



National Curriculum Links

Key Stage 2

Sc1: 2a, 2b, 2f, 2h

Sc2: 5a, 5f

Estimated Teaching Time

50 minutes

1.1 Micro-organisms An Introduction

In this section students are introduced to the world of microbes, firstly by exploring the different types and shapes of microbes and later, by close examination of beneficial and harmful microbes.

The introductory activity allows students to combine their observational and creative skills to make a microbe of their own choice hence reinforcing various microbial types and shapes.

The extension activity *Microbe Mania* reiterates the classroom lesson and allows students to decide whether the microbe being discussed is a bacterium, virus or fungus!

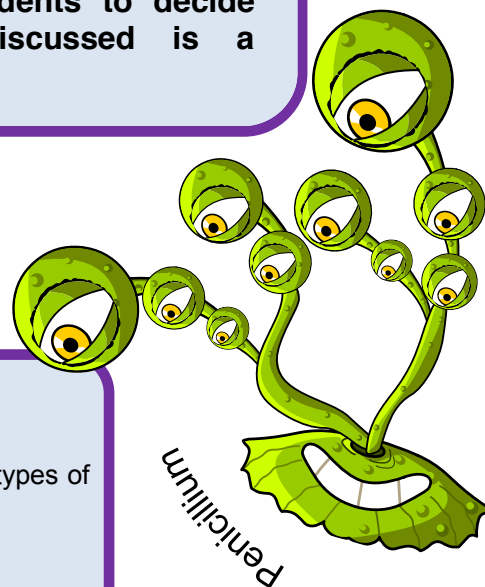
Learning Outcomes

All students:

- Will know that bacteria, viruses and fungi are three different types of microbe
- Will understand that microbes are found everywhere

More able students:

- Will know that microbes come in different shapes and sizes





e-Bug

1.1 Micro-organisms

An Introduction

Key Words

Bacteria
Bug
Cell
Disease
Fungi
Germ
Microbe
Micro-organism
Microscope
Pathogen
Probiotic
Viruses

Materials Required

Per Student

- ☐ A copy of [SH 1](#)
- ☐ A copy of [SW 1](#)
- ☐ A copy of [SW 2](#)
- ☐ Petri dish (optional)
- ☐ Microbial images from www.e-bug.eu

Per Group

- ☐ Play dough in a variety of colours (for home made recipe see [TS 4](#))

Available Web Resources

- A demonstration film of the activity
- A variety of microbial photographs

FASCINATING FACT

Anthony van Leewenhoek created the first ever microscope in 1676. He used it to examine various items around his home and termed the living creatures (bacteria) he found on scrapings from his teeth 'animalcules'.

Background Information

Micro-organisms, also known as germs, bugs or microbes, are tiny living organisms too small to be seen with the naked eye. They are found almost everywhere on earth. Some microbes are beneficial and others can be harmful to humans (this will be explored in later sections). Although extremely small, microbes come in many different shapes and sizes. There are three main groups of microbes:

Viruses are the smallest of the microbes and are generally harmful to humans. Viruses cannot survive by themselves. They need a 'host' cell in order to survive and reproduce. Once inside the host cell, they rapidly multiply and destroy the cell in the process!

Fungi are multi cellular organisms that can be both beneficial and harmful to humans. Fungi obtain their food by either decomposing dead organic matter or by living as parasites on a host. Fungi can be harmful by causing infection or being poisonous to eat; others can be beneficial or harmless, e.g. *Penicillium* which produces the antibiotic penicillin. There are also fungi that are not microbes and some that can be eaten like *Agaricus*, commonly known as the white button mushroom.

Bacteria are single-celled organisms that can multiply exponentially once every 20 minutes. During their normal growth, some produce substances (toxins) which are extremely harmful to humans and cause us disease (*Staphylococcus*); other bacteria are completely harmless to humans and others can be extremely useful to us (*Lactobacillus* in the food industry), some are even necessary for human life such as those involved in plant growth (*Rhizobacterium*). Harmless bacteria are called non-pathogenic, while harmful bacteria are known as pathogenic. Over 70% of bacteria are non-pathogenic.

Bacteria can be simply divided into three groups by their shapes – cocci (balls), bacilli (rods) and spirals. Cocci can also be broken down into three groups by how the cocci are arranged: staphylococci (clusters), streptococci (chains) and diplococci (pairs). Scientists use these shapes to tell which infection a patient has.

Advance Preparation

- Prepare a copy of [SW 1](#) and [SW 2](#) for each student.
- Prepare [SH 1](#) poster for the classroom or on the white board.
- Purchase or follow the recipe in [TS 4](#) to make play dough in a variety of colours.
- Download a variety of microbe images from www.e-bug.eu for student viewing.





1.1 Micro - organisms

An Introduction

Lesson Plan

Introduction

1. Begin the lesson by asking children what they already know about germs or bugs. Ask the children if they have, or anyone in their family, ever been sick? What was the disease and what do they think caused it?
2. Explain to the children that some diseases called infections are caused by germs and that these are tiny living organisms called microbes. Show the children that there are three different types of microbe: bacteria, viruses and fungi. Use the colour poster provided ([SH 1](#)), which is also found on the e-Bug website (www.e-bug.eu), for whiteboard presentation format.
3. Explain that these microbes are so small that they can only be seen through a microscope. Use the web activity or provide students with [SH 2](#) to demonstrate the different sizes of microbes.
4. Emphasise that although some microbes cause disease, there are also beneficial microbes. Ask children to identify some useful microbes. If they cannot, provide examples for them e.g. *Lactobacillus* in yogurt and probiotics drinks, penicillin from fungi, etc.
5. Highlight to the class that microbes can be found EVERYWHERE: floating around in the air we breathe, on the food we eat, on the surface of our bodies, in our mouth, nose and gut/tummy.

Main Activity

1. This activity can be done either individually or in groups.
2. Provide each group with either a colour handout ([SH 1](#)) of the different types of bacteria or place colourful posters on the classroom walls from the website www.e-bug.eu. These handouts will show the range of shapes and sizes of microbes with names and whether they are useful or harmful microbes.
3. Provide each group with play dough in a variety of colours, petri dishes and a copy of [SW 1](#).
4. Ask each child / group to recreate a microbe or groups of microbes in their petri dish based on the coloured images provided.
5. Each child must decide whether or not they think their microbe is useful or harmful and provide its name. It is important to let the children get as creative as possible whilst taking into consideration the actual structure of microbes.
6. Remind the class that fungi are the largest microbes and viruses are the smallest.
7. If time permits, students can then present their microbes to the class.





e-Bug

1.1 Micro - organisms An Introduction

Lesson Plan

Plenary

Check for understanding by asking the children the following questions:

1. What are the most common types of microbe?
There are three main types of microbe known as bacteria, viruses and fungi.
2. What are germs?
A germ is another name used to describe a harmful microbe.
3. Where is a microbe found?
Microbes are found EVERYWHERE, floating around in the air we breathe, on the food we eat, on the surface of our bodies, in our mouth, nose and gut/tummy.
4. Are all microbes harmful?
*No, although there are microbes which can be harmful to us there are also a lot of microbes that are very useful to us that we use every day, for example, *Saccharomyces* (fungi) is used to help bread rise, *Lactobacillus* (bacteria) help make yogurt and cheese.*
5. What are the different shapes of bacteria?
*Spirals (*Campylobacter*), Rods (*Lactobacilli*) and Balls (*Staphylococcus*).*

Extension Activity

1. Provide each student with a copy of [SW 2](#) and [SH 1](#).
2. By reading the descriptions and using the information on their handouts students must decide whether the microbes are bacteria, virus or fungi.
 - a. *Staphylococcus* is a bacterium.
 - b. *Lactobacillus* is a bacterium.
 - c. *Dermatophytes* are fungi.
 - d. *Influenza* is a virus.
 - e. *Penicillium* is a fungus.
 - f. *Campylobacter* is a bacterium.



1.1 Micro - organisms

An Introduction

Home-made play dough Recipe

Play dough is a soft, pliable material that can keep children occupied for considerable lengths of time. Play dough is available to purchase under a range of different brand names but it may be cost effective to make your own. Home made play dough has the added advantage that you can choose your preferred palate of colours. The home made play dough is non-toxic, brightly coloured and easily sculpted making it an ideal tool for creative play and this activity.

Ingredients

- 1 cup of plain flour
- 1 cup of water
- 1/2 cup of salt
- 2 tablespoons of cream of tartar
- 2 tablespoons of oil
- Food colouring

Method



Mix together the **dry ingredients**



Add the **water** and **mix** until smooth



Add the **food colouring** followed by the **oil**



Cook on a **medium heat**, **stirring constantly**, until the dough leaves the side of the pan in a ball



Allow to **cool** before use





What are Microbes?

- Microbes are living organisms
- They are so small we need a microscope to see them
- They come in different shapes and sizes

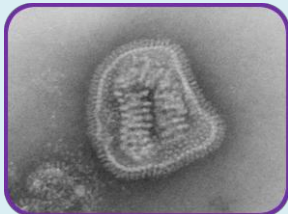
- They are found EVERYWHERE!
- Some microbes are useful or even good for us
- Some microbes can make us ill



There are **3** different types of microbes:

VIRUSES

Influenza



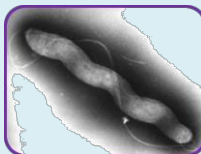
- Viruses are even smaller than bacteria and can sometimes live INSIDE bacteria!
- Some viruses make us sick.
- Diseases like CHICKENPOX and the FLU are caused by viruses.
- Viruses can spread from one person to another but it depends on the type of virus.

BACTERIA

- There are three different types of bacteria. They look like:

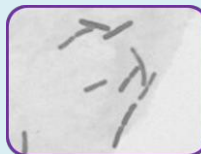
Spirals

(*Campylobacter*)



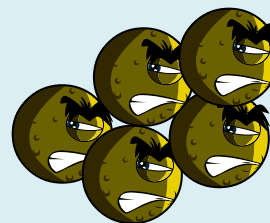
Rods

(*Lactobacillus*)



Balls

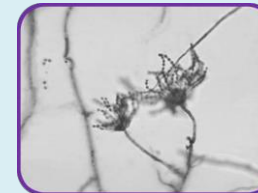
(*Staphylococcus*)



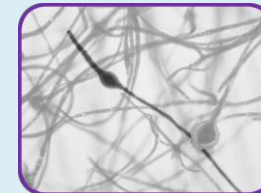
- They are so small that 1000s of bacteria could fit on the full stop at the end of this sentence.
- Some bacteria are helpful in cooking, for example, making yogurt and cheese.
- Some bacteria are harmful and cause infection.

FUNGI

Penicillium

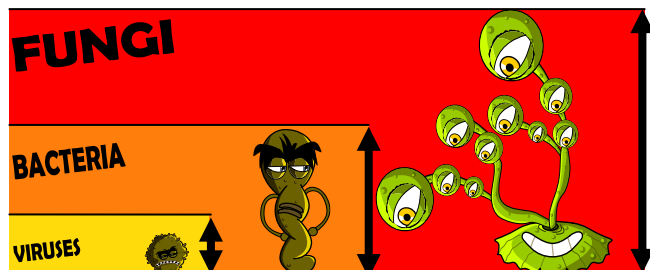


Dermatophyte



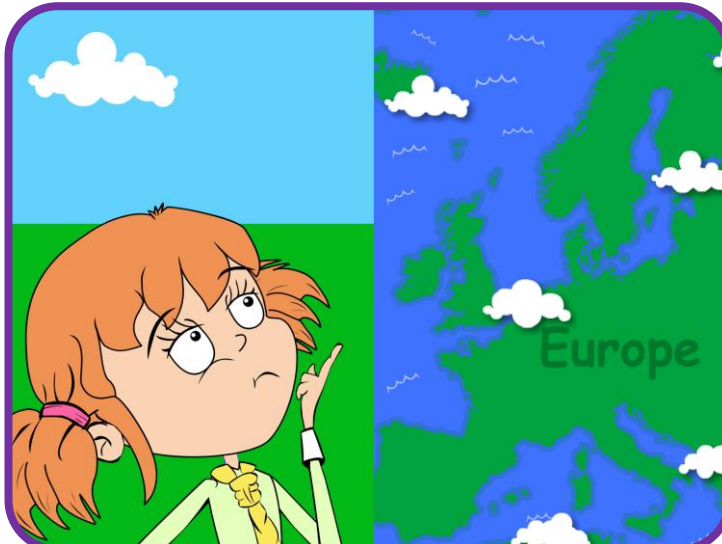
- Fungi are the largest of all microbes.
- Fungi can be found in the air, on plants and in water.
- Mould, which grows on bread, is a type of fungus.
- Some antibiotics are made by fungi!

Microbe Size





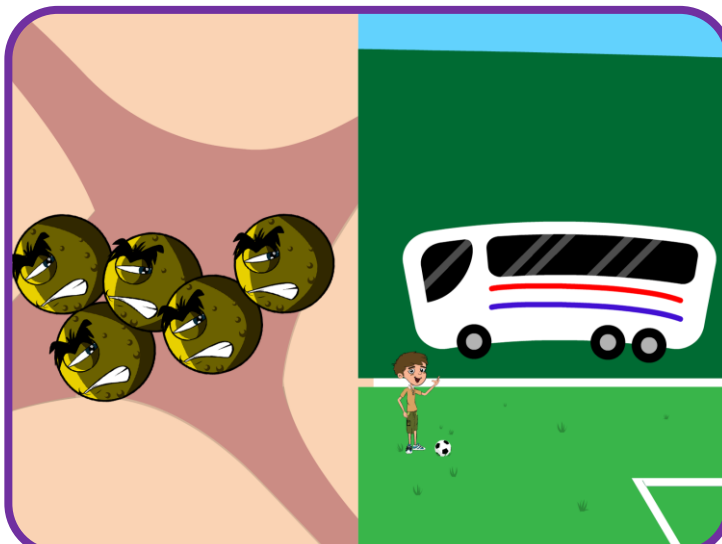
How big is a Microbe?



1. If you were as big as EUROPE...



2. A FUNGUS would be the size of a football pitch!



3. A BACTERIUM would be the size of a BUS!



4. A VIRUS would be the size of a FOOTBALL!



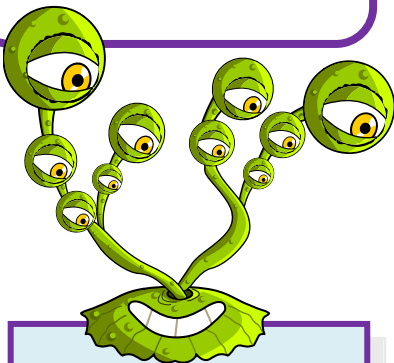
Bacteria come in lots of different shapes and sizes – some are round like balls, some are like spirals and some are long like rods. Some even use tail like structures to help them swim and move!

Design a microbe of your choice, either a bacterium, a virus or a fungus using the materials provided.

Before you start, decide if your microbe will be beneficial or harmful! Here are some pictures which might help!

My Observations

1. Is it a beneficial or harmful microbe?
2. Choose a name for your microbe.



Fascinating Fact

YOU are home to 1000 million microbes!



Draw your microbe here

This is a picture of my



123

Microbe Mania

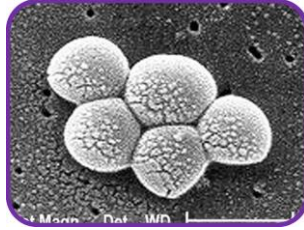
There are 3 different types of microbe – bacteria, viruses and fungi.

From the pictures and descriptions, can you work out which microbe is which?

Hint

Remember there are three different types of bacteria

- rods
- spirals
- balls



My name is **Staphylococcus**. I am round in shape and I like to live in your nose or armpit! If I live on your skin I can give you spots. If I get into your bloodstream I can make you ill! What am I?

Staphylococcus is a:



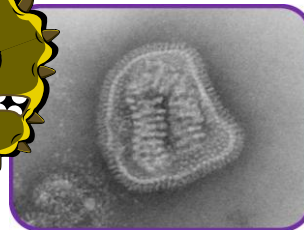
My name is **Lactobacillus**. People call me 'friendly' because I change milk into yogurt! When you eat me in yogurt I live in your guts and help you digest other food. What am I?

Lactobacillus is a:



I'm called a **Dermatophyte** and I like to live on your skin. I especially like living in damp places like between the toes on sweaty feet! When I live there I give people athlete's foot! What am I?

Dermatophytes are:



My name is **Influenza** but my friends call me the 'flu'. I'm very generous; I like to give people headaches and fever. I easily spread from person to person through coughing and sneezing. What am I?

Influenza is a:



My name is **Penicillium** and you'll find me growing on old oranges or stale bread making them look mouldy. Humans use me to make an antibiotic known as Penicillin which can make them better, but only from bacterial infections! What am I?

Penicillium is a:



My name is **Campylobacter**. I have a pretty spiral shape and I like to live in chickens but if I get into your tummy I make you very ill – I can give you diarrhoea! What am I?

Campylobacter is a:

