Are your hands *actually* clean?

A microbiology experiment

Background

We are always told that we need to wash our hands, but do you ever wonder why? Wait you probably don't because we are also told we do it to stop germs, but before you read the rest, just stop think to yourself does that really stop you from getting your hands dirty? And I'm not meaning after 10 minutes your hands are dirty again because most likely we both know that; but I am talking about it happening in the same room and at the same 1-2 minutes. I hope you keep on reading! 😃😃😃

To find out the answer, I ran the following microbiology experiment to test my scientific question.

Scientific Question

Does the way by which you dry your hands affect how clean your hands are?

I wanted to test multiple ways to dry hands in order to figure out which way is the cleanest. I selected five common ways people dry hands these five are: 1. Air Dry “without machine,” 2. Paper Towel, 3. Cloth Roll Towel Cabinet, 4. Standard Hand Dryer, 5. Air Blade (high powered), I also measured the plain old Faucet Handles as my positive control (I expected this to contain germs).

Hypothesis

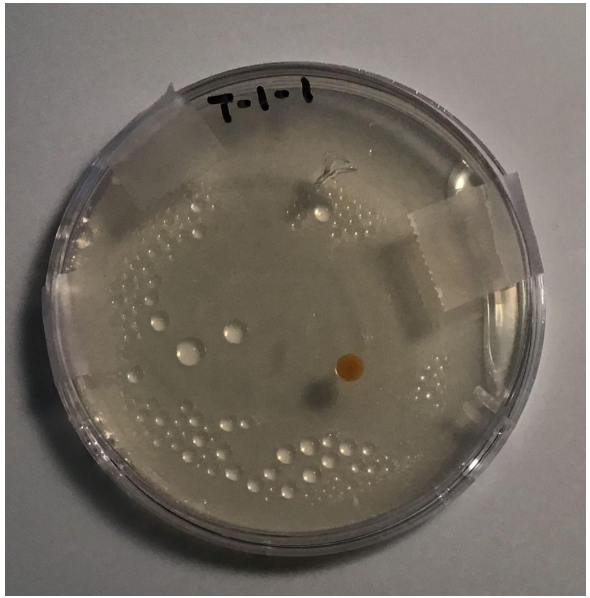
I believe that different ways of drying your hands effects how clean your hands are and that out of our tests that the cleanest way is to Air Dry your hands (without machine).

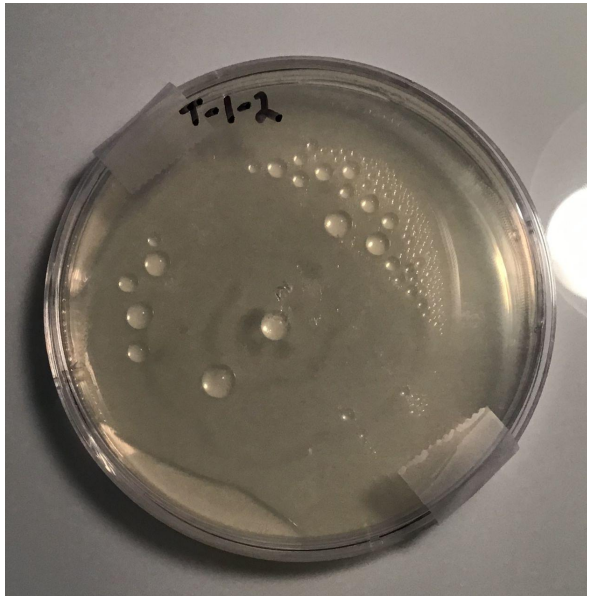
Materials & Method (“m&ms”)

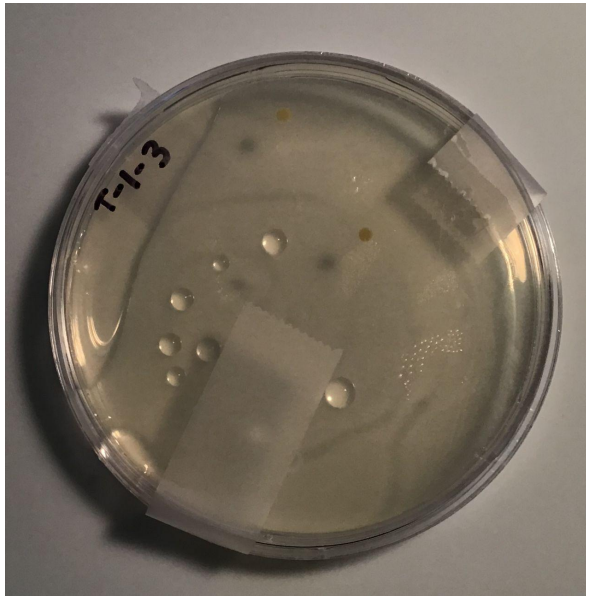
I used agar plates and sterile swabs from Amazon. Before conducting my experiments I surveyed local destinations for different drying mechanisms. For each test condition I sterile-swabbed the surface on to a unique agar plate. I ran each test condition in triplicate for if I messed up one later i would have two others for back up. I then incubated all agar plates for three days under a heat lamp to make the process go faster. After that I recorded all my results.

Results

Test Condition 1: Air Dry (without machine)

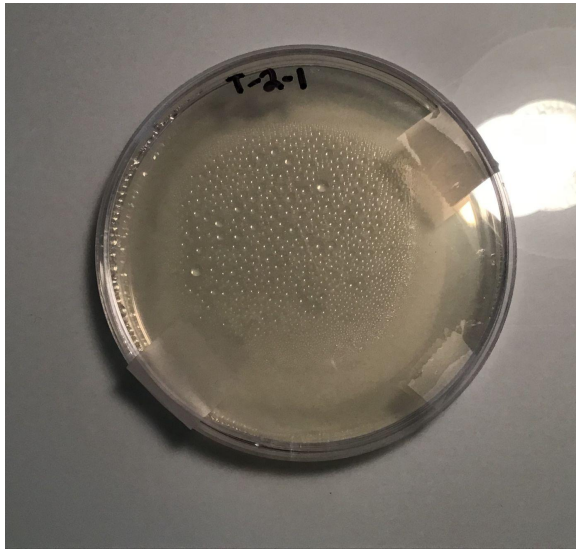


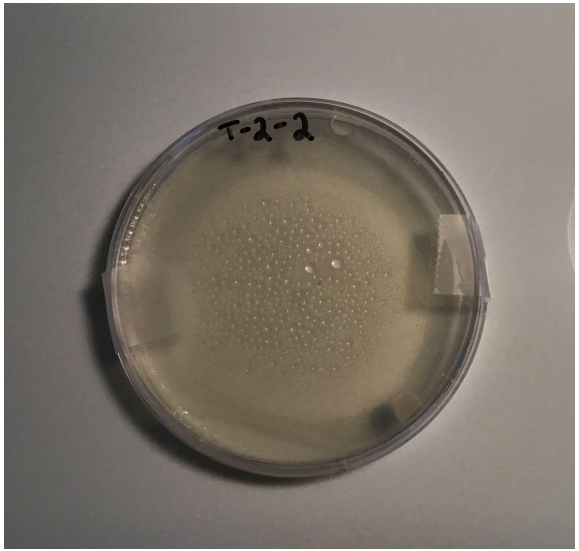


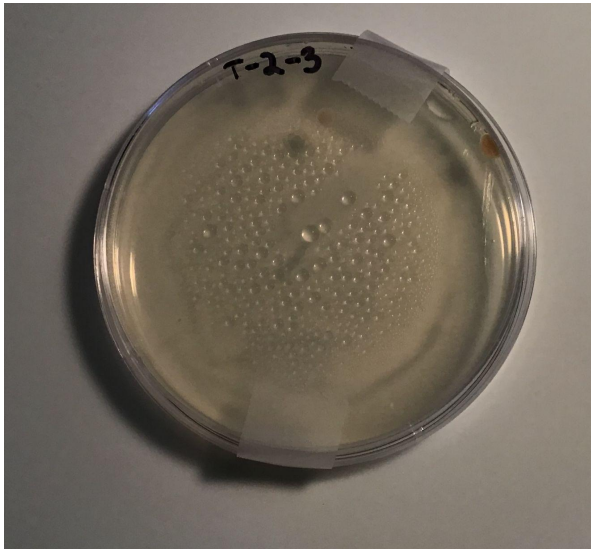


Results

Test Condition 2: Paper towels

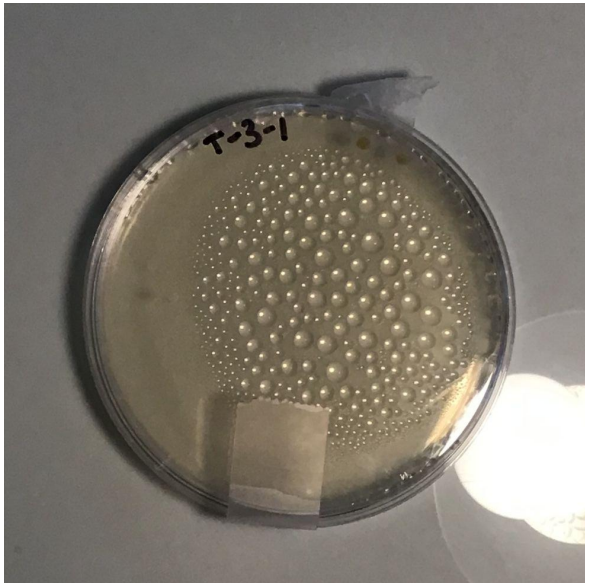


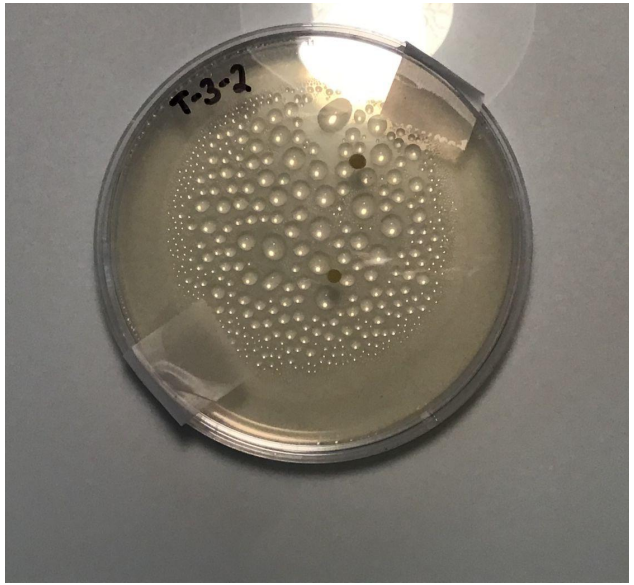


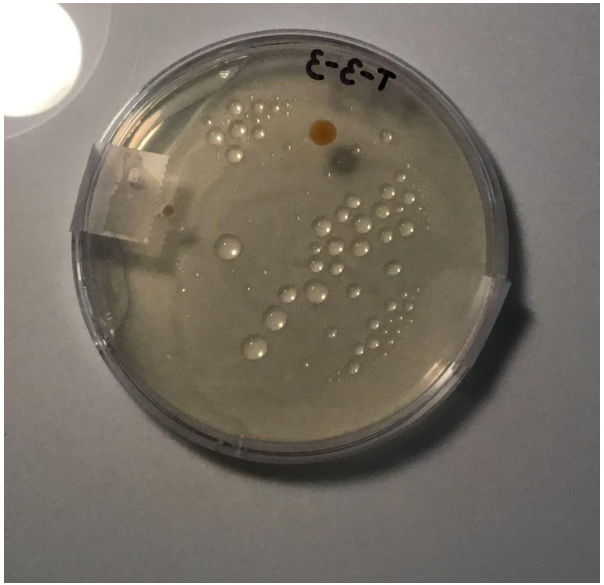


Results

Test Condition 3: Cloth Roll Towel Cabinet

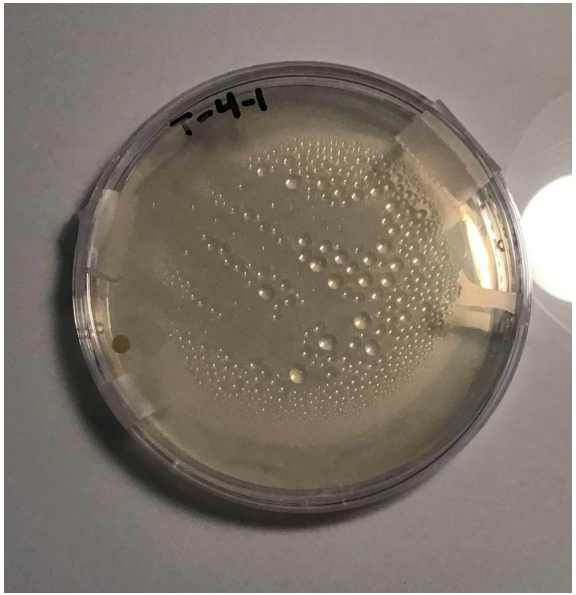


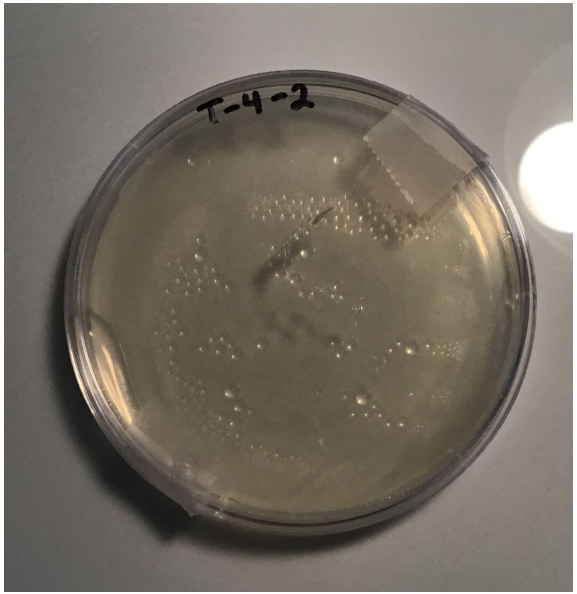


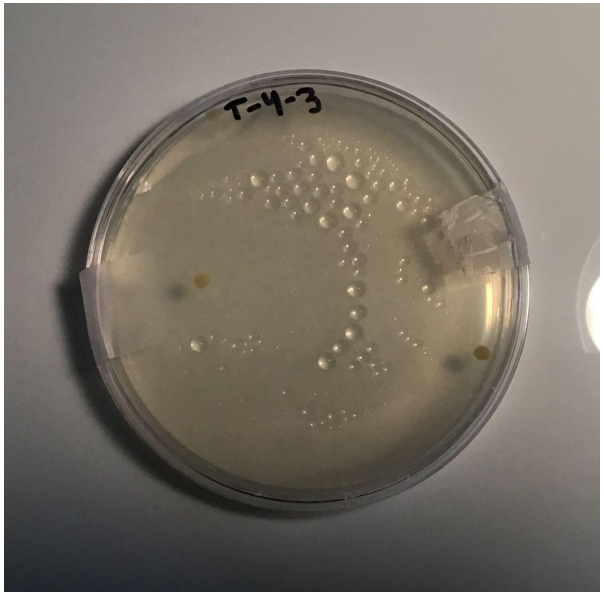


Results

Test Condition 4: Standard Hand Dryer

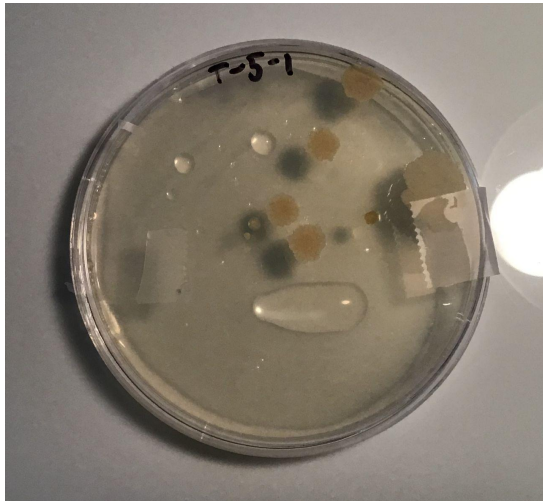


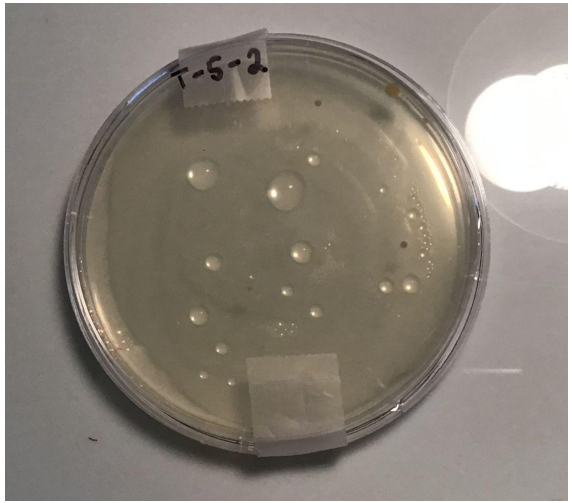


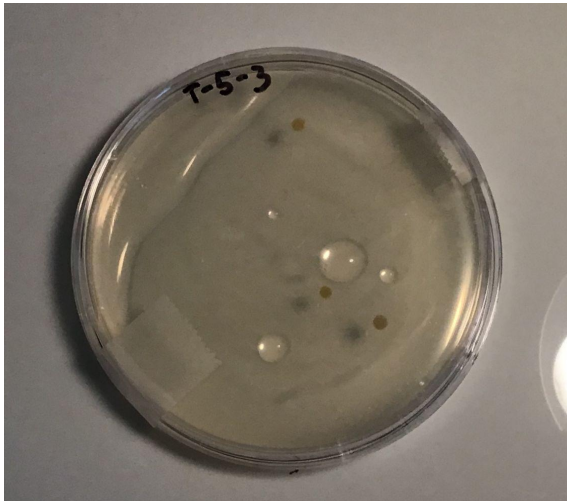


Results

Test Condition 5: Air Blade (high powered).

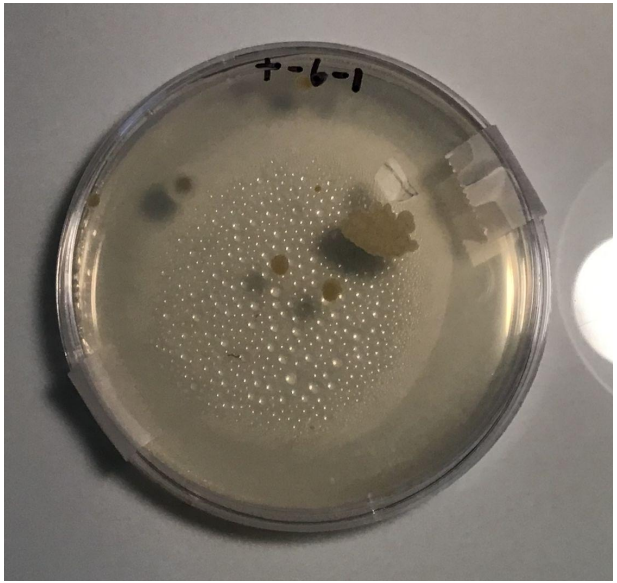


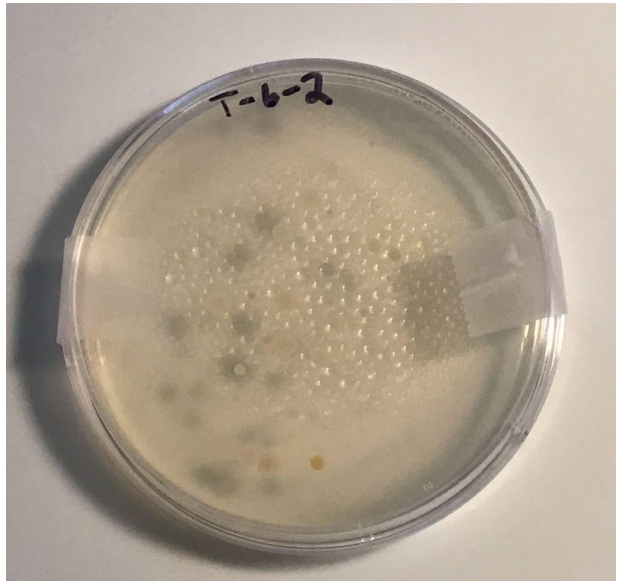


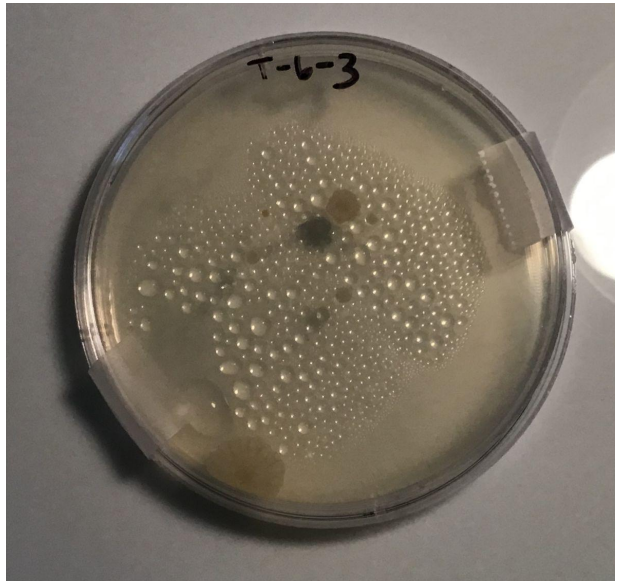


Results

Positive Control: Faucet Handles







Observations

Test condition 1. Air dry (without machine)

When reviewing the plates for test condition 1. I saw that across all three plates there were four colonies made up of three different microbes (germs).

Test condition 2. Paper towels

When reviewing the plates for test condition 2. I saw across all three plates there were three colonies made up of three different microbes.

Test condition 3. Cloth roll towel cabinet

When reviewing there plates for test condition 3. I saw across all three plates that there were six colonies made up of three or four different microbes.

Observations (cont.)

Test condition 4. Standard hand dryer

When reviewing the plates for test condition 4. I saw that across all three plates there were five colonies made up of two different microbes.

Test condition 5. Air blade (high powered)

When reviewing the plates for test condition 5. I saw across all three plates there were 20 colonies made up of three different microbes.

Test condition 6. Faucet handles (positive control)

When reviewing there plates for test condition 6. I saw across all three plates that there were 55 colonies made up of 6 different microbes.

Analysis and Discussion

I had expected to find that test 1. air dry (without machine) would have the least germs, but after the experiment I have figured out that test 2. paper towels had one less colonie than test 1. air dry (without machine). Although I had gotten that wrong I did guess that the positive control would have the most and it sure did it had 55 colonies and 6 microbes. I had thought that test five air blade would have a lot of germs but the numbers had come out to be even bigger than expected number 5. Had 20 colonies, and 3 microbes! I had also thought that that test 3. The Cloth roll towel cabinet would have had a lot more than what it came out to be it came out at 6 colonies and 4 microbes. On test four I had intended to test it on the push button hand dryer but I could not locate one so instead I substituted it with a hair dryer on warm low at home. So the results on 4. The standard hand dryer may had been effected how much germs there were because of the hair dryer.

From this study it appears that when you wash your hands you should either use a paper towel or air dry your hands (without machine) and you definitely should NOT touch the faucet handles and you SHOULD invest in automatic faucets.

Future studies to investigate to investigate this study might include a negative control and a push button hand dryer. Also researchers may be interested to isolate and identify the colonies, grown on the dishes.

Appendix - lab notebook