



Key Stage 3

Lesson 3: Harmful Microbes

Teacher Guidance

Some microbes can be harmful to humans and can cause disease: the *Influenza* virus causes the 'flu' (short for 'Influenza' – other respiratory tract infections (RTIs) that cause similar symptoms are the 'common cold' or 'influenza-like illness'), *Campylobacter* bacteria can cause food poisoning and the dermatophyte fungi, such as *Trichophyton*, can cause diseases such as athlete's foot and ringworm. Microbes like these are known as pathogens. Each microbe can make us ill in different ways.

When harmful bacteria reproduce in our bodies, they can produce harmful substances called toxins which can make us feel ill. Bacteria and toxins can damage tissues and organs and make us very unwell, fortunately this is rare.

Viruses need to live within a cell in order to survive. Once inside a cell, they multiply until fully grown and leave the host cell. Dermatophytes generally prefer to grow or colonise under the skin. The products they produce while feeding cause swelling and itching.

Someone who is ill because of a harmful disease-causing microbe is said to be infected. Many harmful microbes can pass from one person to another by a number of different routes – air, touch, water, food, aerosols (such as sneezes and water vapour), animals, etc. Diseases caused by such microbes are said to be infectious diseases.

In some cases, infectious diseases can spread in communities or large areas, this is called an epidemic. When the disease spreads to most of the world this is known as a pandemic. The COVID-19 pandemic was started when a new virus SARS-CoV-2 caused the disease COVID-19 infecting a population in China. This virus was very infectious, and global travel is so commonplace, it was able to spread quickly and infect people all over the world.

It is important to remember that not all microbes are harmful, and some microbes are only harmful when taken out of their normal environment. For example, *Salmonella* and *Campylobacter* live in the gut of chickens usually without causing them any harm. However, when they enter the human gut, the toxins they release through their normal growth can make us very ill.

Our bodies have also adapted to help us get rid of these infections; this may be in the form of:

- **Fever:** Microbes prefer to live at normal body temperature at 37°C. A fever or increase in body temperature is one of the body's immune responses to eliminate the perceived threat (microbe) inside the body.
- **Swelling:** A cut on the hand may result in swelling; this is our body responding in a similar way to a fever only in a more localised way.
- **Rash:** This is our body's reaction to microbial toxins.