



COOKING UP The Curriculum

Pre-Event Information and Activities

At the Cooking Up the Curriculum Event we will be hearing from Dr. Hamid Ghoddusi from London Metropolitan University. Dr. Ghoddusi is a food scientist and microbiologist. His work focuses on the microbes in food that can help preserve them and make them healthy for us. This is a process called fermentation. We will learn a little bit about microbes before meeting Dr. Ghoddusi, and do some experiments in fermentation after we meet him.

What are Microbes?

What do you already know about microbes?

Micro-organisms, sometimes called microbes, germs, or bugs, are living things that are too small to be seen with our eyes; they can only be seen through a microscope. There are three main types of microbes: bacteria, viruses, and fungi. Today we are going to be focusing on bacteria and fungi and the role bacteria plays in food.

Some bacteria are safe for humans and even helpful to us. Others can cause diseases and infections. Have you, or anyone in your family been sick? Do you know what caused it?

Do you know any examples of useful microbes found in food? Some examples are:

- Lactobacillus is yoghurt and probiotic drinks - it's a bacteria
- Yeast in bread - it's a fungus

Practical (Option 1): Design a Bug

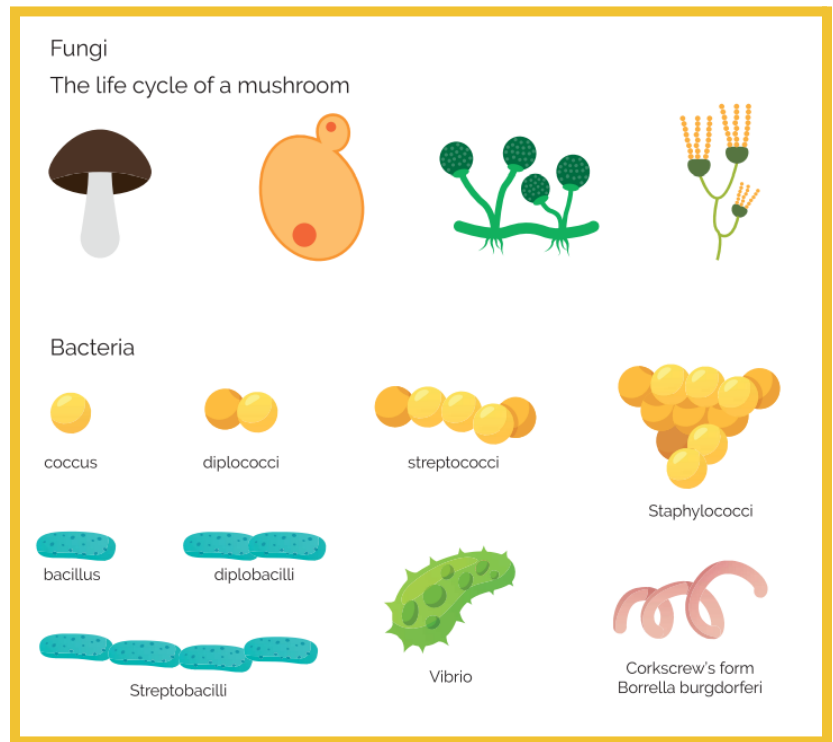
This activity allows students to explore the different types of microbes present in food by designing their own microbes.

Students will:

1. Choose what microbe they want to be (a bacteria or fungi)
2. Add more detail to microbe (shape, useful or harmful microbe)
3. Name your microbe

Instructions

1. Ask students to decide which microbe bacterium or fungus they want to design
2. Decide which microbe shape they would like it to be based on the image above
3. Ask students to decide whether they want their microbe to be a useful or harmful microbe.
4. Ask students to add some details to their microbe depending on whether they've chosen a useful or harmful microbe to design, this could be eyes, a smile, big bushy eyebrows or long wobbly arms.
5. Ask students to give their microbe at least two special feature and a strength or weakness



6. Ask students to name their microbe, this could be a combination of their own name and the microbe shape.
7. At the end of the activity provide students with examples of realistic microbes so they can compare their own designed microbes with real microbes that exist in the world. You can see some examples above.

Practical (Option 2): Balloon Bugs

This activity is all about bacteria. Bacteria come in lots of shapes and sizes. When we identify bacteria in the laboratory we often name them by their shape or where they are found.

- Round ones are called cocci, rod shaped ones are called bacilli, gently curved ones vibrio and spiral ones are called spirilla or spirochetes.
- Bacteria that live in very hot conditions are named thermophiles and those found in extreme cold are named psychrophiles.
- Some bacteria can appear to be different colours, e.g. cyano-bacteria are blue/green while rhodobacteria are red.
- Some bacteria can move around. Tail-like structures called flagella allow some bacteria to move around their environment.

The aim of this activity is to raise the awareness of the diversity of bacteria shapes and sizes. It also introduces how bacteria can cause disease.

Materials

- Balloons of different shapes and sizes, in particular round, sausage and squiggly shapes.
- Balloon pump(s)
- Lengths of wool (to represent flagella)
- Double-sided sticky tape
- Marker pens or felt tip pens
- Tags for labelling the bacteria*
- String
- Rubber bands
- Scissors (to cut around the tags)
- Hole punch

*If you do not wish the children to use scissors, provide pre-cut and hole punched tags.

Before running the activity, check whether any of the students have latex allergies. If there are any students with latex allergies provide alternative craft materials such as cotton wool balls, large polystyrene balls or toilet rolls and craft paper. Make sure that students use balloon pumps to inflate the balloons and not their mouths.

Activity Prep

1. Room setup (prior to students arriving)

It is recommended that you set up separate craft tables for each shape of bacteria with all the correct balloons and necessary materials to make the bug before the start of the session.

Alternatively, prepare several Balloon Bug boxes (one box per bacteria) with all the necessary materials to make the balloon bug. Using this method you can split the class into several groups where the students choose a box and follow the instructions inside to create a balloon bug.

2. Make your own balloon bugs

To provide guidance for the students we recommend you make some example models before the session, ideally one of each bacteria.

Running the Activity

1. Introduce the topic of bacteria using the information above. This will allow students to understand that bacteria come in lots of different shapes and sizes, as well as introduce the activity and the three different bacteria they can choose to make
2. Get the students making their own balloon bacteria.

Guidelines for making the Balloon Bugs

Below are instructions for making three different Balloon Bugs.

How to make a Streptococcus Pneumoniae

We all have this Streptococcus in our throats. However, it can sometimes cause disease. Bacteria like Streptococcus are becoming a health threat because they are increasingly resistant to antibiotics.

1. Using a hand pump, blow up three small round balloons and tie off the ends. Try to make each balloon the same size as the next. Use small pieces of double sided tape to stick the balloons end to end; OR Blow up one long balloon and leave a little room in the end. Twist the balloon in regular intervals and hold in place with a rubber band.
2. If you have time, draw markings on the side of the balloons as in the picture.
3. Complete and attach your name tag



Streptococcus pneumoniae. Shutterstock.

How to make a Salmonella Typhimurium

Salmonella bacteria can cause food poisoning. Food poisoning due to Salmonella affects a lot of people around the world who have drunk unclean water or eaten food that has not been cooked properly.

1. Using a hand pump, blow up one long balloon and tie it off.
2. Use the tape to stick lengths of wool to the balloon like flagella.
3. If you have time, draw markings on the side of the balloons.
4. Complete and attach your name tag.

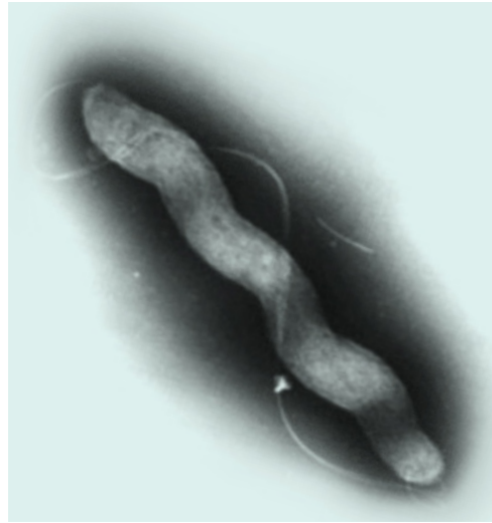


Salmonella typhimurium. David Goulding, Wellcome Trust Sanger Institute.

How to make a Campylobacter Jejuni

Campylobacter is the most common cause of food poisoning. It is found in undercooked chicken and unclean water, causing tummy cramps, diarrhoea and fever.

1. Using a hand pump, blow up one squiggly balloon and tie it off.
2. Stick a long piece of wool to each end
3. Complete and attach your name tag.



Campylobacter jejuni. B. Wren, London School of Hygiene & Tropical Medicine.

Bad Microbes: Food Hygiene

Some microbes like to grow in nice warm damp places, such as inside our bodies, and when they find somewhere they like, they grow and multiply. But they usually don't like places that are very warm or cold. How do you think harmful microbes enter our bodies? It can be through the food that we eat.

Do you know why we cook food or keep it in the fridge? Putting food in the fridge only slows or stops microbial growth, it doesn't kill it. The microbes will grow again when they come out of the fridge. The only way to kill microbes is to cook food until it is really hot and cooked all the way through. This is because very warm temperatures kill many harmful microbes.

Which foods do you think contain the most harmful bacterium? Which of the below foods contain useful or harmless bacteria and which contain harmful bacteria?

- Fruit and vegetables
- Milk
- Yoghurt
- Bread
- Raw Chicken
- Raw Sausages

Answers:

- Fruit and vegetables: Most of the microbes found in fruit and vegetables are harmless, but sometimes harmful microbes can be found in the soil in which they are grown. It is therefore important to wash all fruit and vegetables before cooking and/or eating them.
- Milk: Fresh milk contains Lactobacillus Bacteria which helps us digest food. There can also be harmful microbes that are removed when the milk is heated up (pasteurised) before it is sent to the shops
- Yoghurt: Yoghurt usually contains Lactobacillus Bacteria which helps us digest food
- Bread: The yeast Saccharomyces cerevisiae helps bread to rise
- Raw Chicken: Raw chicken may contain Salmonella E. coli or Campylobacter Bacteria, all of which can cause food poisoning in humans.
- Raw Sausages: Raw meat may contain Salmonella E. coli Bacteria which can cause food poisoning in humans

Practical: Interactive Food Hygiene Quiz

All students will:

- Understand that microbes can be found on our food and can transfer to humans
- Understand that cooking food properly can kill harmful microbes
- Will understand that bacteria multiply very quickly

Most students will:

- Understand that refrigeration only stops microbes growing, it doesn't kill them
- Understand the difference between 'use by' and 'best before'

You can use the link below to access a great interactive food hygiene quiz by the UK Health Security Agency, as part of their e-Bug Programme. You can access more of their resources that spans key stages and their free training on food safety [here](https://e-bug-prod-stack-s3bucket-qfn1eoa6k1na.s3.amazonaws.com/eu-west-2/documents/gb_ks2_fh_food_hygiene_interactive_whiteboard_presentation_-_accessibility_audit.pptx).

https://e-bug-prod-stack-s3bucket-qfn1eoa6k1na.s3.amazonaws.com/eu-west-2/documents/gb_ks2_fh_food_hygiene_interactive_whiteboard_presentation_-_accessibility_audit.pptx