**What can we learn from fossils?**

Scientists have found many fossils of organisms that lived a very long time ago.



What can fossils help us to work out?

Tick **one** box for each answer.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Answers** | | I am **sure** this is right | I **think** this is right | I **think** this is wrong | I am **sure** this is wrong |
| **1** | The shape and size of the organisms. |  |  |  |  |
| **2** | The structure of the organisms’ bodies. |  |  |  |  |
| **3** | Where the organisms lived. |  |  |  |  |
| **4** | How long ago the organisms died. |  |  |  |  |

*Biology > Big idea BVE: Variation, adaptation and evolution > Topic BVE3: Evolution > Key concept BVE3.1: Explaining evolution*

|  |
| --- |
| **Diagnostic question** |
| **What can we learn from fossils?** |

**Overview**

|  |  |
| --- | --- |
| Learning focus: | The characteristics of a species can change over generations as advantageous adaptations become more common; this is evolution, and can be explained by a process of natural selection. |
| Observable learning outcome: | Explain how the fossil record provides evidence that species change over time. |
| Question type: | Confidence grid |
| Key words: | fossils, evolution |

|  |  |
| --- | --- |
| **P** | **PRIOR UNDERSTANDING**  This diagnostic question probes understanding of ideas that are usually taught at age 5-11, to aid transition from earlier stages of learning. |

**What does the research say?**

School biology curricula in various countries expect students to develop understanding from an early age that fossils provide evidence from which inferences about organisms that lived and died long ago can be made (e.g. AAAS Project 2061, 2009; Department for Education, 2013). Borgerding and Raven (2018) found that children as young as 6 years old commonly understood that inferences about body shape and size can be made from fossils, and that the locations in which fossils are found can allow inferences about the habitats of the fossilised organisms to be made.

**Ways to use this question**

Students should complete the confidence grid 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 question and answers 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**

1. The shape and size of the organisms – **right**
2. The structure of the organisms’ bodies – **right**
3. Where the organisms lived – **right**
4. How long ago the organisms died – **right**

**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.

It has been reported that experience of examining real fossils in the classroom and in the field can increase engagement and learning of key concepts about fossils (e.g. Clary and Wandersee, 2009; Teske and Pittman, 2016); if students have misunderstandings about what kinds of inferences can be made from fossils, it could be helpful to provide some fossil specimens for them to examine in pairs or small groups, with an emphasis on discussion of what you could conclude about the original organisms from observing their fossils.

If students have misunderstandings about fossils and what evidence they can provide about how species and their habitats change over time, or if students have misunderstandings about geological/evolutionary time scales, BEST key concept BVE1.2: Changes in species over time - fossil evidence provides diagnostic questions and response activities to further probe and develop their understanding.

**Acknowledgments**

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Images: pixabay.com/diego\_torres (1000575)

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