**Microorganisms on trial!**

Imagine that all microorganisms are being put on trial.

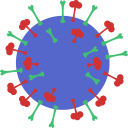
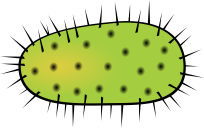
The **Judge** must decide what happens to the microorganisms.

* If they are found guilty, they will be locked away forever!
* If they are found not guilty, they will be allowed to continue roaming free.

**To do in your pair or group**

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| **Prosecution team**   1. Come up with one or more reasons why microorganisms should be locked away. 2. Try to think of examples to support your reasons. The examples must convince the Judge that you are right! 3. When your teacher tells you to, present your reasons and examples to the Judge! |

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| **Defence team**   1. Come up with one or more reasons why microorganisms should be allowed to roam free. 2. Try to think of examples to support your reasons. The examples must convince the Judge that you are right! 3. When your teacher tells you to, present your reasons and examples to the Judge! |



*Biology> Big idea BHD: Health and disease > Topic BHD3: Health and infectious disease > Key concept BHD3.1: Pathogens*

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| --- |
| **Response activity** |
| **Microorganisms on trial!** |

**Overview**

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| --- | --- |
| Learning focus: | The health of humans, other animals and plants can be affected by infection with pathogens, including viruses and some bacteria and fungi. |
| Observable learning outcome: | Recognise that not all microorganisms cause ill health. |
| Activity type: | Role play, discussion |
| Key words: | Health, disease, microorganisms, pathogens, bacteria, fungi, viruses |

This activity can help develop students’ understanding by encouraging them to discuss and debate the positive and negative roles played by microorganisms. It could be used in follow-up to this diagnostic question:

* Diagnostic question: Yogurt drink

**What does the research say?**

The common and incorrect practice of referring to *all* microorganisms as ‘germs’ or ‘bugs’ (or even as ‘pathogens’) indicates the misunderstanding that all microorganisms cause disease (Byrne and Sharp, 2006). Most bacteria and fungi are not pathogenic; many have beneficial and important roles (e.g. the breakdown and cycling of substances by decomposers, and the roles of the gut microbiota in supporting digestion and nutrition), and some are used by humans to perform useful functions (e.g. in fermentation to produce foodstuffs or to synthesise medicines).

Bacteria and other microorganisms are often portrayed in everyday life and even in lessons in a negative light, particularly in disease contexts; this likely contributes to widespread negative perceptions of microorganisms, and to concerns that many students (and teachers) have about working with living microorganisms in lessons (Lock, 1996); it also underscores the need for positive approaches to reassure students that most microorganisms are not harmful (Lock, 2011).

In a study of concept maps drawn by 169 students, Byrne & Grace (2010) found that 11-year-olds much more readily associate microorganisms with disease and the spoilage of food than with any useful roles. In a subsequent study of concept mapping, drawing and interviews with 458 students, Byrne (2011) found that negative perceptions of microorganisms were present in students of all ages from 7-14. In a study of 836 primary school students, over half described microorganisms as being harmful, dirty or a form of pollution (Karadon and Şahin, 2010).

**Ways to use this activity**

Students should complete this role play activity in pairs or small groups.

The idea is that pairs or small groups of students will role play as P**rosecution** and **Defence**. The focus of the activity should be on group discussion to formulate their arguments as either Prosecution or Defence. The pairs or groups must then present their arguments to a **Judge**, who will decide which side has won the case.

The class could be divided into groups of 5 or 7 students, with each group conducting their own ‘trial’ and composed of one Judge, two or three students working on the Prosecution, and two or three students working on the Defence. Alternatively, a whole class trial could be conducted, with the teacher as the Judge, and groups of students assigned to either Prosecution or Defence.

The **Prosecution** team needs to argue why all microorganisms should be locked away forever. The simple argument that “microorganisms cause disease” is unlikely to win the case; they must support their argument with persuasive examples of how microorganisms threaten human life.

The **Defence** team needs to argue why microorganisms should be allowed to continue to roam free. Again, the simple argument that “some microorganisms are helpful” is unlikely to win the case; they must support their argument with persuasive examples of how microorganisms support (and are essential to) human life.

It is through the discussions that students can check their understanding and develop their explanations. Listening in to the conversations of each pair/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 pairs/groups, or by allocating specific roles to students in each pair/group.

*Differentiation*

You may choose to read the instructions 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.

If necessary, prompt students working on the Prosecution team to support their argument by finding examples of microorganisms threaten human life, and prompt students working on the Defence team to support their argument by finding examples of how microorganisms support (and are essential to) human life.

It might be helpful to provide access to printed and digital resources so that students can do some research and find examples to support their argument.

**Equipment**

For each pair/group:

* access to printed and digital resources on microorganisms (optional)

For the class activity:

* props such as a judge’s wig, costume and gavel (optional)

**Acknowledgments**

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Images: judge – pixabay.com/mohamed\_hassan (3008038); red virus – pixabay.com/Pixaline (2833622); purple virus – pixabay.com/OpenClipart-Vectors (1294144); green bacterium – pixabay.com/OpenClipart-Vectors (156869); grey bacteriophage – pixabay.com/OpenClipart-Vectors (149183)

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