**Ideas about species**

Some children discuss their ideas about species.

**Connor**

All the members of a species live together in the same place.

**Amelia**

Members of the same species look similar.

**Freya**

Members of different species can breed to make fertile offspring.

**Zoe**

The characteristics of a species stay the same forever.

**George**

I disagree with Freya. If organisms can breed to make fertile offspring they must be the same species!

**To talk about in your group:**

1. Who do you **agree** with?
2. Who do you **disagree** with, and why?
3. How would you explain the right ideas to these children?

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

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| **Response activity** |
| **Ideas about species** |

**Overview**

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| 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’. |
| Activity type: | Talking heads, discussion |
| Key words: | species |

This activity can help develop students’ understanding of how a species is defined in biology through small group discussion. It can be used in response to the following diagnostic question:

* Diagnostic question: What is a 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. However, 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 activity**

Students should complete this activity in pairs or small groups, and the focus should be on discussion within the group. Students should work together to follow the instructions on either the worksheet or the PowerPoint presentation. Giving each group one worksheet to complete between them is helpful for encouraging discussion, but each member should be able to report back to the class. Listening in to the conversations of each group will often give you insights into how your students are thinking.

If there is disagreement when you take feedback, a good way to progress might be 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.

*Differentiation*

You may choose to read the speech bubbles and 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.

The quality of the discussions can be improved with a careful selection of groups; or by allocating specific roles to students in 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.

**Expected answers**

Students should **agree with Amelia**, though they may think she has not given a full explanation. It is not just the visible features of members of the same species that are similar – their internal body structures and genomes will also be similar, but not identical.

Students should **disagree with Connor**. A species consists of one or more populations of organisms of the same kind, which may be geographically separated.

Students should **disagree with Freya** and **agree with George**.

Students should **disagree with Zoe**. The characteristics of the organisms in a species change (evolve) over many generations.

**Acknowledgments**

Developed by Alistair Moore (UYSEG).

**References**

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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.