National Biofilms Innovation Centre

#BIOFILMAWARE

Craft a Biofilm Wall

This activity is designed to engage a wide range of people, of varied ages, abilities and interest, with biofilms and microbiology, through crafts.

Activity description

This activity is designed to engage a wide range of people, of varied ages, abilities and interest, with biofilms and microbiology, through crafts.

It can be used at a variety of events; you will need a table to the public to make their own crafts, and a wall to put these crafts on. The idea is to ask people to design their own bacteria to add to the biofilm on the wall.

People are given a piece of paper (we recommend pieces from an A4 sheet cut into four parts), of the colour of their choice, to get started. They can use the description and images we provide to replicate the sketch of a bacteria from these documents, or they can make their own using their imagination – the choice is left to them. They can use any of the materials provided to add to their bacteria – they can stick things to it, draw on it, etc.

While they do this, it provides a perfect occasion to take about bacteria and biofilms. You could, for instance, talk about what a biofilm is and what a bacteria does depending on its shape and attributes (ex: flagella), and ask people to design their bacteria according to what they want it to do, which could lead to a very meaningful scientific discussion.

Once the visitor is happy with their bacteria, you can give them pieces of double-sided tape so that they can go stick it on the wall!

Materials

We have attached bacteria information sheets at the end of this booklet, which should be indivdiually printed and displayed by the activity.

You should be able to find the remaining materials in any good craft shop.

- Pompoms
- Coloured sheets of paper
- Pipe cleaners
- Googly eyes
- Glue guns (and their protective heat mat)
- Bin bags
- Pens or pencils
- Scissors (for children, with round ends)
- Craft sticks
- Ribbon
- Double-sided tape (or any other method to stick the craft bacteria on the wall, depending on its nature).

Health and safety

Be careful that no very small children/toddlers put the small pieces of materials (googly eyes, etc), in their mouth.

The glue gun is very warm and should only be used by the people staffing the activity, who will ask visitors where to put the glue, and recommend that visitors do not touch the glue with their skin, as it is very hot.

Credits

This activity was developed by Hollie Shaw, Karolina Pyrzanowskay, Isabel Parreira (University of Sheffield) and JC Denis (University of Edinburgh).

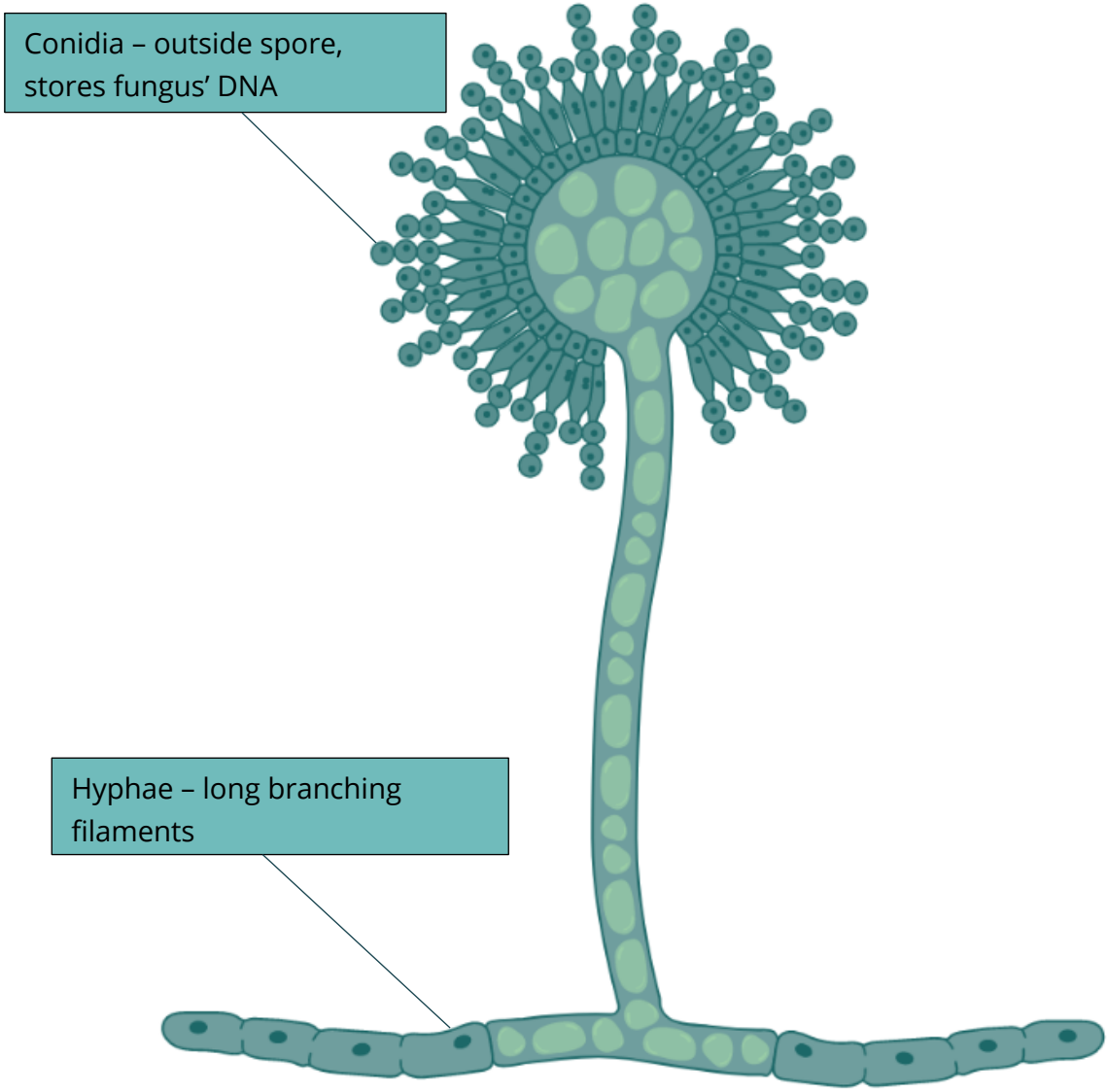
A big thank you to all of the volunteers and visitors who successfully tested the activity for the first time at the New Scientist Live event in London, October 2022.

Aspergillus spp.

Aspergillus spp. Facts

- *Aspergillus spp.* are spore-producing fungi
- *Aspergillus spp.* normally live in the soil
- They cause respiratory diseases
- They can be used as mini factories to make citric acid and enzymes

Use the craft supplies available to create your own *Aspergillus spp.* to add to the biofilm wall. Include key features shown below.

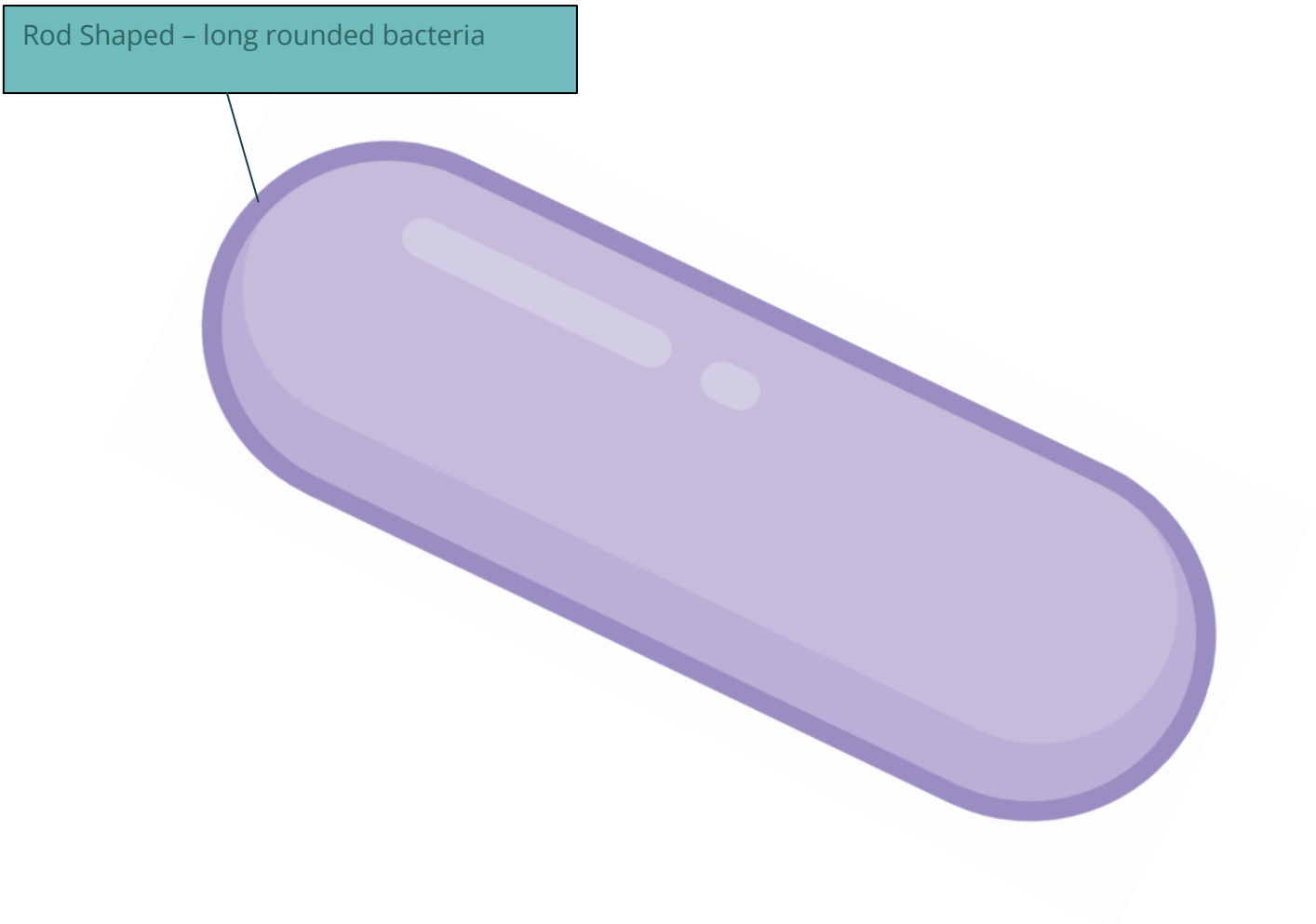


Bacteroides spp.

Bacteroides spp. Facts

- *Bacteroides spp.* are rod shape bacteria
- *Bacteroides spp.* normally live in the gut
- They do not like oxygen
- They make up a very big part of the gut microbiome - particularly people who eat meat
- It affects brain development

Use the craft supplies available to create your own *Bacteroides spp.* to add to the biofilm wall. Include key features shown below.

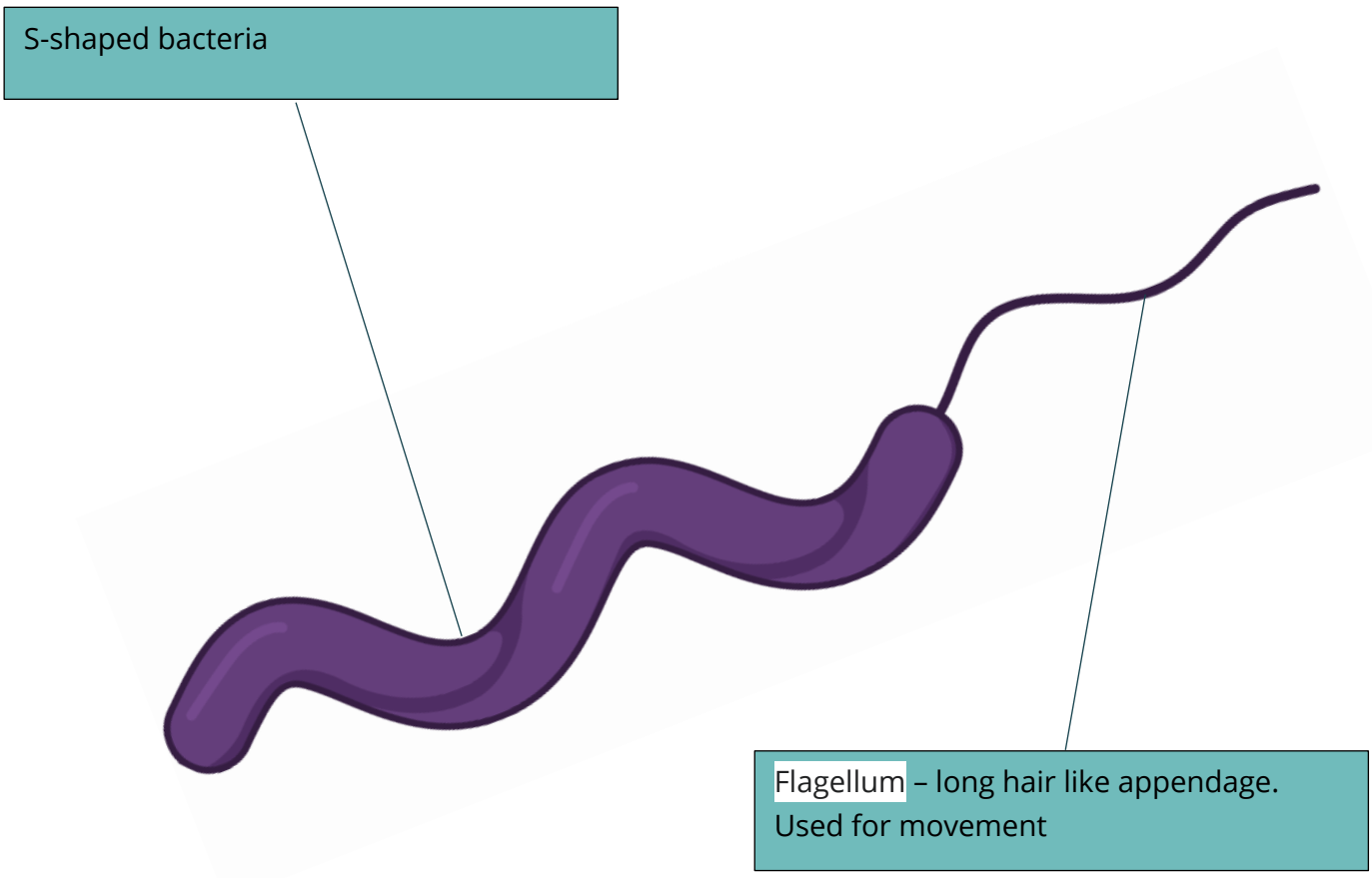


Campylobacter spp.

Campylobacter spp. Facts

- *Campylobacter spp.* are s-shaped bacteria
- *Campylobacter spp.* normally live in the intestines, poultry and water
- Infections cause bloody diarrhoea

Use the craft supplies available to create your own *Campylobacter spp.* to add to the biofilm wall. Include key features shown below.

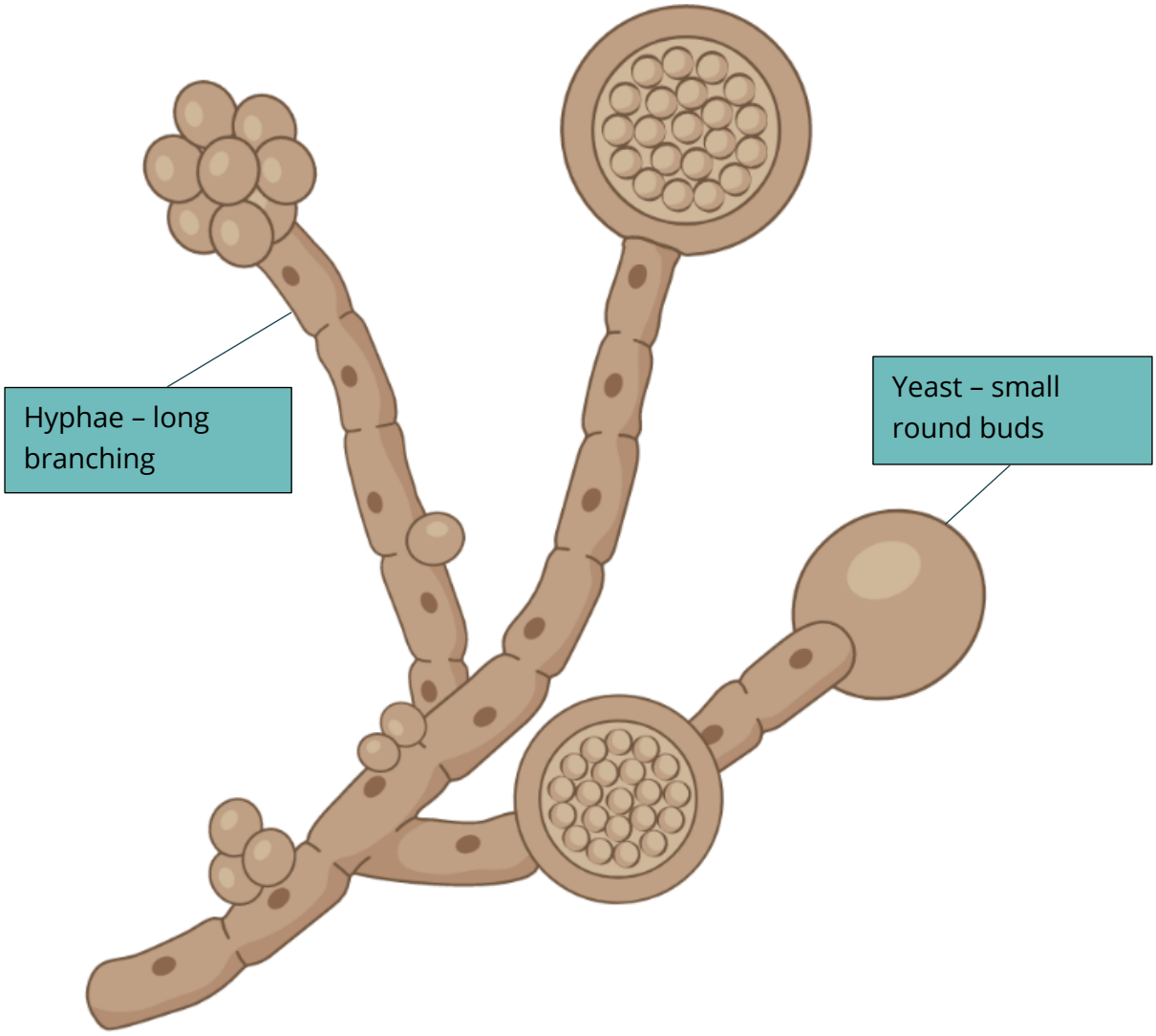


Candida spp.

Candida spp. Facts

- *Candida spp.* are fungus
- *Candida spp.* normally live in the gut and skin
- It is polymorphic – takes on different forms
- Antibiotic use promotes growth of yeast infection

Use the craft supplies available to create your own *Candida spp.* to add to the biofilm wall. Include key features shown below.

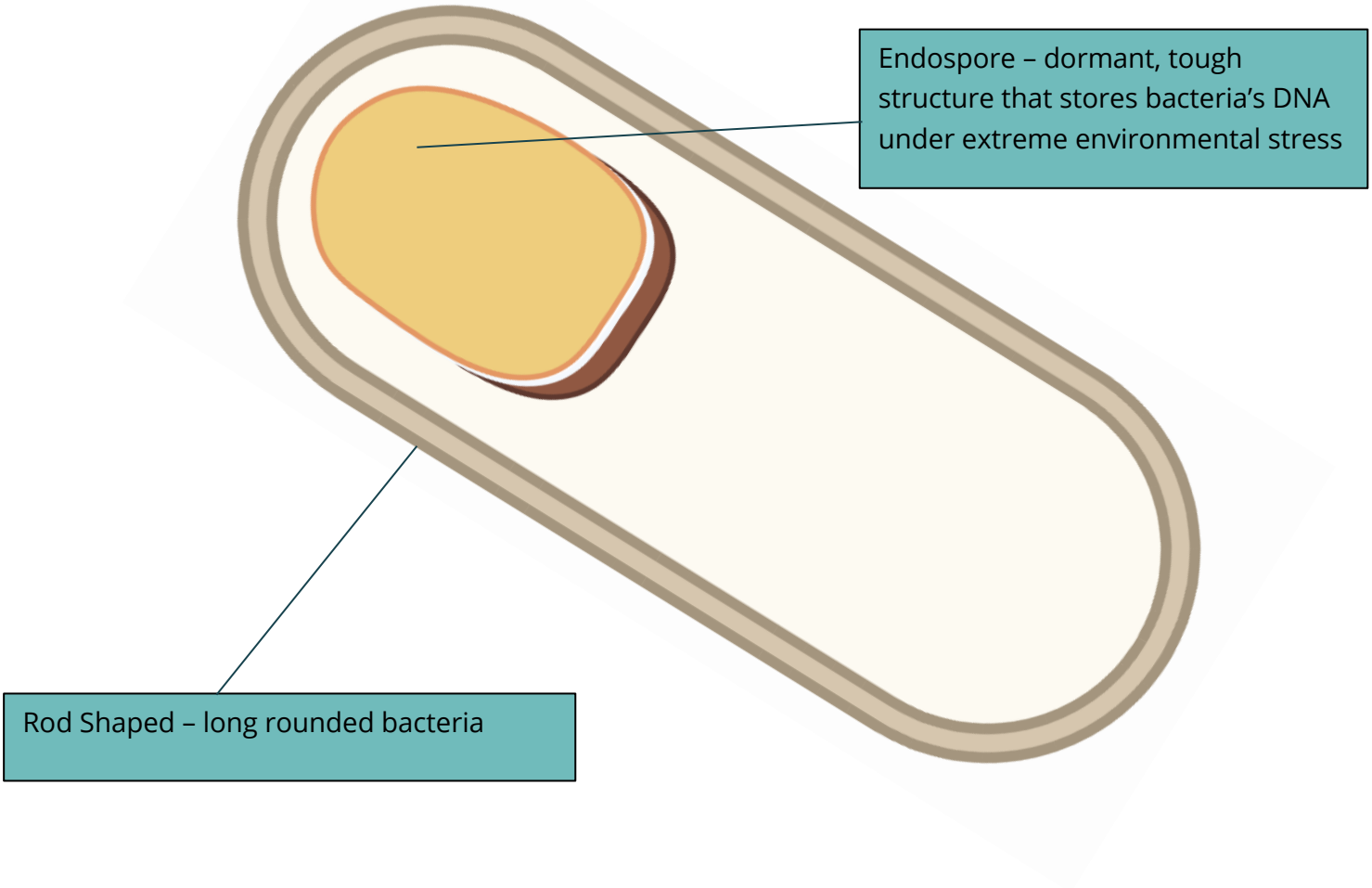


Clostridia spp.

Clostridia spp. Facts

- *Clostridia spp.* are rod shape bacteria
- *Clostridium* normally live in soil, water and gut
- Substances secreted by *Clostridium* can be used for cosmetics and medicine (Botox)
- In hostile environments, it produces very resistant spores

Use the craft supplies available to create your own *Clostridia spp.* to add to the biofilm wall. Include key features shown below.

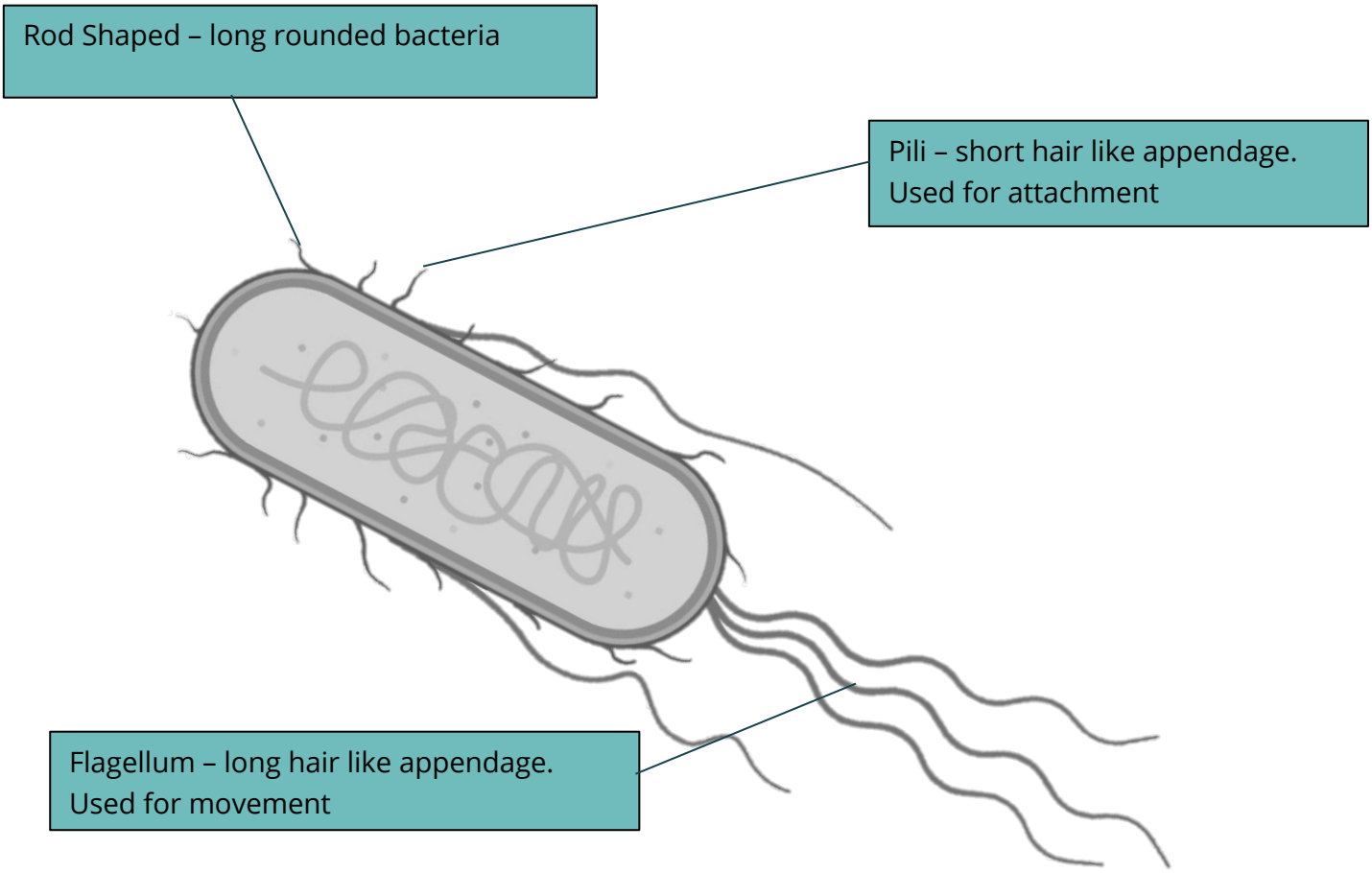


E. coli

E. coli Facts

- *E. coli* are rod shape bacteria
- *E. coli* normally live in the intestines
- It can grow with and without oxygen
- They can be used as mini factories to make medicines

Use the craft supplies available to create your own *E. coli* to add to the biofilm wall. Include key features shown below.

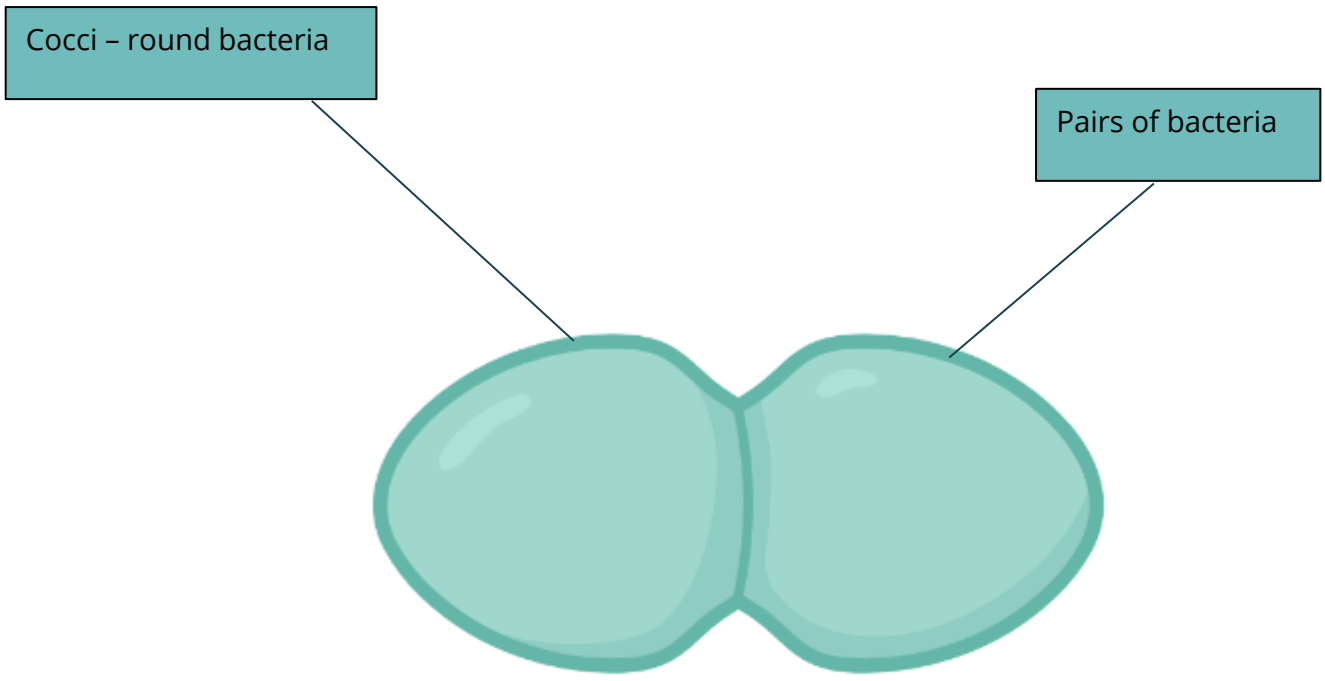


Enterococcus spp.

Enterococcus Facts

- *Enterococci* are sphere shape bacteria
- *Enterococci* are often found in pairs
- They commonly found in the intestines of humans and animals
- Some *Enterococcus spp.* can survive up to 60 ^{o}C

Use the craft supplies available to create your own *Enterococcus* to add to the biofilm wall. Include key features shown below.

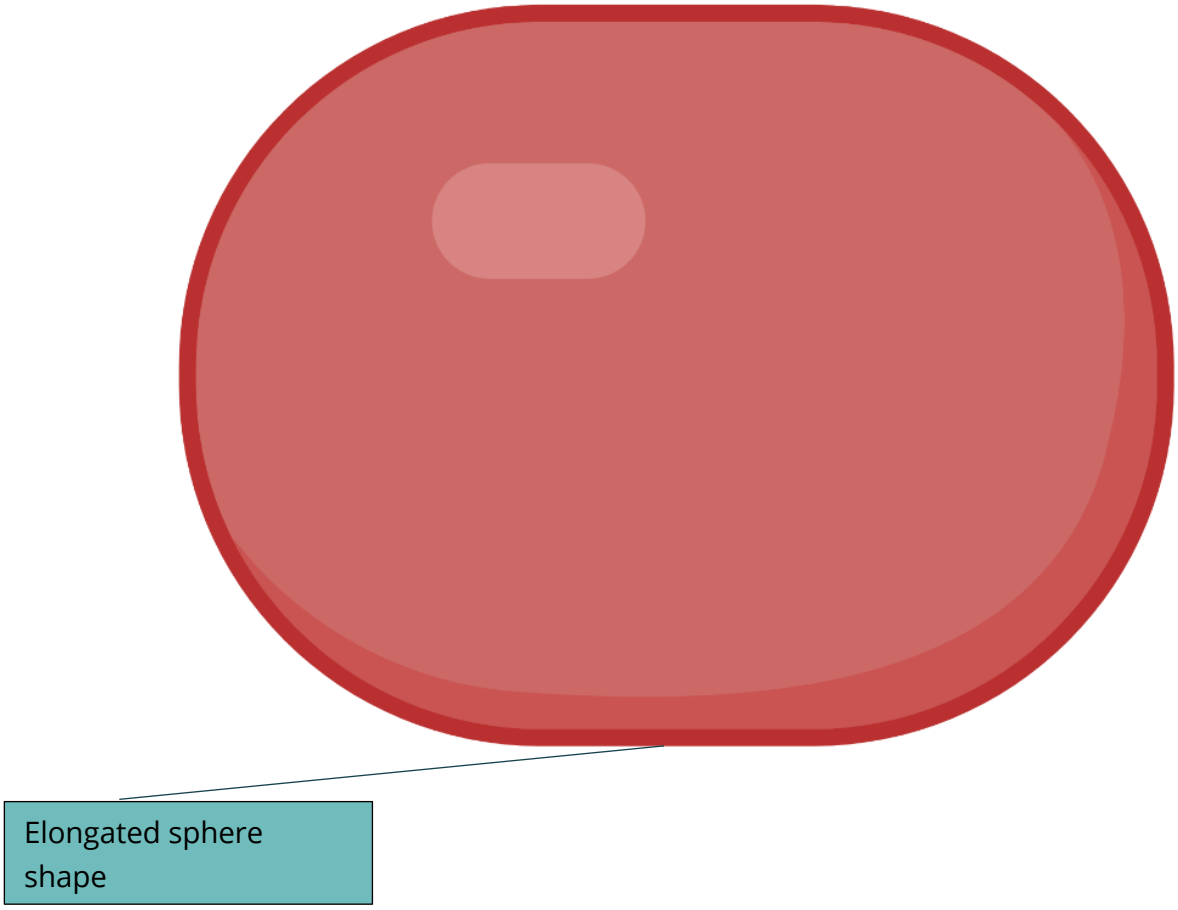


H. influenzae

H. influenzae Facts

- *H. influenzae* are elongated spheres shape bacteria
- *H. influenzae* normally live in the nose, ears and lungs
- It has a capsule that stops them being eaten by immune cells
- It needs blood for food
- First bacteria to have their DNA mapped out

Use the craft supplies available to create your own *H. influenzae* to add to the biofilm wall. Include key features shown below.

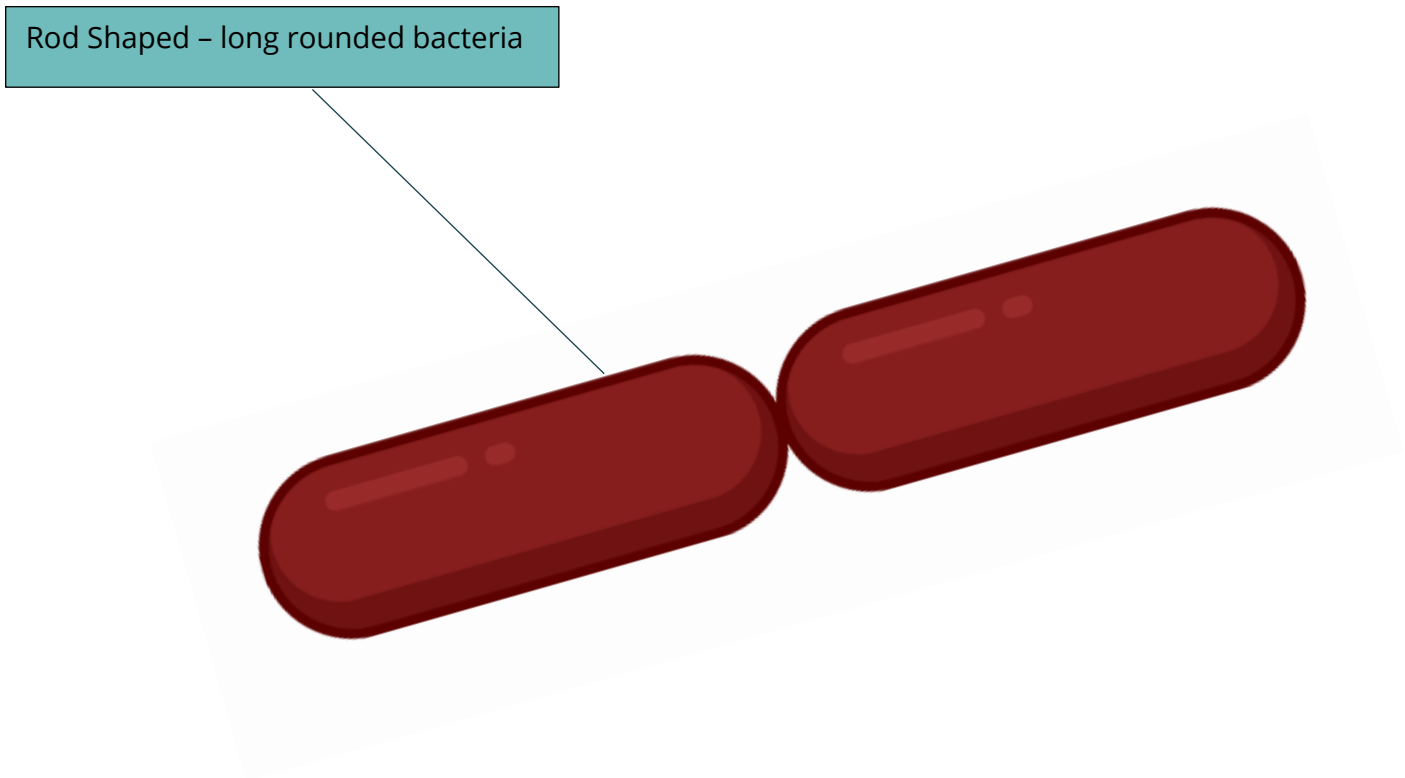


Klebsiella spp.

Klebsiella Facts

- *Klebsiella* is a rod shaped bacteria
- *Klebsiella* lives in soil
- *Klebsiella* can be found in the mouth, intestines, and on the skin.
- *Klebsiella* can cause lung infections

Use the craft supplies available to create your own *Klebsiella* to add to the biofilm wall. Include key features shown below.

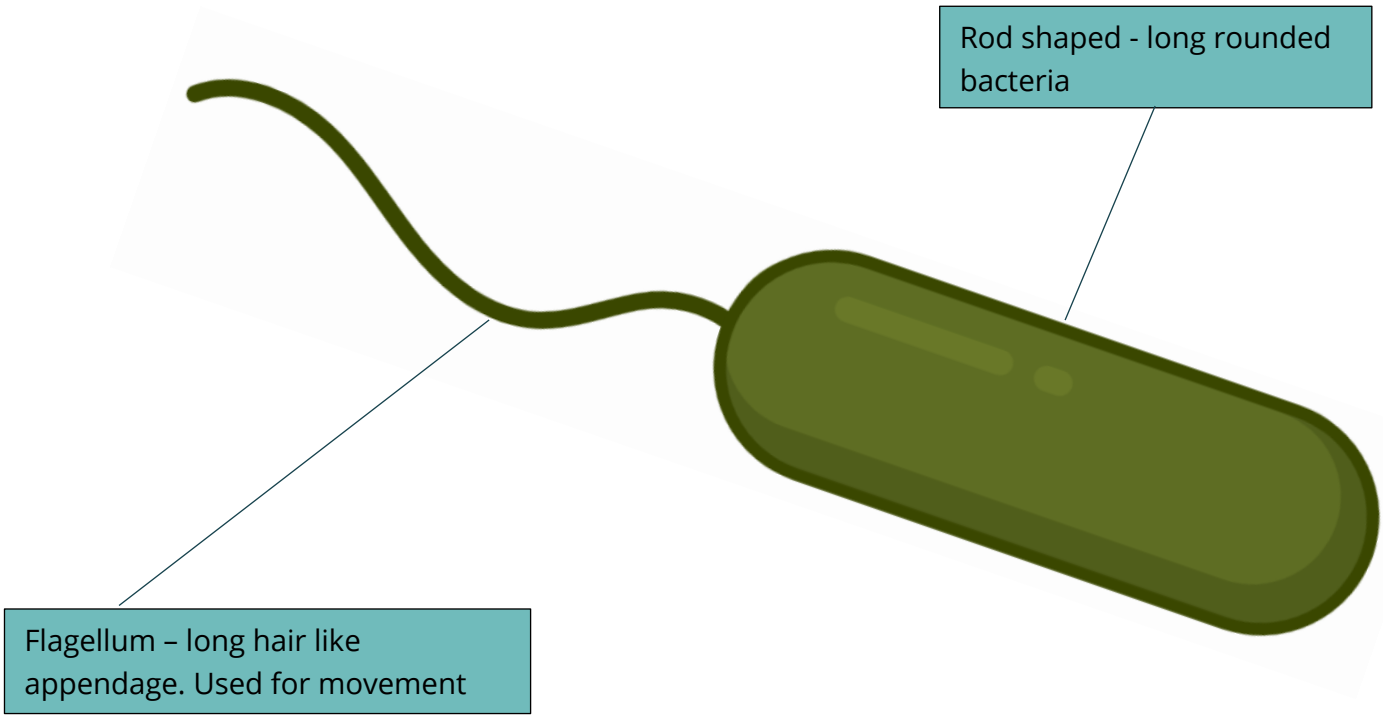


Legionella spp.

Legionella spp. Facts

- *Legionella spp.* are rod shape bacteria
- *Legionella spp.* normally live in water
- It causes pneumonia
- It can be used as a bioweapon

Use the craft supplies available to create your own *Legionella spp.* to add to the biofilm wall. Include key features shown below.

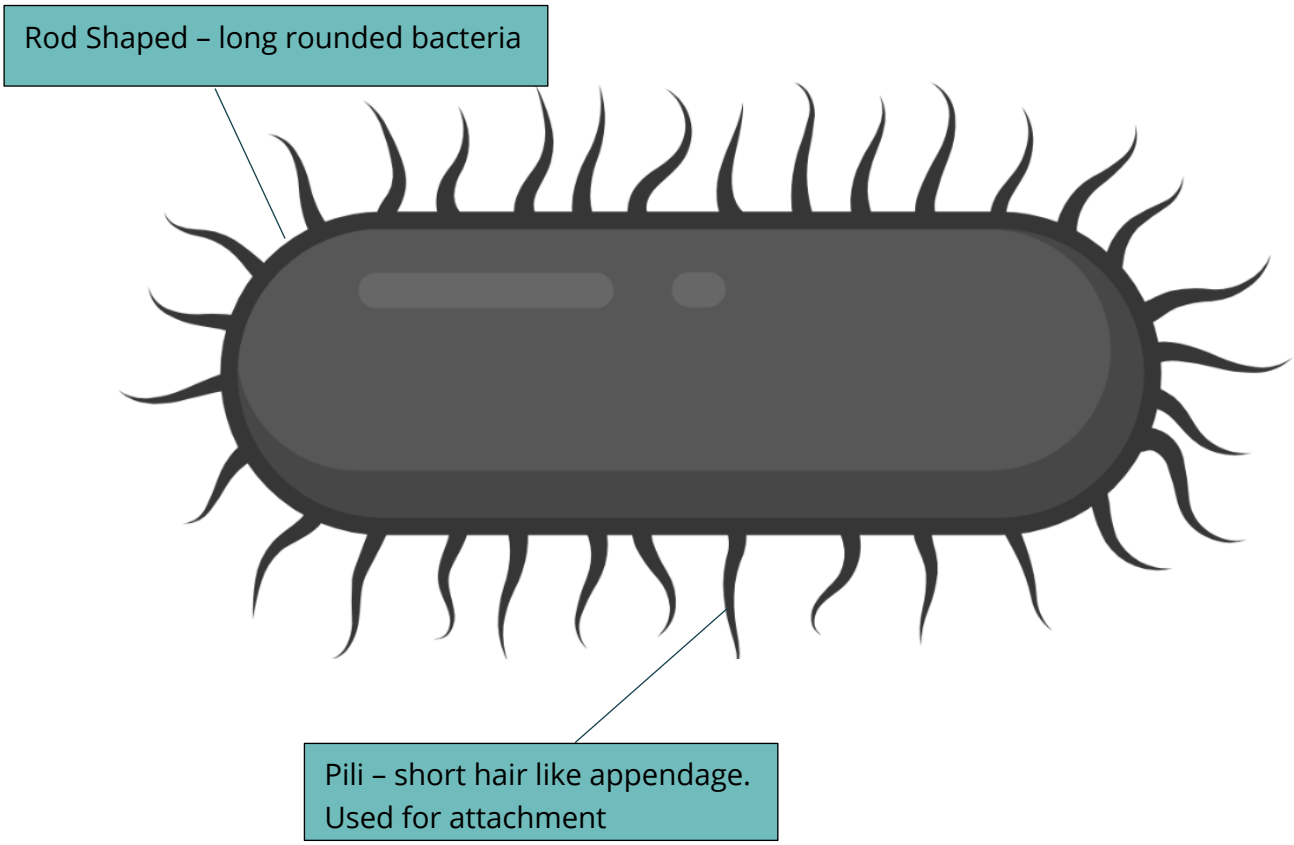


P. gingivalis

P. gingivalis Facts

- *P. gingivalis* are rod shape bacteria
- *P. gingivalis* normally live in the mouth and gut
- They have black pigments
- It is associated with teeth and heart diseases

Use the craft supplies available to create your own *P. gingivalis* to add to the biofilm wall. Include key features shown below.

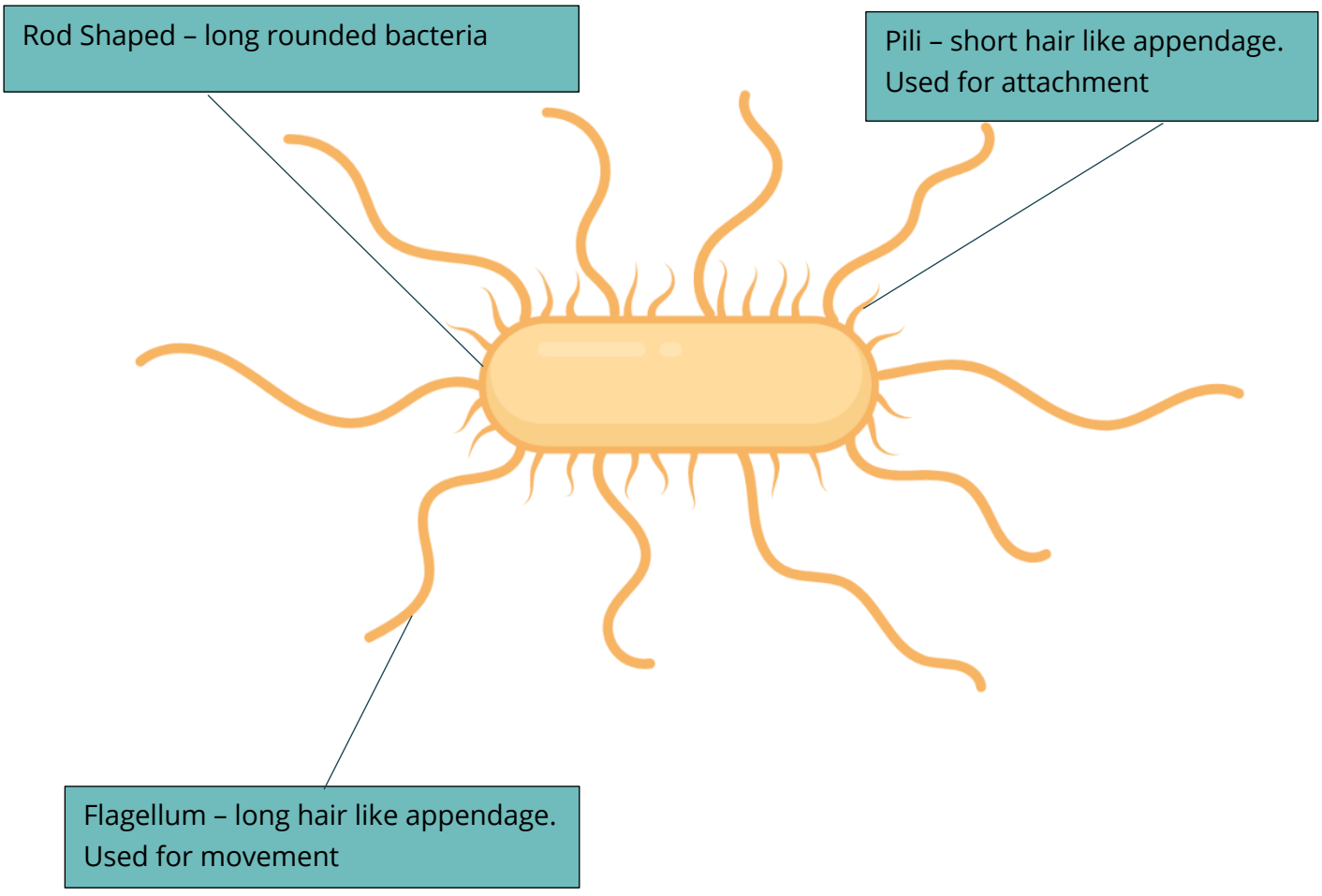


P. mirabilis

P. mirabilis Facts

- *P. mirabilis* are rod shape bacteria
- *P. mirabilis* normally live in water and gut
- It causes UTIs
- It smells fishy

Use the craft supplies available to create your own *P. mirabilis* to add to the biofilm wall. Include key features shown below.

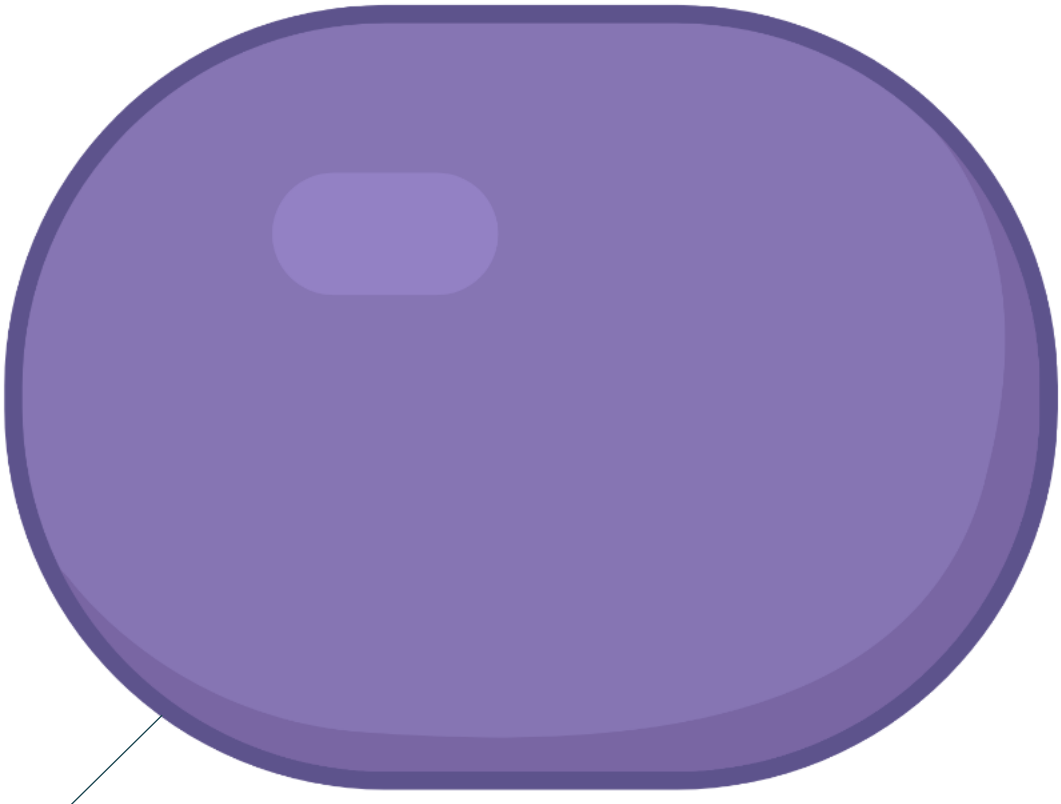


Prevotella spp.

Prevotella spp. Facts

- *Prevotella spp.* are short rod shape bacteria
- *Prevotella spp.* normally live in the mouth and gut
- They do not like oxygen
- They make up a very big part of the gut microbiome - particularly people who eat carbohydrates and plants
- *Bacteroides spp.*'s "cousins"

Use the craft supplies available to create your own *Prevotella spp.* to add to the biofilm wall. Include key features shown below.



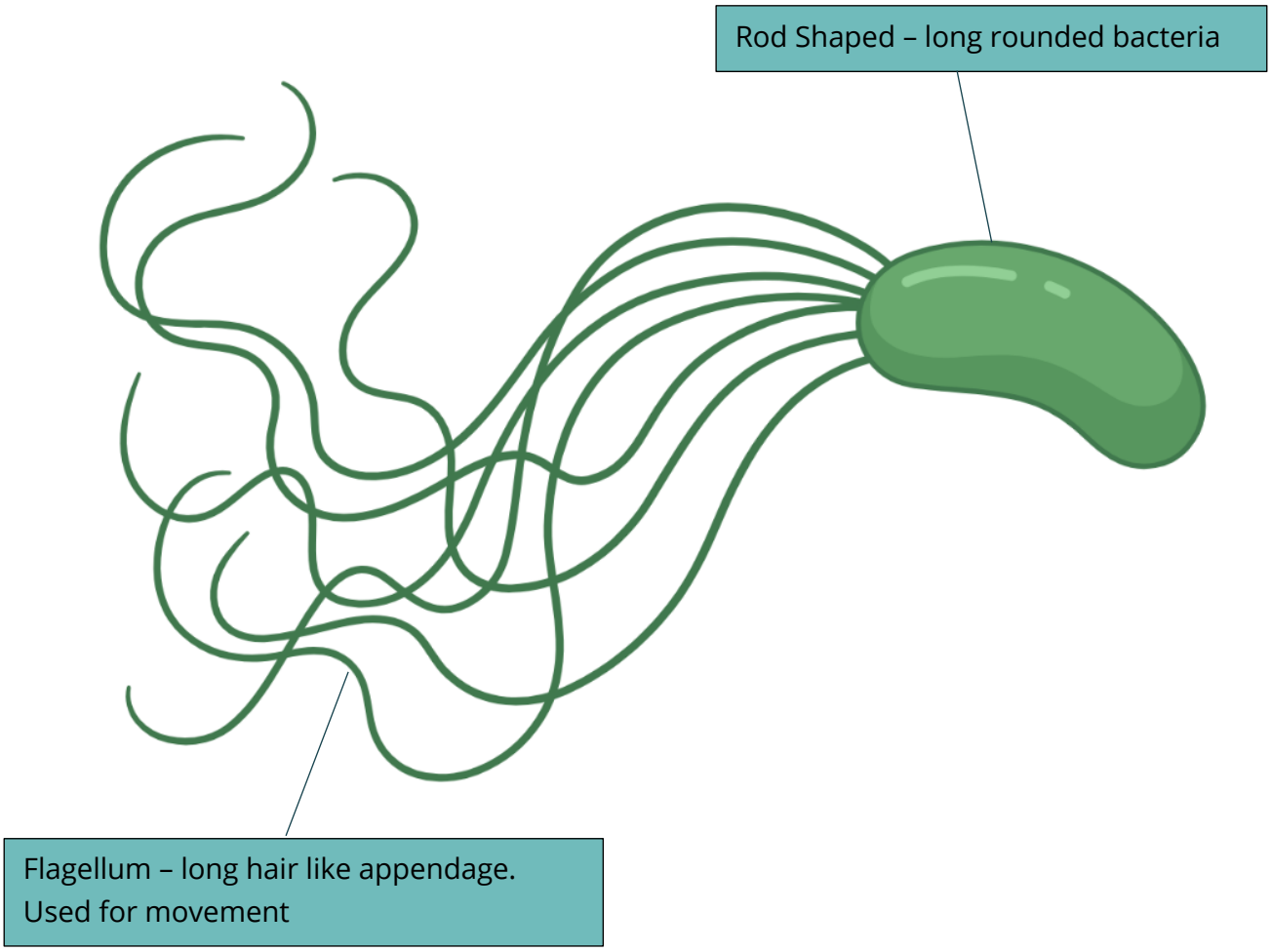
Short rod Shaped – elongated circular bacteria

P. aeruginosa

P. aeruginosa Facts

- *P. aeruginosa* are rod shape bacteria
- *P. aeruginosa* normally live in the water, soil and skin
- It has a capsule that stops them being eaten by immune cells
- They cause serious infections in the lungs and skin

Use the craft supplies available to create your own *P. aeruginosa* to add to the biofilm wall. Include key features shown below.

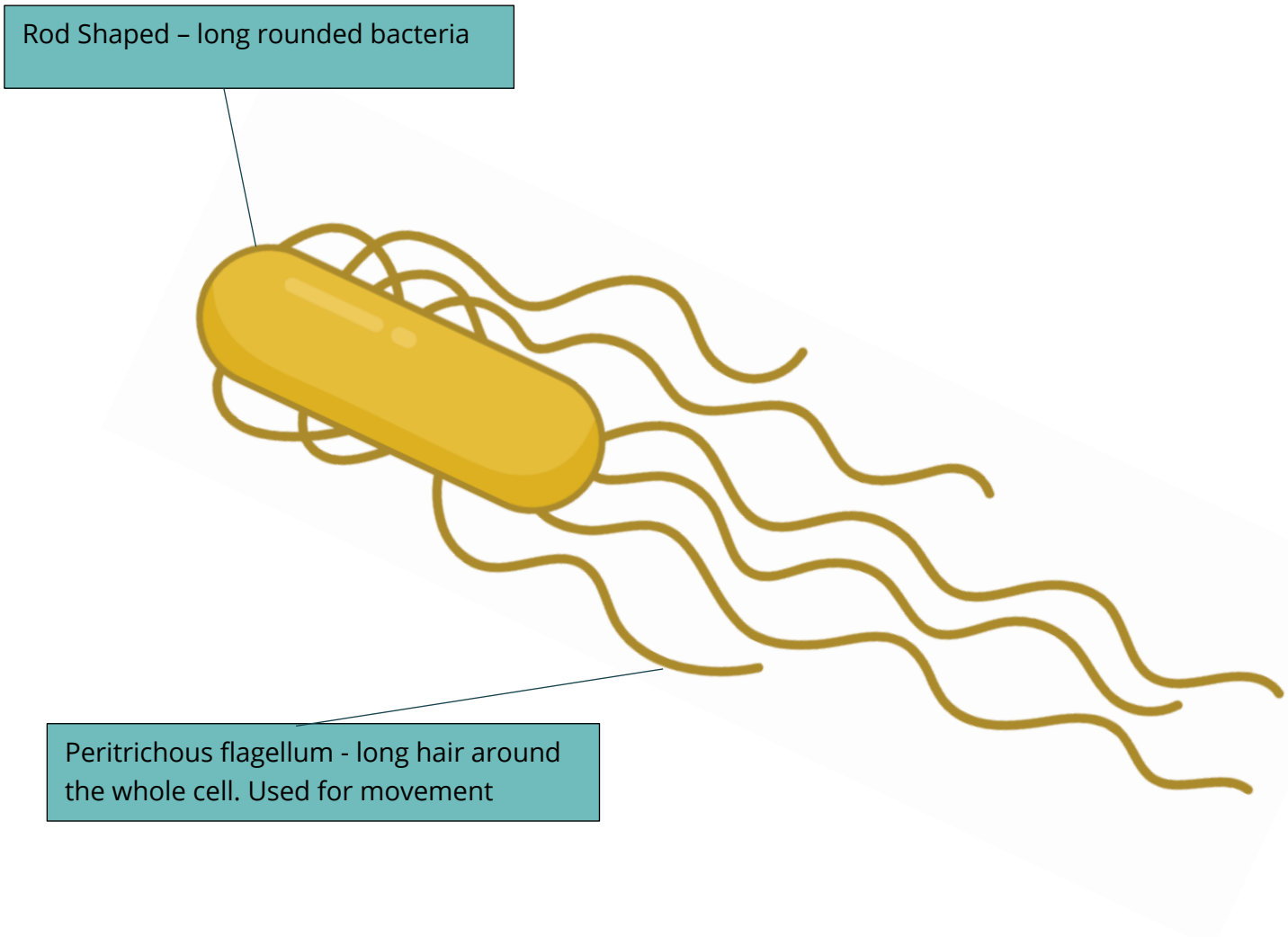


Salmonella spp.

Salmonella spp. Facts

- *Salmonella spp.* are rod shape bacteria
- *Salmonella spp.* normally live in the intestines and water
- Infections are caused by eating poop contaminated food
- Most reptiles and amphibians carry *Salmonella*

Use the craft supplies available to create your own *Salmonella spp.* to add to the biofilm wall. Include key features shown below.

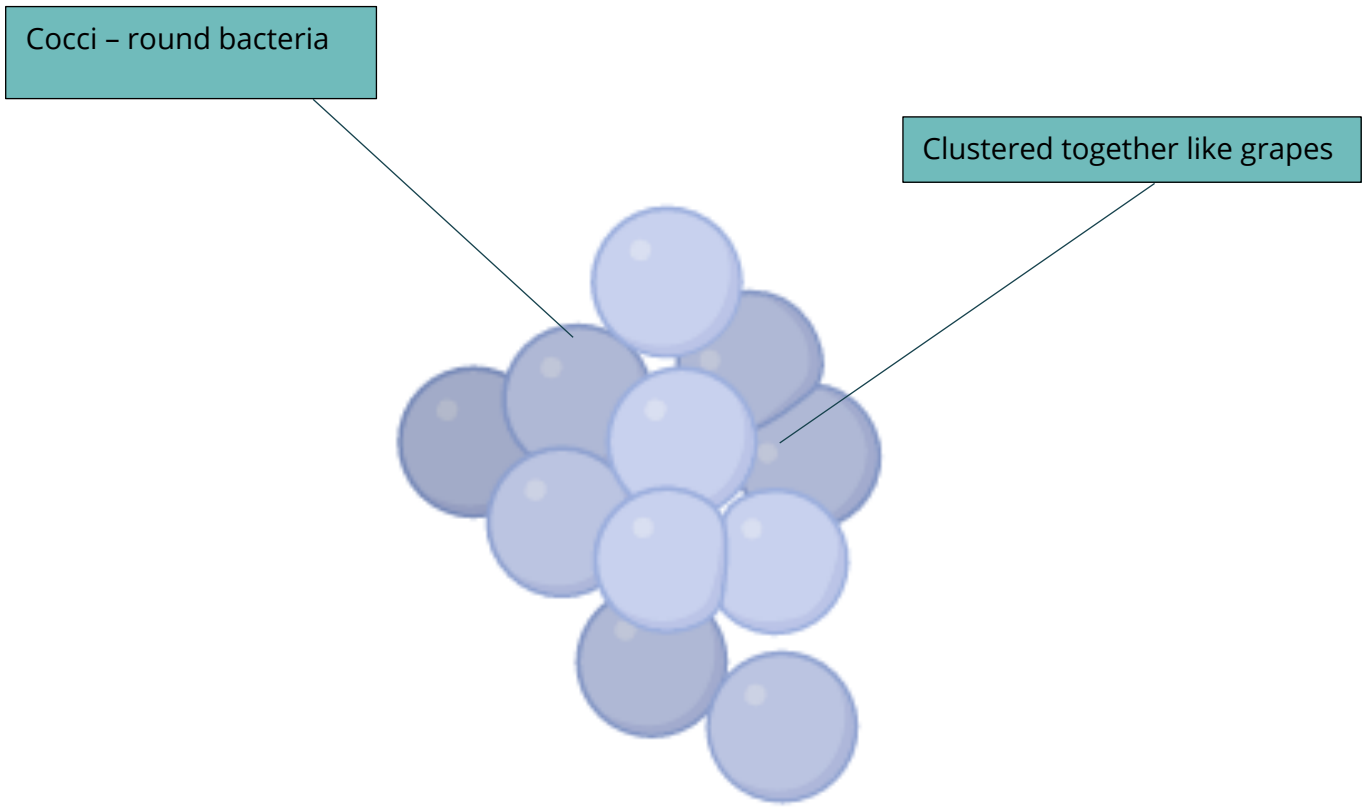


Staphylococcus spp.

Staphylococcus Facts

- *Staphylococci* are sphere shape bacteria
- *Staphylococci* grow in clusters. “Staph” comes from bunch of grapes
- They commonly live on skin
- *Staphylococcus aureus* is the most common cause of hospital acquired infection

Use the craft supplies available to create your own *Staphylococcus* to add to the biofilm wall. Include key features shown below.



Streptococcus spp.

Streptococcus Facts

- *Streptococci* are sphere shape bacteria
- *Streptococci* grow in chains
- *Streptococci* can grow with and without oxygen
- *Streptococci* cause a lot of common infections in humans

Use the craft supplies available to create your own *Streptococci* to add to the biofilm wall. Include key features shown below.