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

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| **Response activity** |
| **Can it be inherited?** |

**Overview**

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| 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: | Recognise that there is variation between individuals within a species, and that only genetic variation can be inherited. |
| Activity type: | Discussion |
| Key words: | heredity, reproduction, genome |

This activity can help students to overcome misunderstandings about inherited and acquired characteristics through small group discussion. It can be used in response to the following diagnostic questions:

* Diagnostic question: Heritable variation?

**What does the research say?**

Research reported by a number of authors (Driver et al., 1994; Williams, 2012; Cisterna, Williams and Merritt, 2013; Allen, 2014) suggests that children up to age 11 have numerous misunderstandings about family resemblance and how characteristics are passed from one generation to the next, including that acquired characteristics (resulting from interaction with the environment or from learning) can be passed from parents to offspring.

An organism’s characteristics are not only affected by the genome but by the organism’s lifestyle and environment as well. Research indicates that most students at secondary school level think of genes as the only determinants of an organism’s characteristics – a conception dubbed ‘genetic determinism’ (Jamieson and Radick, 2017).

Researchers have used formative assessments coupled with group discussions to develop students’ understanding of ideas about inheritance (e.g. Chin and Teou, 2010).

In order to explain evolution using ideas about natural selection, students must appreciate that only genetic variation can be inherited.

**Ways to use this activity**

Students should complete this activity in pairs or small groups, working together to sort characteristics into groups under headings such as:

* It can be inherited
* It cannot be inherited

and:

* It is affected by genetic information in the genome
* It is affected by lifestyle or the environment
* It is learnt

Each characteristic could be provided on a card, to be sorted into circles – either loops of string or circles drawn on transparency sheets. Students may decide to use a Venn diagram-like approach, in which circles overlap, or you may wish to instruct students to sort the cards this way.

You may decide to ask students to generate a list of characteristics through teacher-led class discussion, or you may provide a ready-made list for students to sort. Ideally, the characteristics to be sorted should include some of each of the following types:

* Characteristics that result from information in the genome and **cannot** be modified by environmental factors (e.g. eye colour)
* Characteristics that result from information in the genome and **can** be modified by environmental factors (e.g. height)
* Characteristics that result from lifestyle or interaction with the environment (e.g. scars)
* Characteristics that are learnt (e.g. skills)

The focus of the activity should be on group discussion to reach a consensus on how the characteristics should be sorted into groups. It is through the discussions that students can check their understanding and develop their explanations. Listening in to the conversations of each group will often give you insights into how your students are thinking.

The quality of the discussions can be improved with a careful selection of groups; or by allocating specific roles to students in the each group. For example, you may choose to select a student with strong prior knowledge as a scribe, and forbid them from contributing any of their own answers. They may question the others and only write down what they have been told. This strategy encourages contributions from more members of each group.

After their discussions, each group should be prepared to report the key points of their discussion to another group, or to the class.

**Equipment**

For each pair/group:

* examples of characteristics printed or written on cards
* circles (e.g. loops of string or drawn on transparency sheets) into which the cards can be sorted

**Acknowledgments**

Developed by Alistair Moore (UYSEG).

**References**

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