# The bacteria's that surround us

By: Isabelle Franziska Brunet

This project is given to Mr. Dominic Decoeur

In the class of SBI 3C

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École Secondaire Catholique Le Relais

**Introduction:**

A bacterium can be found in 3 forms: The cocci, a spherical form (coccus, diplococci, streptococci, staphylococci) Bacilli, a rod shaped (bacillus or streptobacilli) and the last Spirochetes, a spiral form (spirulina and spirochetes). Hulls can be in pairs (Diplococci) they can be in a chain (Streptococci) and they can be in a bunch of grapes (Staphylococci)

The bacteria do not have a nucleus so they do not make mitosis. they divide themselves with a process called scissiparity. Without bacteria, there is no life. They are the basis of food chains because they recycle the material to make it available to various organisms.

Here is a description of bacteria by Daphnée Bocciarelli who is a professor at the National School of Agronomy and Agro-Food Industries:

"A bacterium, or bacterial, is a prokaryotic unicellular living organism. Two identical cells are produced from a mother cell. The cell growth is manifested by an increase in cell volume, followed by the synthesis of a transverse septum in the middle of the cell, resulting in the separation of the two daughter cells. When they are in a favorable environment bacteria can multiply at a vertiginous pace. A population of bacteria can double every 20 minutes depending on the culture."[1]

On this site they also talk about the propitious condition. They say Microorganisms grow in a pH range of 2 to 11. Temperature is a very important factor in the development of microorganisms. While doing a research I read that some of the most popular spots for bacteria to grow are Kitchen Faucets, Soap Dispensers, Computer keyboards and Doorknobs. These will be the 4 places studied in the laboratory.

[1] http://web04.inpl-nancy.fr/ENSAIA/marie/web/ntic/pages/2010/boccia.html

**Objectives:** To find bacteria's in my surroundings.

**Hypothesis:** In my lab, I will be discussing about Kitchen Faucets because the metal aeration screen at the end of the faucet is a total germ magnet. Running water keeps the screen moist, an ideal condition for bacteria growth. Because tap water is far from sterile, if you accidentally touch the screen with dirty fingers or food, bacteria can grow on the faucet. Next topic is the soap dispensers which about 25% of public restroom dispensers are contaminated by fecal bacteria. Soap that harbors bacteria may sound ironic, but that's exactly what a recent study found. "Most of these containers are never cleaned, so bacteria grows as the soap scum builds up, And the bottoms are touched by dirty hands, so there's a continuous culture going on feeding millions of bacteria." We will also be talking about computer keyboards because we constantly use the keys but how many times do you take the time to wipe down the keys and screen. Lastly we have doorknobs. Doorknobs are touch hundreds of times in a year by many different hands some dirty and some clean.

**Material:**

- Sterile petri dish
- Incubator
- Q-tips
- agar

**Steps:**

1. Put the solid agar in the microwave to melt it. Make sure it is fully melted with no solid pieces.
2. Fill the petri dish with agar and let it sit until the agar has reformed into a solid.
3. Separate a sterile petri dish in four with a sharpie and write the date.

4. Swab Computer keyboard, Soap Dispenser, Faucets and Door handle. Transfer material to the sterile petri in their proper spots.
5. Place the petri dishes in the incubator and for 3 days check and write down what you see.

**Results:**

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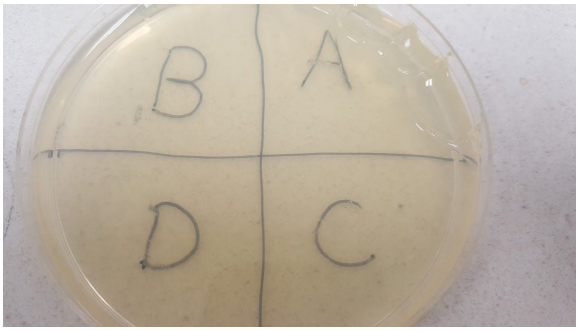
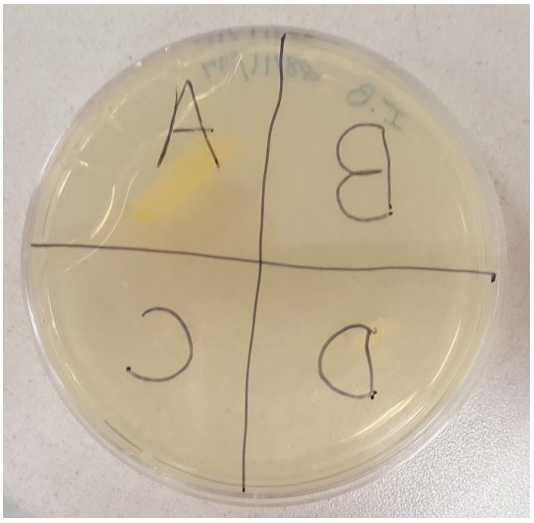
| Day one: During the first night the temperature dropped to 22°c.<br>There didn't seem to be any changes. |  |
| Day two: We finally were able to stabilize the temperature to 30°c.<br>A- Started a rod shaped colony.<br>B- Nothing.<br>C- Nothing.<br>D- Spherical shaped colonies. |  |
| Day three: The temperature stayed at 30°c.<br>A- The rod shaped colony got a darker yellow color.<br>B- Started a spherical colony.<br>C- Lots of little spherical colonies, In white, yellow and orange colours. |  |

| | |
|---|---|
| D- The spherical form changed into a odd shape and darkened to a grey/yellow color. | |
| Day four: The temperature stayed at 30°c.<br>A- The rod shaped colony bubbled up and darkened to a orange color<br>B- Smaller spherical colonies added to the one.<br>C- More small spherical forms grew and the orange color got darker<br>D- The odd shape seems to have grown another cercle but was too close so it stuck to the original form. |  |

**Discussion:** Question 1 to 5:

1. **Where do the most important bacteria populations in your class seem to be?**

In my petri dish, You see the most bacteria in the section from the tap. I believe it came from this because it was a public tap and many people used it. Microbiologist Kelly Reynolds, PhD, an associate professor of community environment and policy at the University of Arizona College of Public Health[2] says: Over time, bacteria build up and form a wall of pathogens called biofilm that sticks to the screen. "Eventually, that biofilm may even be big enough to break off and get onto your food or dishes,". This means anything coming out of the tap is silently poisoning you. My advice would be to clean your tap well once a month.

[2] https://www.prevention.com/health/health-concerns/top-10-places-germs-can-make-you-sick

2. **Based on your knowledge of microorganisms, where did the bacteria come from on the surfaces you wiped? Name at least three factors that could limit the growth of bacteria.**

The bacteria's I wiped all came from hands. We get bacteria on our hands by sneezing, touching other people's hands, books, using public computer, money and many more.

Three factors I know for sure that could limit growth of the bacteria is Temperature, Oxygen and light. The reason I know for sure temperature is a factor because during the first night are temperature dropped to 20 degrees and we did not see any difference in the petri dish at all. I say that the second factor is oxygen because my bacteria colony was very colorful and big and I did not leave it open for oxygen to enter. On the other hand one of the other students had left there's open often and their colony know has a big white webbed cloud over all of it. So big you cannot tell if what are the bacteria underneath. Lastly, The factor of light, the petri dish that was in the dark incubator had more growth than the petri dish that was outside of the incubator in the light all day.

3. **Did this experiment include a scientific constant?**

Yes because I had full control on my bacteria's growth. I controlled the temperature(Even though it took us a day to regulate the temperature), The oxygen intake and also its time in the light. After seeing my colony and my peers colony I truly believe that oxygen intake is a big factor. He opened his petri dish often letting oxygen in. Mine on the other hand was closed and did not get any extra oxygen.

4. **Based on your observations, what general statements can you make about bacterial growth and the conditions that promote this growth?**

Based on my observation, I grew big and colorful colonies that followed most of the growth factors. The conditions that promote the growth are darkness, lack of oxygen, moisture and a constant temperature.

5. **Have you observed any forms especially in bacterial cultures that are developed? If so, do some research on the forms of cultures to see if you can learn more about your bacterial culture.**

The bacterias I have observed are:

A- Bacillus B- Cocci C- Staphylococci D- Bacillus

A and D- Bacillus is important pathogens, causing anthrax and food poisoning.

B and C- Cocci is a single bacteria and Staphylococci is many cocci bacteria grouped together. These bacteria are often found in the nose and on the skin, and about 20% of humans are carriers. It is capable of causing various minor skin conditions, and it can cause more serious infections, like pneumonia, meningitis, and toxic shock syndrome (TSS). This Gram-positive bacteria can also cause food poisoning, by producing a toxin.

**Conclusion:**

I was able to find the bacteria's in my surroundings and determine which bacteria it was. I was able to find them because I followed the growing factors which was, Lack of oxygen, a constant temperature and darkness. Because I followed these I was guaranteed and big bacteria colony. I was able to determine which bacteria was which because of the amount of research that was done. Going back to my hypothesis I had talked about why each of my topics would have a impact I believe that I was right to think that the tap, the door knob and the computer would have a bigger impact, but after the doing experiment I see that I was wrong about the public soap dispenser which had a very little bacteria.