IDENTIFYING BACTERIA

Bacteria come in lots of different shapes, sizes and colours.

When we identify bacteria in the laboratory we often name them by their shape:

- Round ones are called **cocci**.
- Rod shaped ones are called **bacilli**.
- Gently curved ones are called **vibrio**.
- Spiral ones are called **spirilla** or **spirochetes**.

Different bacteria like to live in different conditions:

- Some bacteria prefer to live in very hot conditions. These are called **thermophiles**.
- Bacteria which are found in extreme cold are called **psychrophiles**.

Bacteria can be different colours:

- Blue/green bacteria are called **cyano-bacteria**.
- Red bacteria are called **rhodo-bacteria**.

What do you have to do?

1. Look at the bacteria cards on the table.
2. Decide which one you are going to make.
3. Follow the instructions on the card to build your balloon bacterium.
4. Once you have built your bacterium fill in the identification tag and tie this with string to your balloon bacterium.

STREPTOCOCCUS PNEUMONIAE

(Sore throat, meningitis and pneumonia)

Streptococcus pneumoniae. Shutterstock.

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.

These bacteria often attach to each other to make chains of bacteria (see picture). The markings on the outside are blobs of proteins. Our bodies recognise these proteins so our immune system can fight the infection.

What to do:

1. Using the pump provided, 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 modelling 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 a name tag.

SALMONELLA ENTERICA PATHOVER TYPHIMURIUM

(Salmonella food poisoning)

Salmonella typhimurium. David Goulding, Wellcome Trust Sanger Institute.

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.

Food poisoning starts in a person's tummy and the symptoms are sickness and diarrhoea.

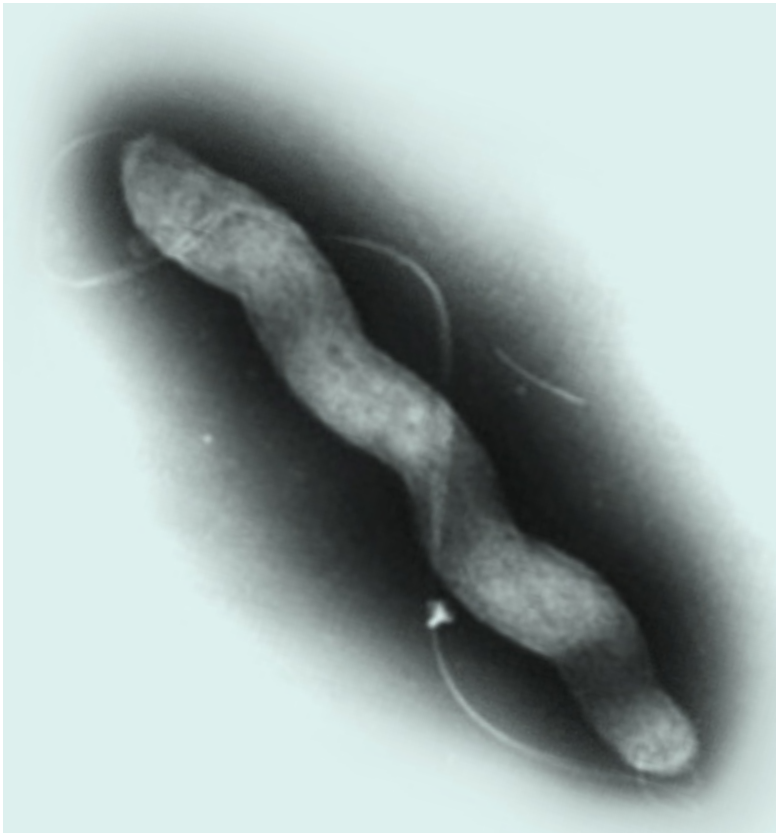
The bacterium uses the long string-like structures seen in the picture (flagella) to move around and stick to the inside of a person's tummy.

What to do:

1. Using the pump provided, 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 a name tag.

CAMPYLOBACTER JEJUNI

(Food poisoning)



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

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

Its spiral shape means that this bacterium moves in a corkscrew manner, helped by the two long, stringy structures attached to each end (flagella).

What to do:

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

CLOSTRIDIUM DIFFICILE

(Diarrhoea, stomach cramps and severe swelling of the bowel)

Clostridium difficile. David Goulding, Wellcome Trust Sanger Institute.

Clostridium difficile is a bacterium that is found in the gut of children and some adults. Usually the gut is full of lots of different bacteria which all compete for space, limiting the number of *C. difficile* bacteria found there. In low numbers *C. difficile* doesn't cause problems.

However, sometimes if a person has taken antibiotics the natural balance of bacteria in the gut changes because the competing bacteria are killed. When this happens *C. difficile* can increase in number and take over in severe cases. They produce lots of toxins that can damage the gut and cause diarrhoea. *C. difficile* is classed as a "superbug" as some strains are resistant to antibiotics.

What to do:

1. Using the pump provided, blow up a long model-makers balloon, leaving a little room at the end. Tie off the end of the balloon.

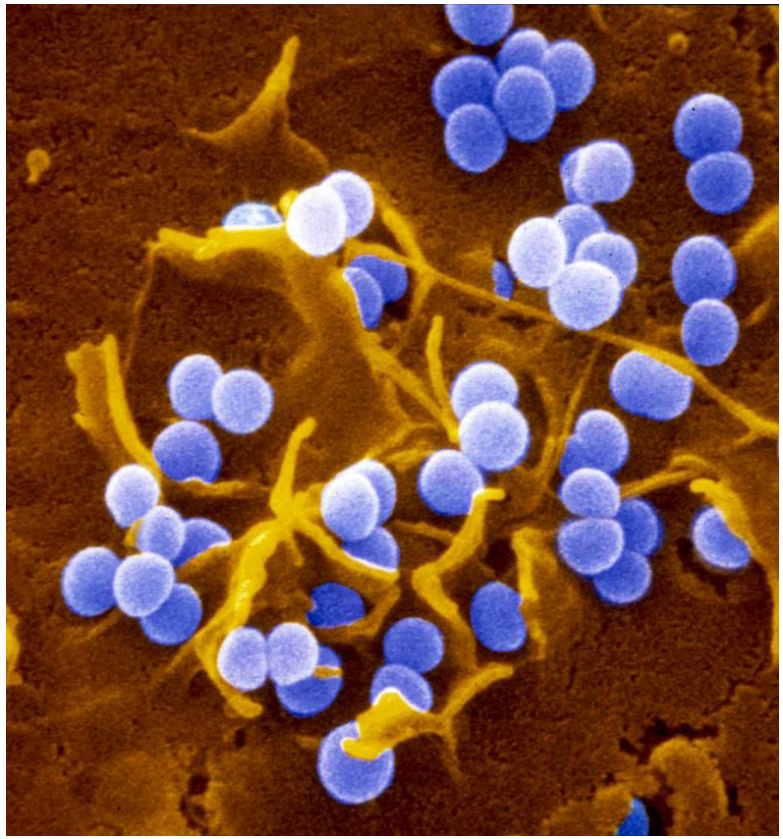
2. Pinch and twist the balloon into four even-sized sausages.

3. Bundle the four sausages together and make a knot using the tied-off end and un-inflated end to make a colony of four bacteria.

4. Complete and attach a name tag.

METHICILLIN-RESISTANT *STAPHYLOCOCCUS AUREUS* (MRSA)

(Skin infections, food poisoning and heart infections)



Staphylococcus aureus. Sharon Peacock, Oxford University.

Staphylococcus aureus is a type of bacterium that is commonly found on human skin and the lining of the nose. *S. aureus* can cause problems if it enters the body and reaches places where it is not normally found. For example, if you cut yourself the bacteria can get under the skin and form a boil. If the bacteria enter the bloodstream this can cause blood poisoning, an infection of the blood.

S. aureus infections can usually be treated with antibiotics. MRSA is a type of *S. aureus* that is not killed by common antibiotics such as methicillin. This makes it a lot harder to treat so it is often called a "superbug". MRSA is spread from person to person by skin contact so its spread can be reduced by washing your hands.

What to do:

1. Using the pump provided, blow up a round balloon.

2. Using a soft pen, draw small dots and squiggles on the balloon. These represent proteins on the surface of the bacteria.

3. Complete and attach a name tag.