock face 6: fossils

What questions about fossils might be asked at any rock exposure?

The ELI* series of 'Questions for any rock face' helps teachers to plan investigative fieldwork at any rock exposure**. In each case some possible questions are given, with some likely answers, to help you to decide whether the questions might work well at your site, or whether they would be asked better elsewhere. Answering the questions will provide basic understanding of the evidence preserved in rocks of the processes that formed them.

Fossils

Take your pupils to places where fossils can be found and ask these questions. The questions should work whether or not the fossils are well preserved or whether or not there is a variety of fossils.

Possible questions	Possible answers
What happened to these animals/plants just after they died? Were they buried where they were or moved around, sorted out and broken up?	Organisms can be buried just where they lived (a 'life assemblage') but are more likely to have been swept away to form a 'death assemblage'. They could be deposited in a quiet area where they are likely to be well preserved, they could accumulate in a bank of broken material, or something in between
As they were being buried, what might they have looked like, smelled like?	This question focuses on the fact that these fossils were once living things
After they were buried, how did they change?	<ul style="list-style-type: none"> In nearly all fossils, the soft organic parts have decayed away leaving only the 'hard parts' (shells, bones, etc.) behind. These are preserved either as they were (with little chemical change) or by being chemically altered. Sometimes fluids flowing through the rock dissolve the organism leaving a mould and may later fill it with minerals, forming a cast The pressures of low-grade metamorphism can deform/distort fossils without destroying them
Why are some types of organism much more commonly fossilised than others?	<ul style="list-style-type: none"> This depends on the organism (size, numbers, presence of hard parts, etc.) and the environment in which it lived/died (mud-burrowers are more likely to be preserved than mountain goats)
What can fossils tell us about a deposit?	<ul style="list-style-type: none"> That there was life around at the time The type of life and type of environment (wet/dry; hot/cool; shallow/deep; salt/fresh, etc.) The relative age of the deposit How evolution was progressing at the time



Crinoids, in a 'death assemblage' (meaning that they were moved here and accumulated after death), Salthills Quarry, Lancashire, UK.

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Fossil sea floor – a 'life assemblage' of organisms preserved where they lived (and died); the Silurian Wenlock Limestone, Dudley, Birmingham, UK.

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* ELI = Earthlearningidea

** An exposure is where rocks can be seen at the Earth's surface, exposed by natural or artificial means; anywhere where a rock reaches the surface, even if it is covered by soil, etc. is an outcrop, so an exposure is also part of an outcrop.

The back up:

Title: Questions for any rock face 6: fossils

Subtitle: What questions about fossils might be asked at any rock exposure?

Topic: Questions to ask at any rock face where fossils can be found.

Age range of pupils: 9-16 years

Time needed to complete activity: 10 minutes

Pupil learning outcomes: Pupils can:

- describe how fossil preservation depends upon:
 - the characteristics of the organism,
 - what happened straight after death,
 - what happened after burial;
- explain the evidence that fossils can provide for the geological history of a rock sequence.

Context:

Fossils are not just interesting to pupils in themselves, they can provide valuable information about the environment in which they were preserved and the geological history of the rock sequence.



Fossil-hunting, Builth, Wales, UK. (Peter Kennett).



Fossil-hunting, Castleton, Derbyshire, UK. (Peter Kennett).

Remember to carry out a risk assessment before taking anybody to any rock exposure.

Following up the activity:

Continue with other 'Questions for any rock face' Earthlearningideas

Underlying principles:

- Fossil preservation depends upon:
 - the characteristics of the organism
 - what happened straight after death
 - what happened after burial
- Fossils can provide useful evidence of the environment in which they were preserved, the age of the deposit and of evolution.

Thinking skill development:

Imagining the fossilisation process involves skills of construction.

Resource list:

- the resources needed for pupil fieldwork listed in the Earthlearningidea activity '*Planning for fieldwork: Preparing your pupils before setting out to "ask questions for any rock face"*'

Useful links:

See the animation of fossilisation at:
<https://www.youtube.com/watch?v=9T0UUZz8G5s> (with captions in French)

Source: Devised by Chris King of the Earthlearningidea Team.

The 'Questions for any rock face' series of Earthlearningideas and the sites where they may be applicable

'Questions for any rock face' Earthlearningidea	Site
Planning for fieldwork	Preparation in school beforehand
1: weathering	Any exposure (cliff, coastal exposure, quarry, cutting) or weathered constructions (wall, gravestone, monument)
2: erosion	Any exposure and many walls
3: soil	Some exposures have a useful soil profile at the top (but many do not)
4: rock group (igneous or sedimentary)	Any exposure of igneous or sedimentary rock or both; also applicable to sedimentary and igneous building stones, gravestones or monuments
5: sedimentary grains	Any exposure of sedimentary rock and also building stones, gravestones or monuments
6: fossils	Any exposure containing readily found and obvious fossils, including some building stones, gravestones or monuments
7: tilted or folded rocks	Any exposure of clearly tilted or folded rocks
8: faults	An exposure where rocks are clearly faulted, preferably where beds can be matched up on either side of the fault
9: metamorphism	An exposure where metamorphic features are clearly visible and preferably, where there is also evidence of the former rock type
10: sequencing	An exposure where a sequence of geological events can be relatively dated using 'Stratigraphic Principles'
11. tectonic plates	An exposure of sedimentary rocks containing evidence of deposition in different climates and altitude/depths from today, with further evidence of plate margin processes
12. quarry/ cutting potential	An exposure in any quarry or cutting
13: quarry economics	An abandoned (or working) quarry
14: recording	Any exposure

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