# Growing bacteria in petri dishes with Tucson waters

Water Cup and Petri Dish photos by Google Stock Images

# Question & Purpose

Our big question for this project is:
What water sources within Tucson are the cleanest and safest to drink?

Our purpose of this project is to prove what water sources would be safe to drink, or what water sources are the cleanest. We have chosen this project because we would like to learn more about what is in the water all around us.

# Research

Typically the bacteria that grows within petri dishes is not a hazard, although when large colonies start growing, safety measures should be cautiously followed.

The bacteria that looks like mold is actually fungus.

According to https://somatosphere.com/2014/petri-dish.html/, “The petri dish was made for separation. It was developed for culturing microorganisms while separating them from airborne contaminants.”

Different looks of bacteria that can grow within the dishes.

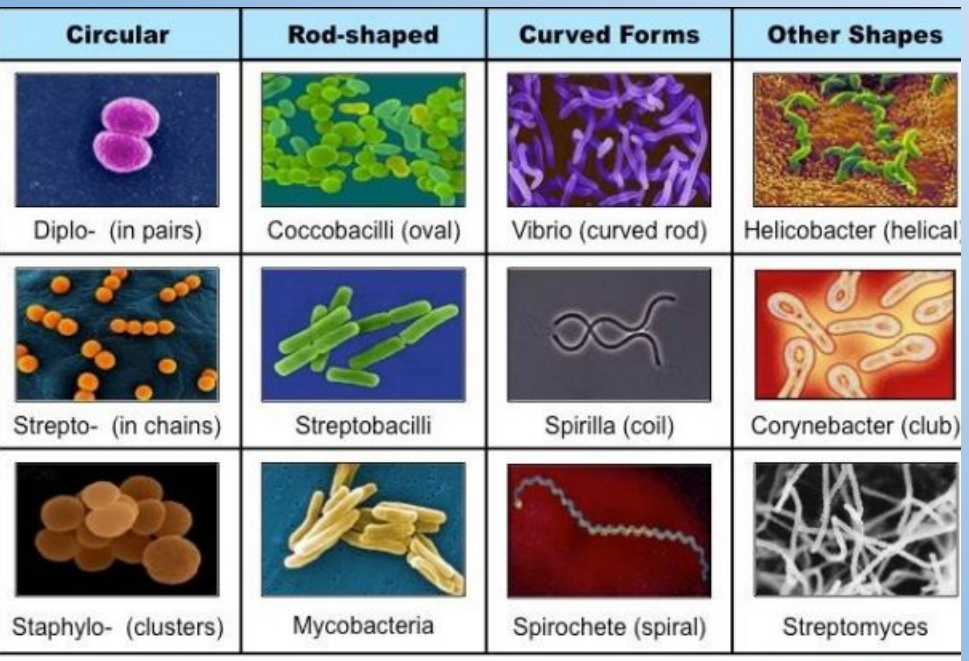


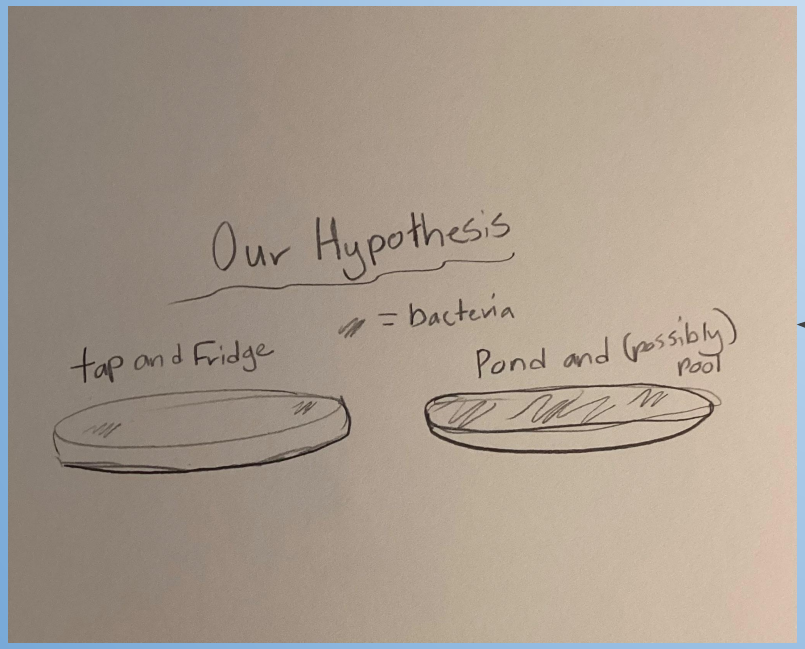

*Image: BioNinja*

Unlike plant and animal cells, bacteria are microorganisms. This means they are tiny cells that do not hold a membrane with DNA without the cell. Bacteria reproduce by using a process called binary fission, in which the cells split into two, making it very quick and easy for the cells to reproduce. In relation to plant and animal cells, bacteria require nutrients in order to grow. The agar gelatin in the petri dishes provides nutrients for the bacteria which allows the bacteria to grow so much that it is visible to the naked eye.

Petri dishes are used to cultivate organisms that are typically invisible to the naked eye.

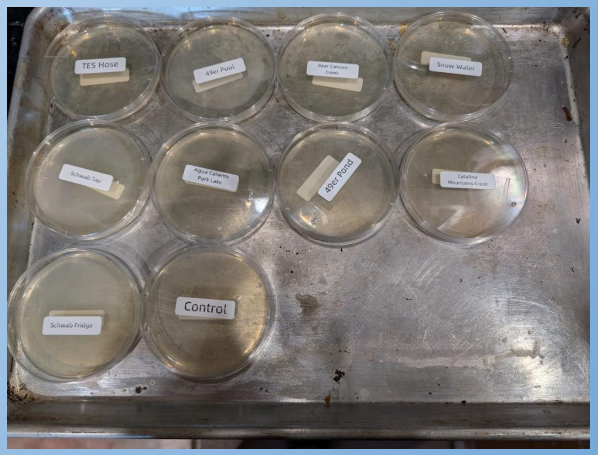
# Hypothesis

**Our hypothesis is that the tap and fridge water will have little to no bacteria, while the more man-made natural water will be very dirty (like the 49er pond water, and the pool water.)**




Original drawing of hypothesis

(Below) All the dishes prepared before they began growing colonies



# Variables

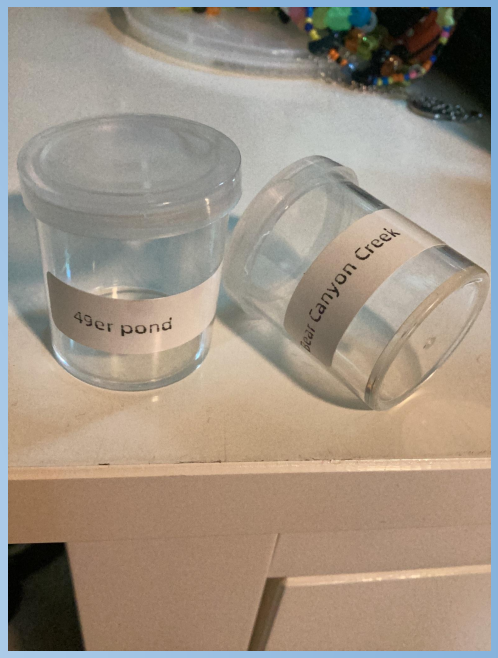
Our independent variable is the exact amount of water we use to grow our bacteria, while our dependent variable is the amounts of bacteria. This is because results of the experiment may vary depending on the amount of water that is used, since there is more bacteria in a larger amount of water.

The amount of snow water we collected

# Materials

- Petri dishes
- Water samples
- Capsules to collect water samples
- Water hardness test strips
- Cotton swabs

Water collecting capsules




Petri dish

Petri Dish photo by Eisco Labs

These are water hardness test strips

The purpose of the control (Right) was to test if the test was done wrong at all in the experiment. If it had grown anything by the end of the week (More than just a few dots of colony sprouting), then the experiment had been done wrong somewhere in the process.

# Procedure

Step one: Collect water.
Go around Tucson and up into the Catalina mountains to collect capsules of water.
Step two: Apply the water into each petri dish
For this step, use cotton swabs and swab drops of each water source on to separate petri dishes.
Step three: Grow the bacteria
Keep the dishes in a humid environment and let them grow while recording of the growth progress every day.
Step four: Stop the growth
After a week of letting the bacteria grow, put the dishes into a freezer to stop the colonies from growing further.
Step five: Examine the growth
Take out each dish and examine what has grown what amount, and record the data.

# Conducting the experiment/Data

Day 2 (Below)

These are the results of the experiment each day.

Day 1 (Below)

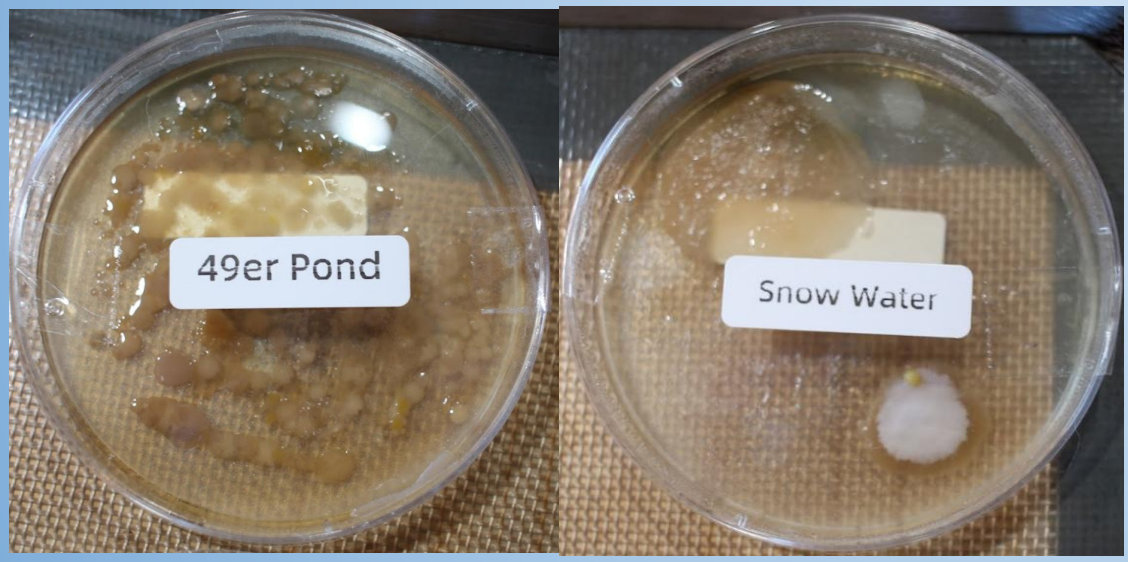
# Conducting the experiment/Data

Day 3 (Below)

Day 4 (Below)

# Results

The results are observed close-up. The amounts of what had grown the most, and what had grown the least are observed.




The two highest amounts were 49er Pond and the snow water.

Our tap water and the Catalina Mountains Creek water held the least amount of bacteria.

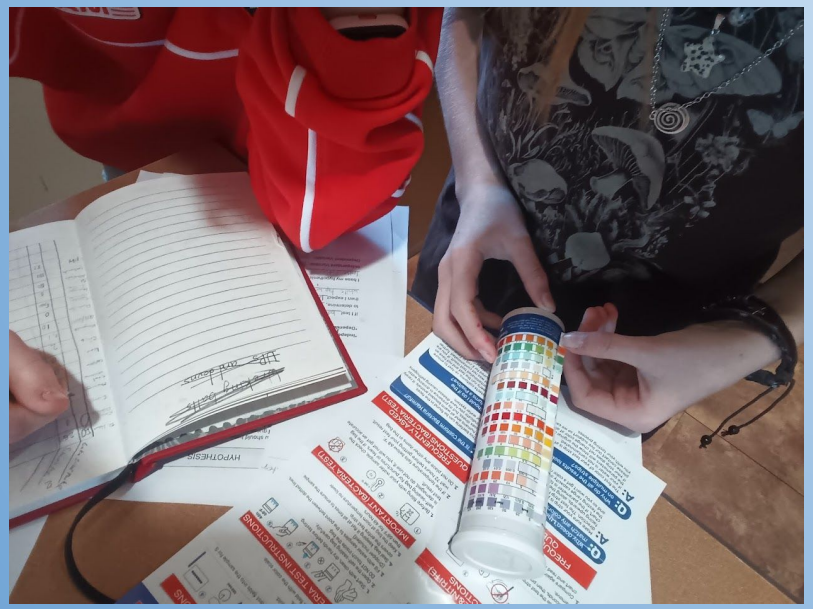
# Conclusion

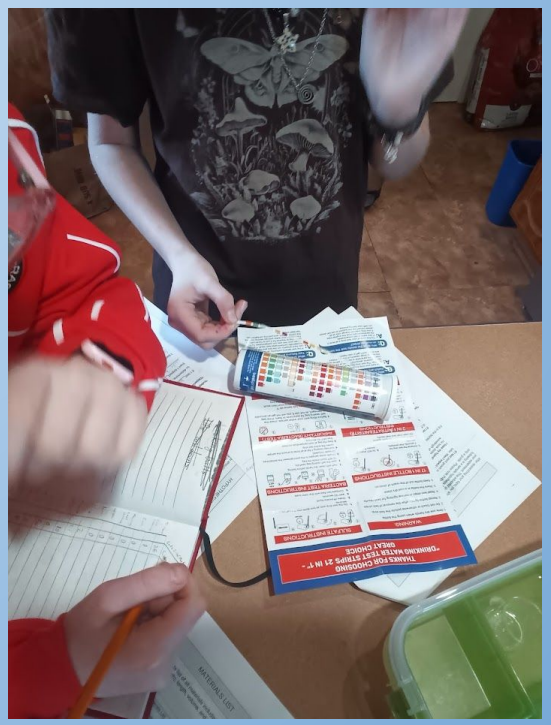
As a conclusion, our hypothesis was proven correct. The filtered water grew little to no bacteria, while the pond water was very dirty and full of colonies. One thing that had proved us wrong though is that the pool water did not hold too many colonies like we thought it would. We believe that this is caused by the chlorine which kills bacteria.

A picture of some colonies that had grown within the Agua Caliente water.

# Additional Testing

The purpose of this test was to see if the percentages of each material type aligned with the bacteria level within the petri dishes.





# Additional Test Data + Growth levels

| | Lakeside Park | Schwab Tap | TES Hose | 49er Pond | 49er Pool | Snow Water | Auga Caliente | Schwab Fridge | Catalina Creek | Bear Canyon | Distilled (Control) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Hardness | 50 | 25 | 120 | 50 | 120 | 25 | 25 | 25 | 25 | 25 | 25 |
| Free Chlorine | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Iron | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Mercury | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total Chlorine | 0 | 0 | 0 | 0 | 0 | 0.5 | 0 | 0.5 | 0 | 0 | 0 |
| Copper | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Lead | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Zinc | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Manganese | 0 | 0.1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| QAC/QUAT | 20 | 10 | 0 | 10 | 10 | 10 | 5 | 10 | 20 | 5 | 20 |
| Fluoride | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sodium Chloride | 0 | 500 | 250 | 500 | 500 | 500 | 0 | 25 | 50 | 50 | 50 |
| Hydrogen Sulfide | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Tot. Alkalinity | 120 | 180 | 120 | 180 | 120 | 0 | 180 | 40 | 0 | 0 | 0 |
| Carbonate | 180 | 180 | 80 | 180 | 80 | 0 | 240 | 120 | 0 | 0 | 0 |
| pH | 7.6 | 8.2 | 7.6 | 8.2 | 7.6 | 6.4 | 9 | 7.6 | 6 | 6 | 6 |
| | | | | | | | | | | | |
| Growth levels | N/A | 1 | 6 | 10 | 4 | 8 | 7 | 9 | 2 | 2 | 1 |
| 1=Good 10=Bad | | | | | | | | | | | |

# Additional Testing Conclusion

Our conclusion overall of this side project is that the amounts of material in each water source do not align with bacteria levels in the dishes. In other words, the higher the numbers of material depicting the bacteria levels in the dishes is false.

# Bibliography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