



Assessment of Microbial Contamination on Environmental Surfaces and Water Sources in a Campus Setting

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Introduction

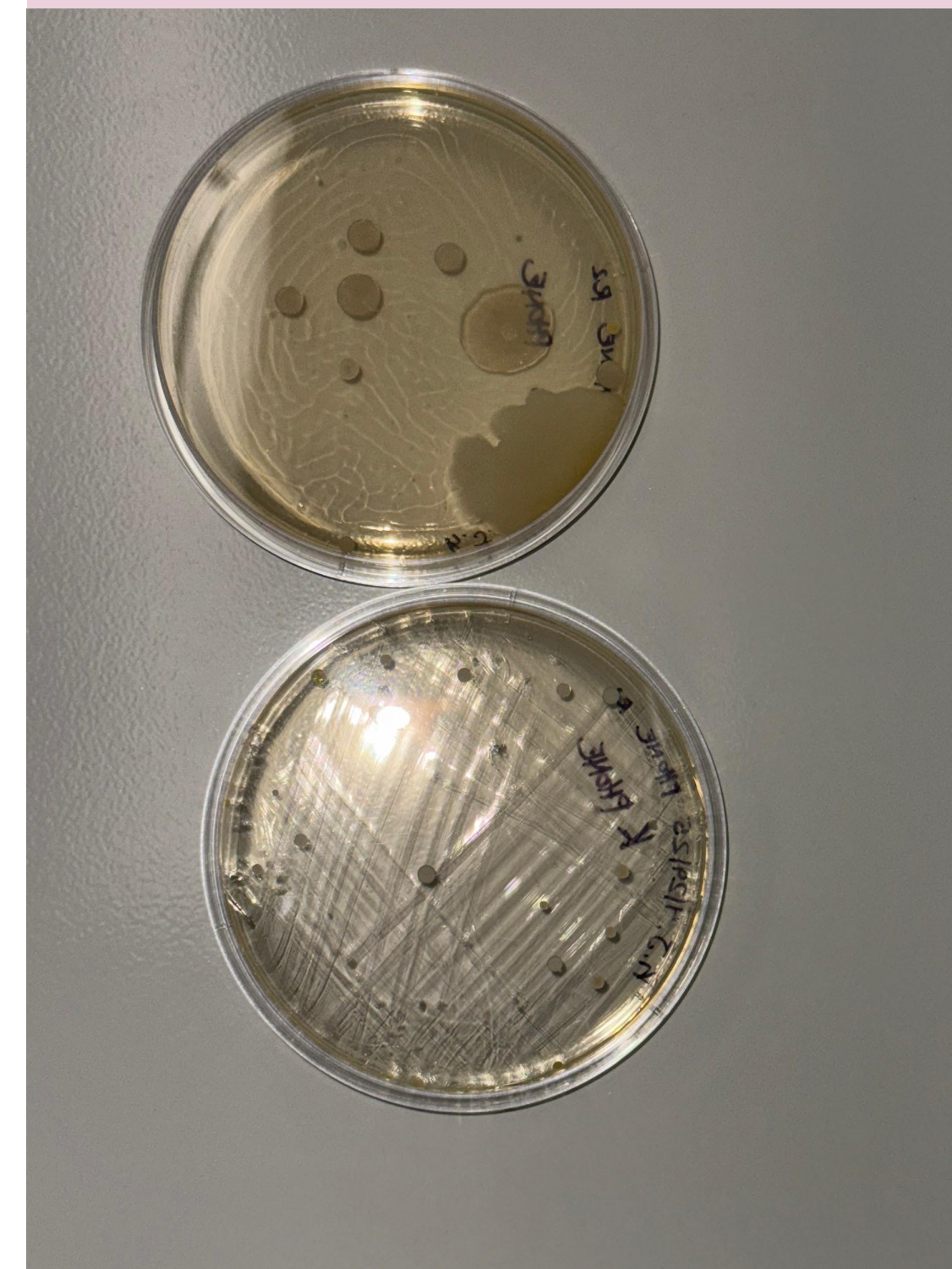
Environmental surfaces can act as reservoirs for various microorganisms, including potentially pathogenic bacteria. Understanding the microbial load on commonly touched surfaces can inform hygiene practices and public health recommendations.

In this study, we prepared Tryptic Soy Agar (TSA) plates to culture and quantify bacterial presence on 5 frequently contacted surfaces around University of Notre Dame's campus, toilet and water fountain water samples, door handles, cell phones and a toilet seat.

Sterile swabs were used to collect samples, which were then streaked onto TSA plates and incubated at 37°C for 24–48 hours. Results are expected to highlight variation in microbial abundance based on surface type and location.

This research demonstrates a low-cost and accessible method for environmental monitoring and promotes awareness of microbial exposure in everyday environments.

phone

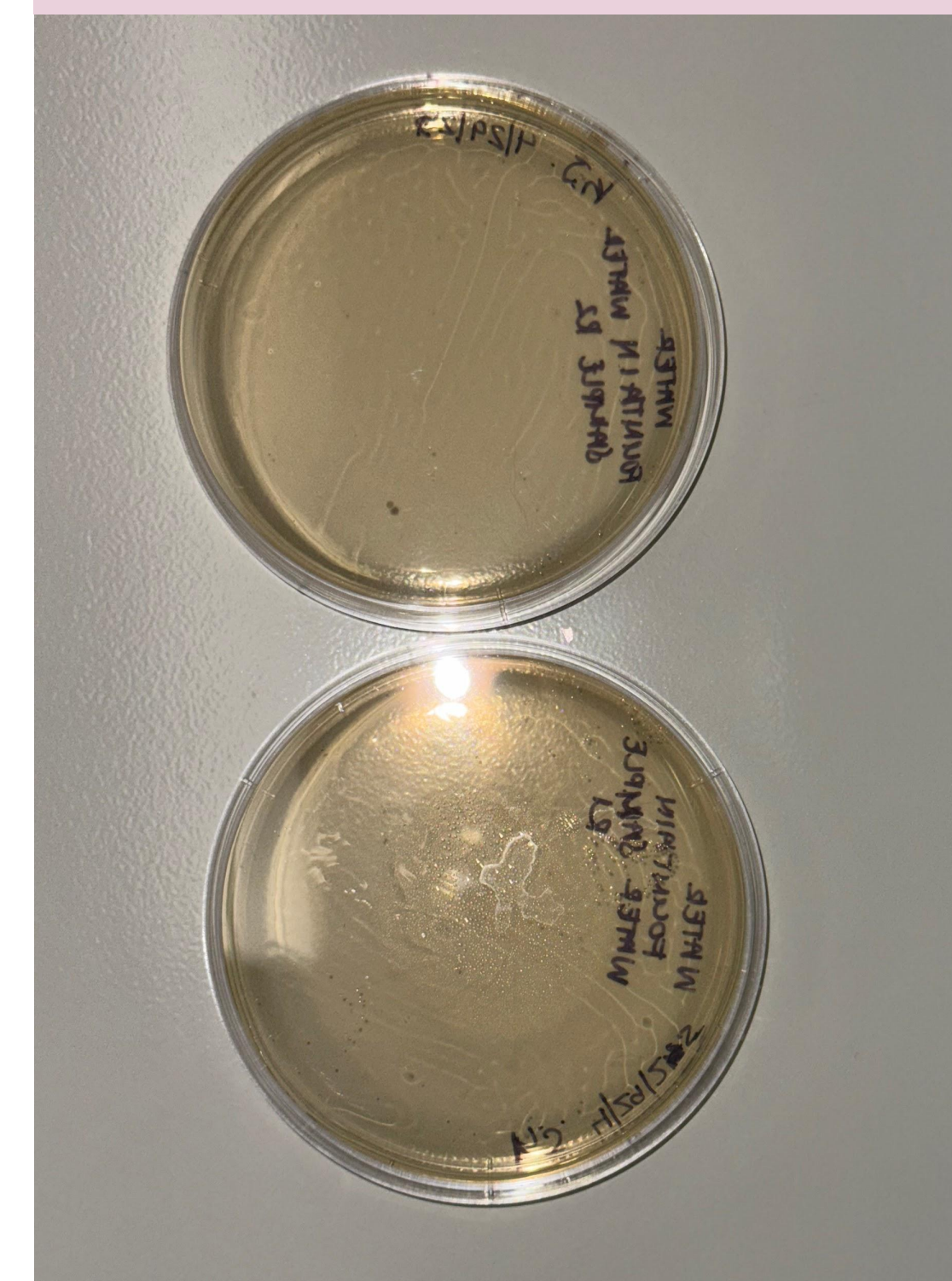


toilet water

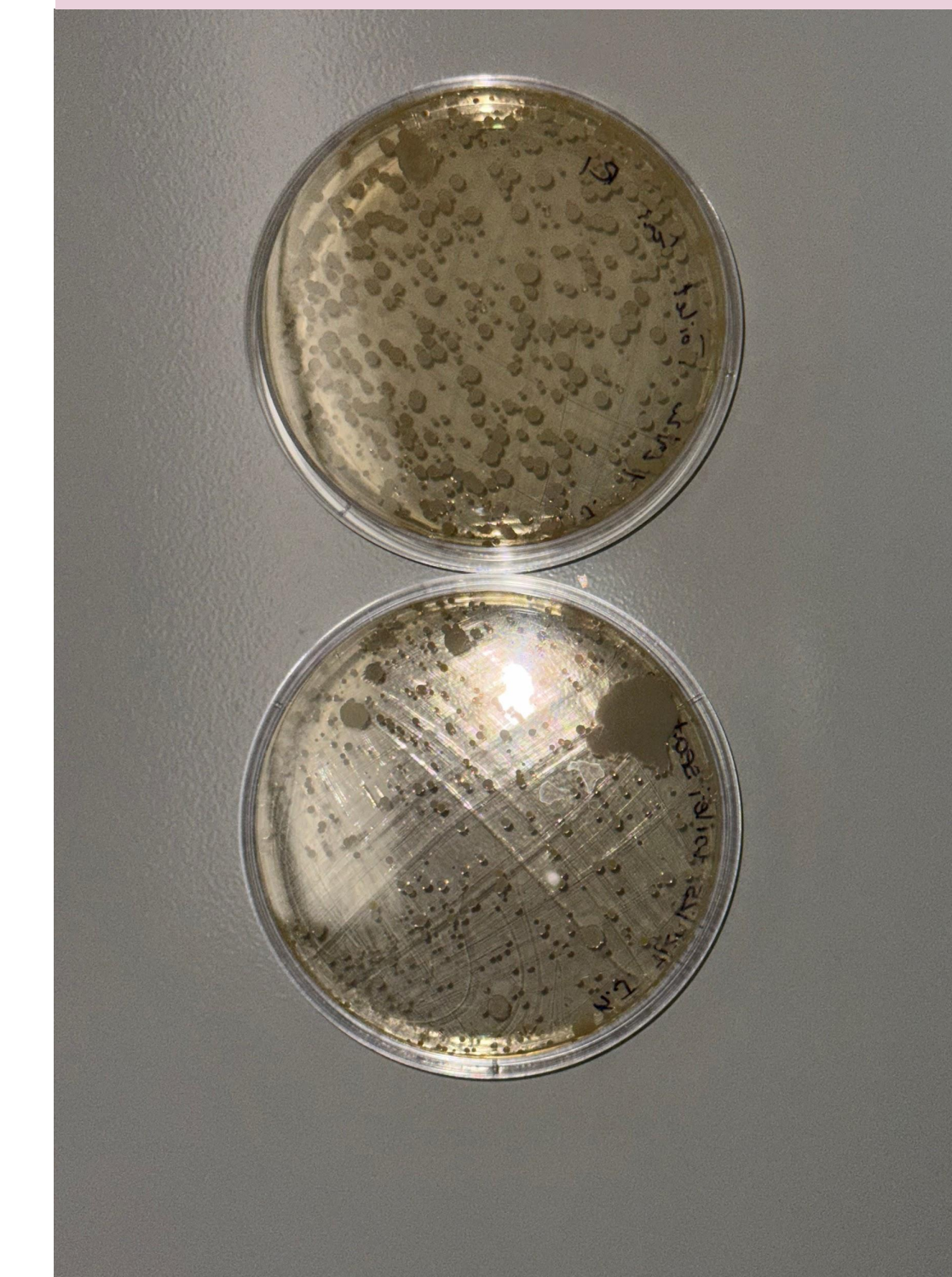


Results

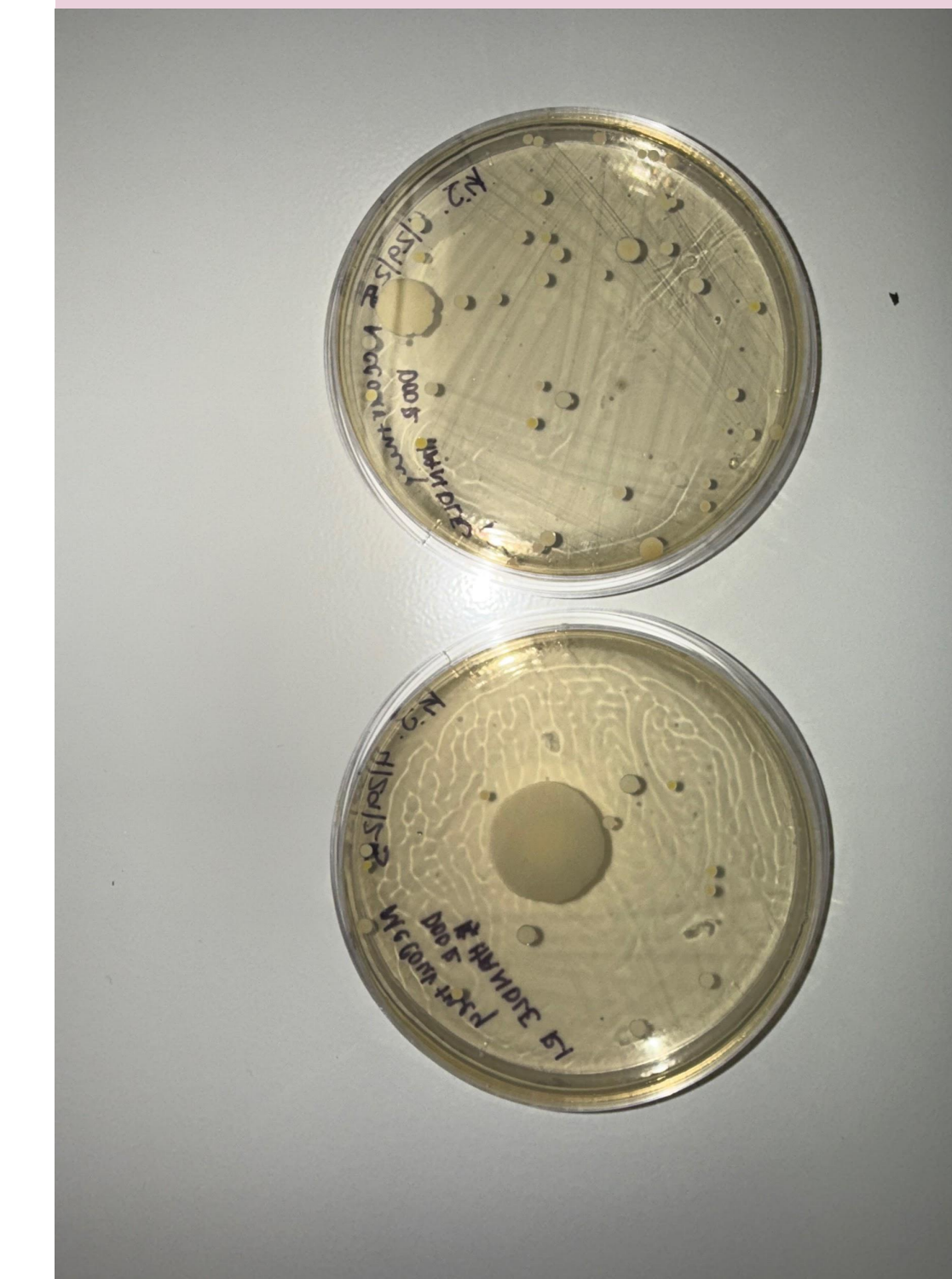
water fountain



toilet seat



door handle



Conclusions

This experiment demonstrated that a variety of commonly touched surfaces and water sources on campus harbor microbial life, as shown by visible bacterial growth on tryptic soy agar plates. The results highlight the importance of hygiene and regular cleaning, especially on high-contact surfaces. By using simple microbiological techniques, we were able to explore how microbes are present in our everyday environment. This project served as a valuable learning experience in environmental sampling, sterile technique, and bacterial culturing. Future work could expand on these findings by identifying specific microbes through DNA sequencing and improving experimental design with appropriate controls and quantitative analysis.

Experience

My opportunity to study in a science lab at Notre Dame University has given and taught me so much.

I have learned how science labs work and operate as well as how scientific research works at a much higher level.

I had the opportunity to gain real internship experience while having fun and learning so many new things. It taught me more responsibility and accountability that I will be able to apply to anything I do in the future.



Methods

To investigate microbial presence on common campus surfaces and in water sources, ten different sites were selected for sampling. These included three physical surfaces and two water samples. The surfaces tested were: a toilet seat, cellphone, and a door handle. The two water samples were collected from the toilet bowl water and the building drinking fountain.

All samples were collected on the same day for consistency and tested in duplicates to account for variability and improve reproducibility.

Microbial growth media was prepared using TSA, a general-purpose, non selective agar suitable for culturing a wide range of bacteria.

Sterile cotton swabs moistened with sterile phosphate buffered saline (PBS) were used to swab each surface in a consistent 5cm x 5cm area. After swabbing, the cotton swab was immediately rolled onto the TSA plates, for water samples 100 uL was spread across a TSA plate.

After the 48-hour incubation period in an inverted position at 37 °C, plates were removed and visually examined for microbial colony growth.

Acknowledgements

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