**Bugs**

What does the word “bugs” make you think about?

Draw a picture of what you think “bugs” are.

Add labels or an explanation to your drawing.

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| **Bugs** |

*Biology> Big idea BVE: Variation, adaptation and evolution > Topic BVE2: Classification > Key concept BVE2.1: Identifying and classifying organisms*

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| **Diagnostic question** |
| **Bugs** |

**Overview**

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| Learning focus: | Organisms can be identified and classified into hierarchical groups based on their characteristics at the macroscopic and cellular levels. |
| Observable learning outcome: | Distinguish between everyday names and scientific classifications. |
| Question type: | Drawing |
| Key words: | classification |

**What does the research say?**

Students aged 13 have been found to struggle with the meanings and application of various taxonomic classifications such as ‘insects’ where there is interference from everyday use of words such as ‘bugs’. The use of terms such as ‘bugs’, ‘creepy-crawlies’ and ‘minibeasts’ to indiscriminately describe various different types of arthropods can create or reinforce the misunderstanding that arthropods such as arachnids (e.g. spiders), myriapods (e.g. centipedes and millipedes) and crustaceans (e.g. woodlice) are all the same, and perhaps are all insects. Colloquial use of the term ‘bugs’ to also refer to pathogens such as bacteria and the associated illnesses or symptoms could create or reinforce the misunderstanding that arthropods and bacteria are similar and should be classified in the same group (Trowbridge and Mintzes, 1985; Schofield et al., 1984; Shepardson, 2002; Allen, 2014).

Allen (2014) suggests asking children to draw ‘bugs’ as a way of collecting evidence of their preconceptions of the word, and specifically what kinds of organisms they associate with the term. Asking children to draw, write and discuss is an established technique for probing their understanding (and diagnosing misunderstandings) in various areas of biology such as health and inheritance (e.g. Chin and Teou, 2010; Çetin et al., 2013), and has been said to enhance participation. The drawing aspect in particular enables children to convey personal preferences and concepts that may be beyond their current vocabulary (Backett-Milburn and McKie, 1999).

**Ways to use this question**

Students should complete the drawing task individually.

Students should be allowed to approach the drawing task unprompted, in the first instance. The aim of the activity is to probe their preconceptions of the word ‘bugs’ – specifically, what kinds of organisms they associate with the term. However, in some cases it may be helpful to prompt students to think about things that they have heard referred to as ‘bugs’ by family members, friends or on television.

The completed drawings could be discussed in small groups as a follow-up activity (see ‘How to respond - what next?’, below). To reduce sensitivities when the drawings are shared, students could be told **not** to put their names on their drawings.

**Equipment**

For each student:

* pencils, pens or crayons
* paper (if not drawing on the student worksheet)

**Expected answers**

There are no ‘right’ answers; the aim of the activity is to probe their preconceptions of the word ‘bugs’ – specifically, what kinds of organisms they associate with the term.

There is likely to be considerable variation in students’ drawings, including depictions of organisms that resemble:

* insects (e.g. flies)
* myriapods (e.g. centipedes and millipedes)
* arachnids (e.g. spiders)
* crustaceans (e.g. woodlice)
* pathogens (e.g. bacteria, fungi and viruses, although children often incorrectly draw these as resembling arachnids or insects, and with facial features).

**How to respond - what next?**

The completed drawings could be discussed in small groups, with the following questions used to prompt discussion:

* What does each drawing show?
* Which drawings show organisms?
* What are the differences between the organisms?
* Which of the organisms could you see with the naked eye? Which ones would you need to use a microscope to see?
* How would you classify each organism? Can they all be classified in the same group?

The diagram of animal groups in the diagnostic question *Groups within groups* and the ‘classification hints’ from the response activity *Garden groups* could be used to help students classify the organisms depicted in the drawings – specifically to recognise that insects, myriapods, arachnids and crustaceans are different groups, and that pathogens such as bacteria, fungi and viruses cannot be classified as animals.

Allen (2014) suggests that Venn diagram-type depictions of circles within circles may help students to understand hierarchical classification of groups within groups, and that they may be easier for some students to understand than depictions in the style of a “family tree”. The following BEST ‘response activity’ challenges students to discuss and construct Venn diagram-type depictions to classify organisms typically found in a garden, including various arthropods. It could be used in follow-up to this diagnostic question:

* Response activity: Garden groups

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Developed by Alistair Moore (UYSEG).

Images: hand holding pencil - pixabay.com/HeatherPaque (1515895)

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