

Microbe Maker

Activity Guide

Discover how DNA can provide clues to how microbes work and whether they are 'good' or 'bad'.

Suitable for: age 7-12

Estimated duration: 30 minutes

You will need:

- DNA profile cards (one set per table)
- DNA key sheet (one per person)
- Worksheets (one per person)
- Colouring pens/pencils

Introduction

A bit like a recipe book, all the biological instructions for making an organism are contained in a long molecule called DNA (deoxyribonucleic acid). All living things, from humans to microbes, have a unique set of instructions written in the four chemical letters of DNA: A, C, G, and T.

All of the DNA in a cell is called the genome. Within the genome there are sections of DNA called genes. Genes provide specific instructions for individual characteristics, like shape and function of the cell. Sometimes there can be small differences in a gene, for example where there's an A in one microbe there may be a T in another. These changes can alter the outcome of the instruction, like making some microbes useful for producing food like yogurt whilst making others cause potential illness. These differences are known as genetic variation. It is this variation that makes all creatures unique. Looking at the DNA profile of microbes can help to understand how they live and whether they are good or bad for us as humans.

In this activity the group will learn how differences in the DNA code can have an impact on the shape and function of microbes. Learners will recreate different microbes by looking at DNA profile cards and working out what traits they may have using a DNA key card.

Running the activity

Setting up the activity

1. Print all the profile cards, DNA key sheets and worksheets needed for the group.
2. Give each learner or small group of learners a selection of profile cards to pick from as well as DNA key sheets, worksheets and colouring pens/pencils.

Warm up discussion

1. Begin the activity by discussing with your group that DNA contains the instructions for making all living things. Made up of four chemical letters, A, C, G, and T, the sequence of DNA letters can influence how all living creatures look.
2. Ask learners to name what creatures have DNA and prompt them to think about 'germs' and microbes too.
3. Explain how microbes are really tiny and can be found everywhere. They are as different from one another as different animal species are. Highlight how some can be 'bad' and make us poorly but most are actually 'good' and really interesting. Many are used to make food (e.g. yogurt and cheese) and medicines we rely on (e.g. insulin).
4. Describe how you can find out what a microbe is like by looking at its DNA. It's like reading the instruction manual so you know how it works. Scientists can get the DNA code fairly easily but they also have to work out what the code does.

How to complete the activity

1. Demonstrate how to use the DNA key sheet. Use the microbe shape gene as an example. Highlight that there are two shape templates (round and rod), make sure you choose the right one!
2. Explain how to work through the list of genes in the microbe profile and decode each one. Once decoded, tick the relevant characteristic box on the worksheet.

How to complete the activity (cont.)

3. Once all the information has been decoded, use the details to draw the microbe on the worksheet.
4. Any features not in the DNA code can be added (e.g. colour of the microbe). Also encourage learners to think if their microbe would be good or bad and how this might be reflected in the features their microbe has.

Follow-on questions

Ask learners to compare the microbes they drew. Can they link the differences they see in the pictures to differences in the DNA codes they were working from?

Discuss what each feature really means for the microbe:

- **Shape:** The physical shape the cell takes. This can affect things like the surface area to volume ratios which can affect how microbes get nutrients.
- **Eyes:** Even microbes react to external factors with some having light sensitive proteins in their cells that help them orientate themselves. Though they can't 'see' like we can they can still sense the world around them.
- **Shield:** Many microbes live in very harsh environments. To survive some have evolved to have a capsule or shield layer that helps make their cells tougher and less likely to be damaged.
- **Tails:** Microbes move in different ways. Some slide on slime, others swim. They do this using flagella (tails) that can move them through the environment they are living in.

Encourage learners to think about what features they couldn't work out from the DNA. Was it just missing information or are there some things about microbes that you cannot tell by only looking at their DNA? e.g. how they work with or fight other microbes.

Take it further

Did you know variation in DNA has a similar effect on human traits. Try our activity, Recreate a Face: <https://www.yourgenome.org/theme/recreate-a-face/>

Want to see how all the information is stored in DNA. Why not make your own helix and see which part contains the letter codes in our activity, Yummy Gummy DNA: <https://www.yourgenome.org/theme/yummy-gummy-dna/>

Find out more

- What is DNA: <https://www.yourgenome.org/theme/what-is-dna/>
- What is a gene: <https://www.yourgenome.org/theme/what-is-a-gene/>
- What is a genome: <https://www.yourgenome.org/theme/what-is-a-genome/>
- What is genetic variation: <https://www.yourgenome.org/theme/what-is-genetic-variation/>