

# Hand print exercise

Microbes live on our skin and in our body. While the majority of microbes are either not harmful or are beneficial to us - there are some species that can cause disease. This is why it is important to have good hand hygiene.



**SAFETY FIRST:** Ensure that no student has a yeast allergy as the agar plates contain yeast extract as a food for the microbes. Additionally students should not eat the agar!

1) Provide each student with an agar plate and ask them not to open it.



2) Using a permanent pen ask the student to write their name on the lid.

3) Demonstrate to the students opening the agar plate and placing your hand firmly onto the surface. Remove your hand, replace the lid and wipe your hand with a baby wipe or wash your hands with soap and water.

4) Supervise the students doing the same ensuring that they clean their hands after they've finished.

5) If you are incubating the plates in the school environment you must seal the plates and incubate at room temperature. You can examine the sealed plates with the students but you must not open the plates. Dispose of the plates responsibly after autoclaving.

OR

5) If we have partnered with you we will collect the plates from your school and incubate them for you. After a few days we will send you photographs for examination with your students.

## Magnificent Microbes – Observations

You have now received pictures of your microbe handprints – take some time to look at them and discuss your observations with one another.



What do you notice about the different handprints? Are they all the same?

Why do some have more growth than others?

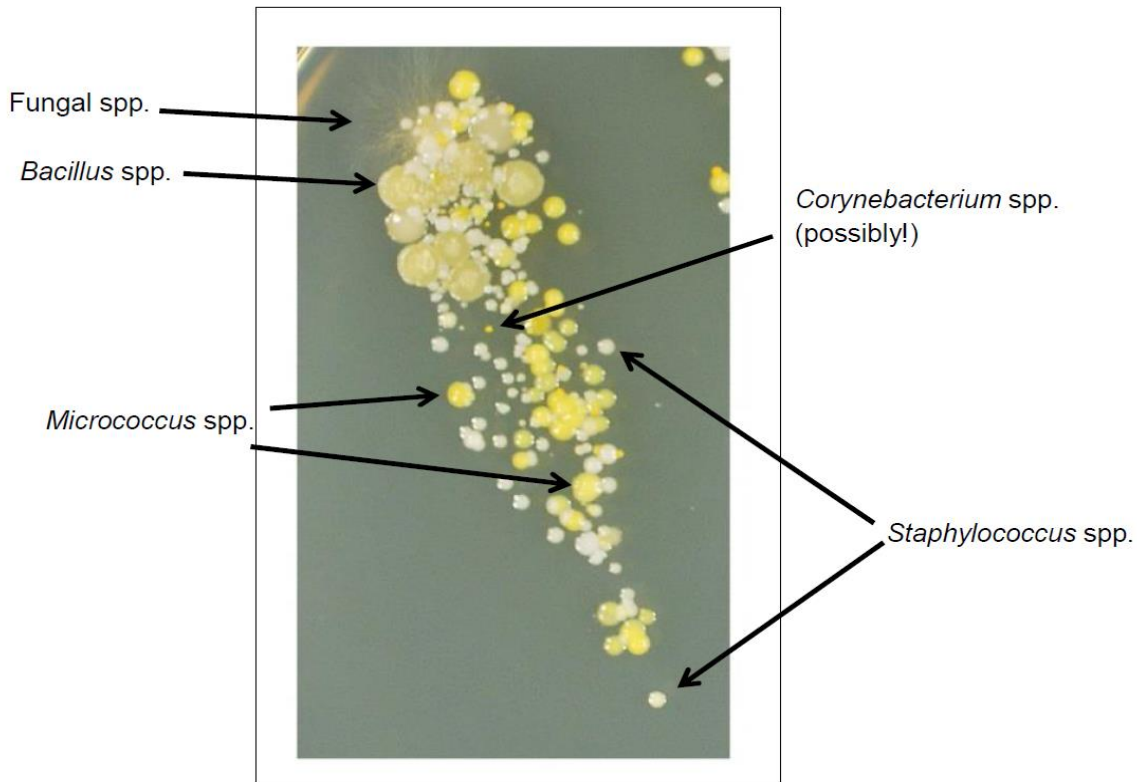
Some students' prints have many more bacteria on them than other prints. This may just reflect the differences in hormones that we all have on our skin, they may have not washed their hands for a while or they might have been touching lots of other things! They may also have pressed harder on the agar, or for longer.

## Magnificent Microbes – Identification sheet

If you look closely at your handprint you will be able to see that it is made up of different types of growth.

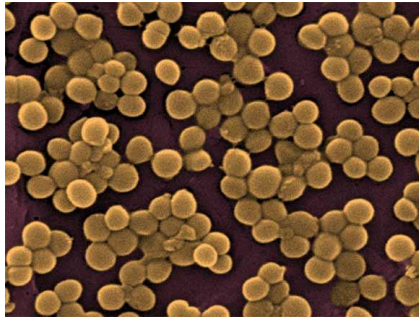
Because an individual bacterium is too small to see with our eyes each small spot you can see is a group of millions of bacteria clumped together.

The groups may be small, large, yellow, orange, fluffy, white, shiny – see if you can pick out all the different groups!



## Magnificent Microbes – Identification sheet

There are mainly two different “groups” of bacteria that are very common skin commensals:



*Staphylococcus*

The light coloured, white ones are likely to be *Staphylococcus* species.

The yellower ones are likely to be *Micrococcus* species.

You may know that some species of *Staphylococcus* can be harmful. They can cause skin infections including impetigo. Others are just part of our normal body “flora” (the bacteria that are found on all of us).

Others that are found at a lower frequency include:

- *Bacillus* species – brown matt colonies
- *Corynebacterium* species – small orange colonies
- Fungal species – sometimes spread over a large area of the plate and are fluffy to look at.

## Magnificent Microbes – What Does it Mean?

Microbiology can be rather “forensic” as the presence of certain bacteria can tell us about where your hands, or indeed other people’s hands, have been!

For example, if someone has picked their nose or chewed their fingernails and then touched something that you then touch, you could expect to see a lot of upper respiratory tract commensals including *Moraxella* and *Neisseria spp.*



This is how bacterial infections can spread by the transfer of microbes from one person to another.

Similarly if someone has not washed their hands after going to the toilet and then touches the door handle on the way out of the bathroom, when you touch the same surface you could transfer some of the microbes onto your hands and you would see a lot of coliforms (poo bacteria!).



## Magnificent Microbes – Results



Learners can:

- work in groups to determine how many different types of microbes they can see on each image
- predict if they think there will be a difference between microbe growth on the hands of girls and the hands of boys

There is no need to count the total number of microbes, just collect an idea of the diversity.

For example:

Image 1 has 4 different microbe forms

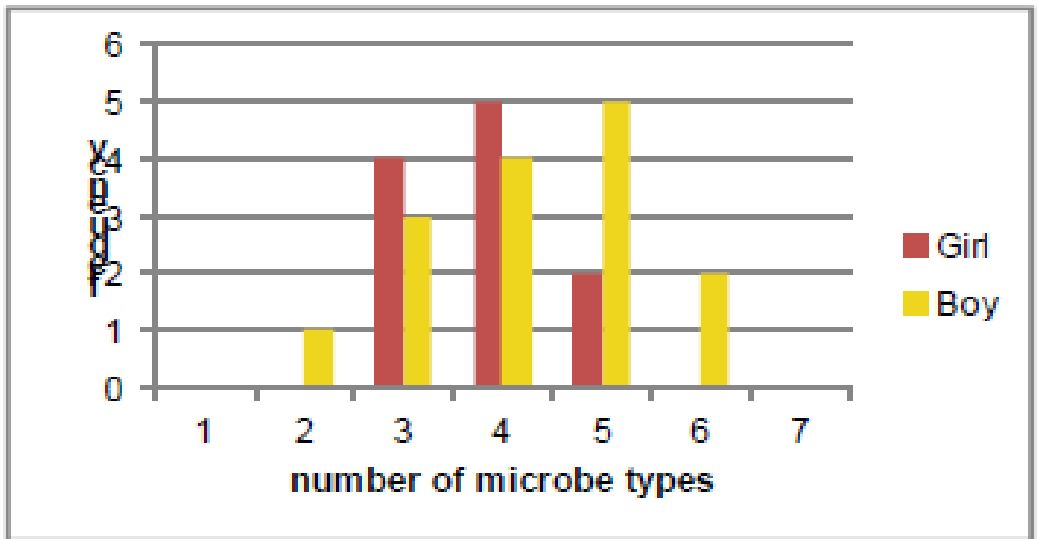
- Yellow shiny
- White shiny
- Large fluffy
- Brown smooth and relatively large

Once they do this for each image they can present the data in any way they choose.

Number of Microbe types	Frequency (girl)	Frequency (boy)
0	0	0
1	0	1
2	4	3
3	5	4
4	2	5
5	0	2
6	0	0

## Magnificent Microbes – Results

We have included this table and chart as an example. From the class results, learners can determine whether there is a difference between boys and girls in their class. If not, what other experiments could be done to find out?



### GLOSSARY:

**Agar** – type of jelly used to grow microbes

**Bacteria** – type of microbe (note: bacteria is the name of a group of microbes, the name for one individual is a bacterium)

**Commensals** – bacteria that live with us and help us in our everyday lives

**Microbe** – small single-celled organisms that include bacteria and fungi.

**Microbiologist** – person who investigates things in the field of microbes and viruses

**Microbiology** – the study of microbes and viruses

**Pathogenic** – harmful/potential to cause disease

**Virus** – small infectious agent that only grows inside another cell e.g. a human, plant or bacterial cell