**Could it become a fossil?**

**Animal**

The photograph shows an iguana. It is a type of lizard.



1. Could the iguana become a fossil?

|  |  |
| --- | --- |
| **A** | It will **definitely** become a fossil. |
| **B** | It **could** become a fossil. |
| **C** | It will **not** become a fossil. |

1. How would you explain your answer to question 1?

|  |  |
| --- | --- |
| **A** | A few dead organisms are preserved as fossils. |
| **B** | All dead organisms are preserved as fossils. |
| **C** | It is not a living organism. |
| **D** | It is too small to become a fossil. |

**Could it become a fossil?**

**Plant**

The photograph shows a fern. It is a type of plant.



1. Could the fern become a fossil?

|  |  |
| --- | --- |
| **A** | It will **definitely** become a fossil. |
| **B** | It **could** become a fossil. |
| **C** | It will **not** become a fossil. |

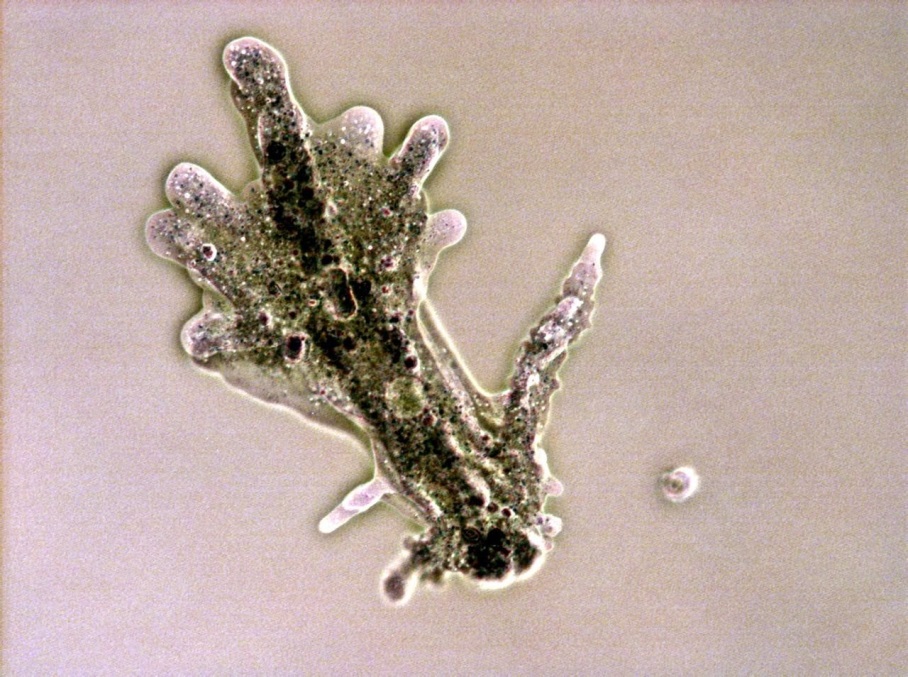
1. How would you explain your answer to question 1?

|  |  |
| --- | --- |
| **A** | Plants cannot be preserved as fossils. |
| **B** | It could be trapped in sediment and replaced by minerals. |
| **C** | It is not a living organism. |
| **D** | It will be preserved as a fossil if it grows bigger. |

**Could it become a fossil?**

**Microorganism**

The photograph shows an amoeba. It is a type of microorganisms made of a single cell.



1. Could the amoeba become a fossil?

|  |  |
| --- | --- |
| **A** | It will **definitely** become a fossil. |
| **B** | It **could** become a fossil. |
| **C** | It will **not** become a fossil. |

1. How would you explain your answer to question 1?

|  |  |
| --- | --- |
| **A** | It is too small to become a fossil. |
| **B** | Only animals can be preserved as fossils. |
| **C** | If it is trapped in sediment and replaced by minerals. |
| **D** | It does not have any hard parts such as bones or a shell. |

**Could it become a fossil?**

**Poo**

The photograph shows some animal poo.



1. Could the poo become a fossil?

|  |  |
| --- | --- |
| **A** | It will **definitely** become a fossil. |
| **B** | It **could** become a fossil. |
| **C** | It will **not** become a fossil. |

1. How would you explain your answer to question 1?

|  |  |
| --- | --- |
| **A** | Only living organisms can be preserved as fossils. |
| **B** | It does not have any hard parts such as bones or a shell. |
| **C** | It was made by a living organism. |
| **D** | It will just decompose. |

**Could it become a fossil?**

**Rock**

The photograph shows a pebble. It is a type of rock.



1. Could the pebble become a fossil?

|  |  |
| --- | --- |
| **A** | It will **definitely** become a fossil. |
| **B** | It **could** become a fossil. |
| **C** | It will **not** become a fossil. |

1. How would you explain your answer to question 1?

|  |  |
| --- | --- |
| **A** | Only living organisms can be preserved as fossils. |
| **B** | Very few things are preserved as fossils. |
| **C** | It is already a fossil. |
| **D** | It was not made by a living organism. |

**Could it become a fossil?**

**Footprint**

The photograph shows an animal’s footprint in some dry mud.



1. Could the footprint become a fossil?

|  |  |
| --- | --- |
| **A** | It will **definitely** become a fossil. |
| **B** | It **could** become a fossil. |
| **C** | It will **not** become a fossil. |

1. How would you explain your answer to question 1?

|  |  |
| --- | --- |
| **A** | It was made by a living organism. |
| **B** | Only living organisms can be preserved as fossils. |
| **C** | It will just break down. |
| **D** | It does not have any hard parts such as bones or a shell. |

*Biology> Big idea BVE: Variation, adaptation and evolution > Topic BVE1: Variation > Key concept BVE1.2: Changes in species over time – fossil evidence*

|  |
| --- |
| **Diagnostic question** |
| **Could it become a fossil?** |

**Overview**

|  |  |
| --- | --- |
| Learning focus: | The fossil record provides evidence that species change over time, but it is incomplete and there are limitations to the conclusions that can be drawn from it. |
| Observable learning outcome: | Recognise that all fossils are the mineralised remains of once-living organisms or of traces left behind by once-living organisms. |
| Question type: | Two-tier multiple choice |
| Key words: | fossils |

**What does the research say?**

There is limited research into children’s understanding (and misunderstandings) of fossils, but Borgerding and Raven (2018) report findings from work with younger children (up to 6 years old), including:

|  |  |
| --- | --- |
| **Commonly understood:** | **Less commonly understood:** |
| * Fossils are not alive. * Fossils are found underground. * Inferences about body shape and size can be made from fossils. * Inferences about the habitats of fossilised organisms can be made from the locations in which fossils are found. | * All fossils have a biological origin – they are the mineralised remains of organisms that were once alive, or of traces left behind by organisms that were once alive. * Things other than bones and shells can become fossilised. * Non-mineralised remains such as skeletons are not fossils. |

In Borgerding and Raven’s study:

* Some of the children did not think that fossilised plants were fossils, perhaps because the children were not sure that plants are living organisms.
* Some of the children could not distinguish between rocks and fossils.
* Few of the children were aware that traces made by living organisms can become fossils, including for example faeces, burrows, footprints and feedings marks; children are probably most familiar with ‘body fossils’ (in which the body structures and tissues of an organism are replaced by minerals) and less familiar with ‘trace fossils’ and impressions left in sediments that become fossilised.
* The children were also not commonly aware that softer parts of organisms (i.e. parts other than bones, shells, teeth, claws and so on) can become fossilised in the correct conditions.

**Ways to use this question**

Students should complete the questions individually. This could be a pencil and paper exercise, or you could use the presentation with an electronic voting system or mini white boards.

*Differentiation*

You may choose to read the questions to the class, so that everyone can focus on the science. In some situations it may be more appropriate for a teaching assistant to read for one or two students.

**Expected answers**

*Animal*

1. B – It could become a fossil.
2. A – Very few dead organisms are preserved as fossils.

*Plant*

1. B – It could become a fossil.
2. B – If it is trapped in sediment and replaced by minerals.

*Microorganism*

1. B – It could become a fossil.
2. A – Very few dead organisms are preserved as fossils.

*Poo*

1. B – It could become a fossil.
2. C – It was made by a living organism.

*Rock*

1. C – It will not become a fossil.
2. D – It was not made by a living organism.

*Animal*

1. B – It could become a fossil.
2. A – It was made by a living organism.

**How to respond - what next?**

If there is a range of answers, you may choose to respond through structured class discussion. Ask one student to explain why they gave the answer they did; ask another student to explain why they agree with them; ask another to explain why they disagree, and so on. This sort of discussion gives students the opportunity to explore their thinking and for you to really understand their learning needs. Responses often work best when the activities involve paired or small group discussions, which encourage social construction of new ideas (meaning making) through dialogue.

If students have misunderstandings about what can become a fossil, examining real fossils in the classroom and in the field will enable them to observe a range of fossil types and may help to build their understanding (e.g. Clary and Wandersee, 2009; Anderson et al., 2016; Teske and Pittman, 2016).

If students have misunderstandings about how the process of fossilisation occurs, the following BEST ‘response activity’ describes a task in which students must build a correctly sequenced explanation through group discussion, which could be used in follow-up to this diagnostic question:

* Response activity: Fossilisation

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**References**

Anderson, A. E., et al. (2016). Students explore fossil creatures of the Cambrian Period Burgess Shale through model-making. *Journal of STEM Arts, Crafts, and Constructions,* 2(1)**,** 32-57.

Borgerding, L. A. and Raven, S. (2018). Children's ideas about fossils and foundational concepts related to fossils. *Science Education,* 102(2)**,** 414-439.

Clary, R. M. and Wandersee, J. H. (2009). Incorporating informal learning environments and local fossil specimens in earth science classrooms: a recipe for success. *Science Education Review,* 8(2)**,** 47-57.

Teske, J. K. and Pittman, P. J. Z. (2016). Eighth graders explore form and function of modern and fossil organisms. *Journal of STEM Arts, Crafts, and Constructions,* 2(1)**,** 79-94.