**What is a species?**

Lions (*Panthera leo*) are one **species** of animal.



Read the statements in the table. Some are right and some are wrong.

Tick **one** box for each statement.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Statements** | | I am **sure** this is right | I **think** this is right | I **think** this is wrong | I am **sure** this is wrong |
| **1** | The members of a species have many characteristics in common. |  |  |  |  |
| **2** | All the members of a species live together in the same place. |  |  |  |  |
| **3** | Members of the same species can breed to make fertile offspring. |  |  |  |  |
| **4** | Members of *different* species cannot breed to make fertile offspring. |  |  |  |  |
| **5** | The characteristics of a species stay the same forever. |  |  |  |  |

*Biology> Big idea BVE: Variation, adaptation and evolution > Topic BVE1: Variation > Key concept BVE1.1: Differences within species*

|  |
| --- |
| **Diagnostic question** |
| **What is a species?** |

**Overview**

|  |  |
| --- | --- |
| Learning focus: | There is variation between individuals of the same species, caused by differences in the genomes, lifestyles and environments of the individuals. |
| Observable learning outcome: | Recognise what is meant by a ‘species’. |
| Question type: | Confidence grid |
| Key words: | species |

**What does the research say?**

Students at age 11 are likely to be familiar with the term ‘species’ from earlier stages of education (AAAS Project 2061, 2009) and from their everyday experiences, for example from reports about endangered species and conservation. They will have formed their own conceptions of what is meant by a ‘species’, which may or may not align with scientific explanations or usage of the term. Researchers have reported that the term ‘species’ is often used in school science lessons without any explanation of what it means (Ellis and Wolf, 2010).

Many students distinguish between species based solely on visible differences (Jiménez-Tejada, Sánchez-Monsalve and González-García, 2013). There is considerable debate amongst biologists about how to define ‘species’. This debate is rarely acknowledged in school classrooms and textbooks, and ‘species’ is usually defined unproblematically in these settings using what is known as the ‘biological species concept’ – i.e. “a group of organisms that can breed to produce fertile offspring” (Ellis and Wolf, 2010). Biologists have offered many definitions of ‘species’ over many decades, but there are some overarching concepts, including (adapted from Ellis and Wolf, 2010):

* a species is a set of morphologically and genetically similar organisms, living in one or more populations;
* the individuals within the population(s) of a species do or can reproduce to make fertile offspring;
* a species has a separate line of descent from a common ancestor, and its own evolutionary trajectory [or, put more simply, the characteristics of the organisms in a species change (evolve) over many generations, separately to those of other species].

Researchers have recognised that the underlying reasons for the species debate, and many of the alternative species definitions offered, may be too complex to grapple with in school settings, but that it may be useful to widen the traditional definition to encompass the ideas presented in the bullet points above. It has been suggested (e.g. by Chung, 2004) that it may be helpful to acknowledge, even in introductory courses, that the above ideas are *one* useful way of defining a species, but other useful definitions are also sometimes used; this will better prepare students to engage with the species concept debate later.

**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 statements 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 members of a species have many characteristics in common – **right**
2. All the members of a species live together in the same place – **wrong** (a species consists of one or more populations of morphologically and genetically similar organisms, which may be geographically separated)
3. Members of the same species can breed to make fertile offspring – **right**
4. Members of different species cannot breed to make fertile offspring – **right**
5. The characteristics of a species stay the same forever – **wrong** (the characteristics of the organisms in the species change (evolve) over many generations)

**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 how a species is defined in biology, the following BEST ‘response activity’ describes a group discussion-based task that could be used in follow-up to this diagnostic question to help students build their understanding:

* Response activity: Ideas about species

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Images: pixabay.com/Aboeka (1660044)

**References**

AAAS Project 2061. (2009). *Benchmarks for Science Literacy* [Online]. Available at: <http://www.project2061.org/publications/bsl/online/index.php>.

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Jiménez-Tejada, M.-P., Sánchez-Monsalve, C. and González-García, F. (2013). How Spanish primary school students interpret the concepts of population and species. *Journal of Biological Education,* 47(4)**,** 232-239.