

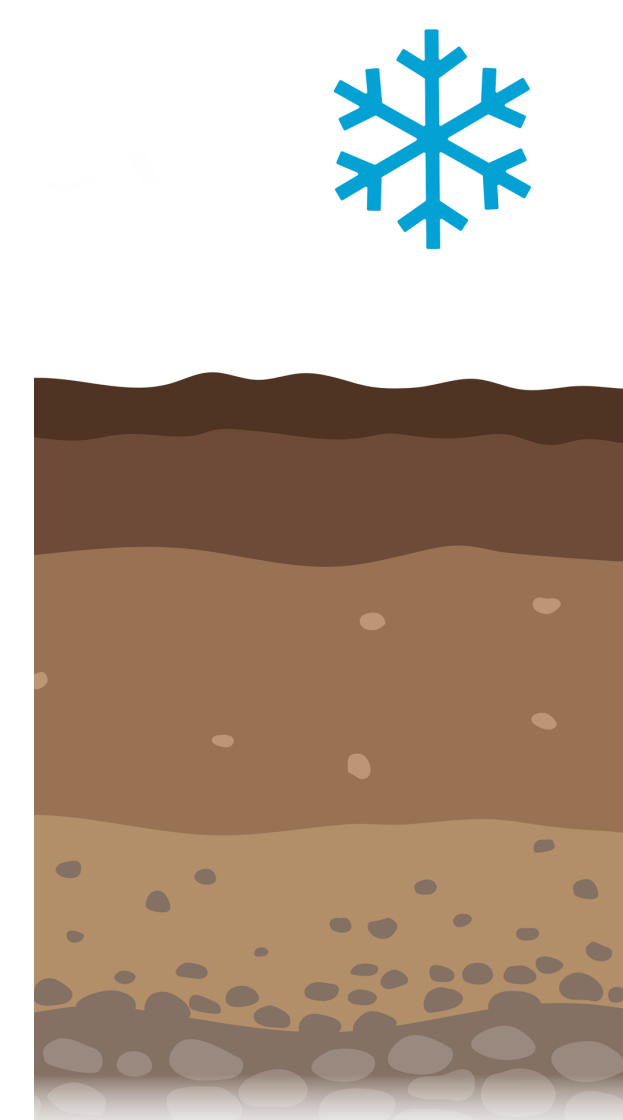
Characterizing novel antimicrobial compounds from Canadian High Arctic soil bacteria

Grace Parish¹, Eszter Farkas¹, Daniella Serrador¹, Laurence Belanger², Lyle Whyte³, Samantha Gruenheid¹, and Dao Nguyen^{1,2,4}.

¹Department of Microbiology & Immunology, McGill University; ²Meakins-Christie Laboratories, Research Institute of the McGill University Health Centre; ³Department of Natural Resources Sciences, McGill University; ⁴Department of Medicine, McGill University

BACKGROUND

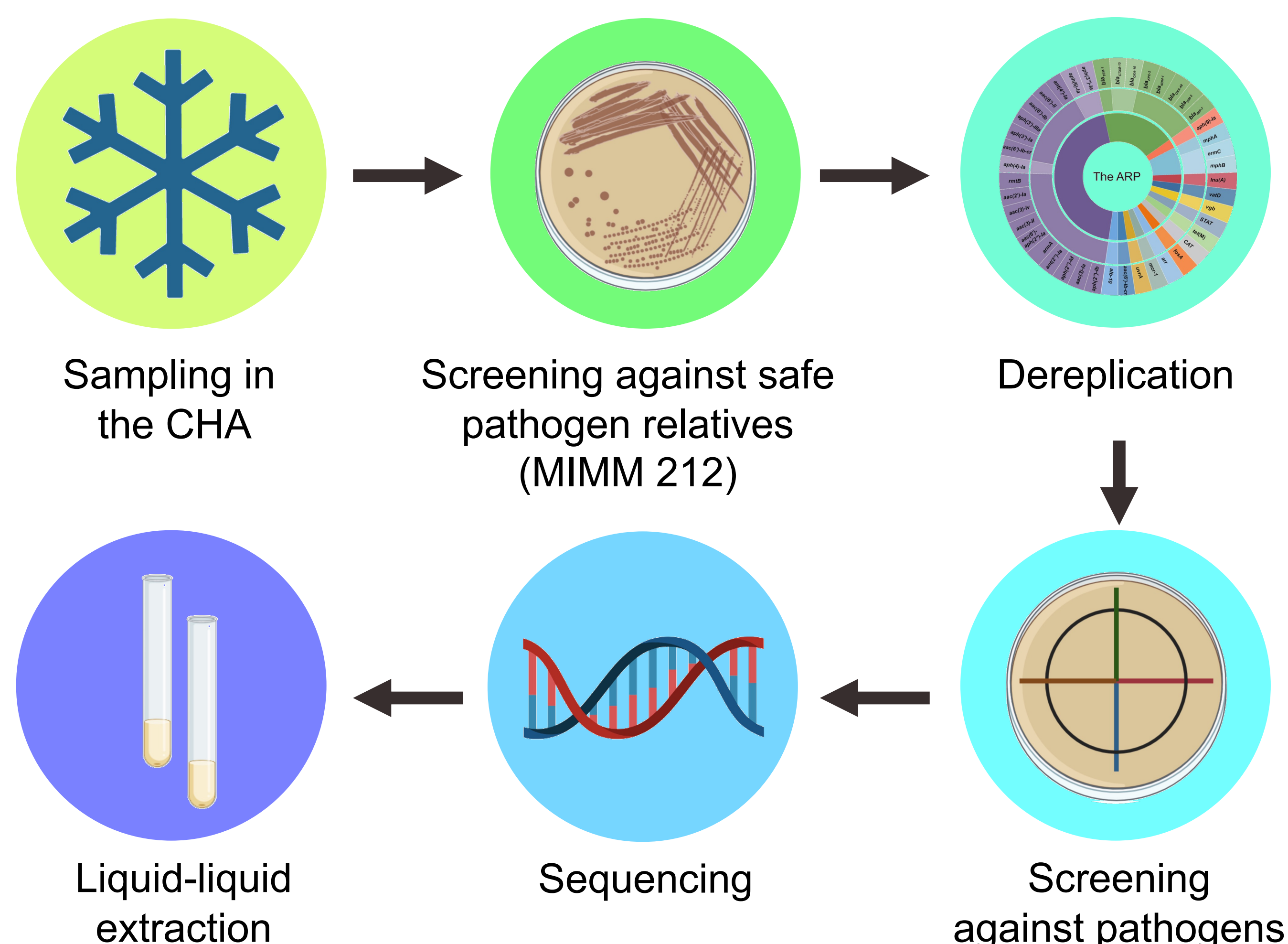
- Antimicrobial resistance (AMR) is a global public health crisis contributing to an estimated 4.95 million deaths annually.¹
- In the face of AMR, the pipeline of novel antibiotics is running dry – there is a need to identify and develop new compounds.
- Two thirds of antibiotics in use are derived from natural products or semi-synthetic derivatives of natural products such as bacteria and fungi.²
- The Canadian High Arctic provides a unique environment leading to uncharacterized antibiotic-producing bacteria.
- Tiny Earth is an antibiotic crowdsourcing project used in McGill's MIMM 212 undergraduate lab course.³



HYPOTHESIS

Due to the unique environmental pressures and microbial communities in the Arctic, bacteria from Canadian High Arctic soil produce novel antibacterial compounds.

PROJECT OVERVIEW



RESULTS

1. Tiny Earth Arctic isolates show antibacterial activity against human pathogens

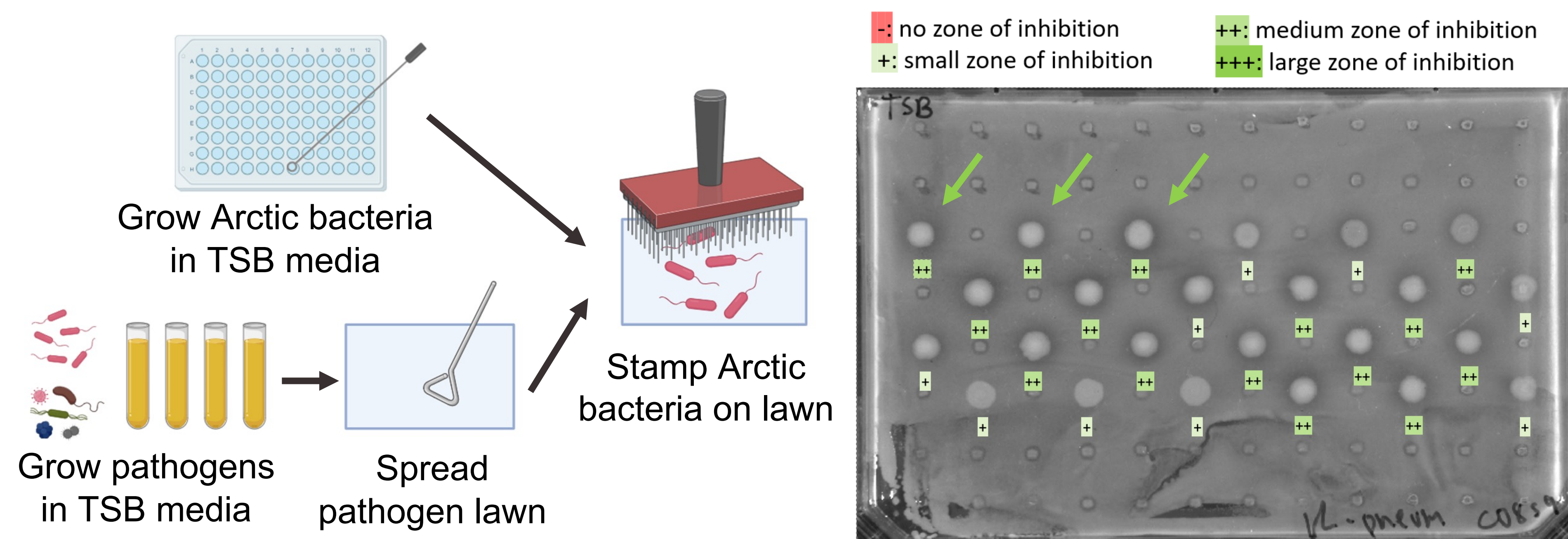


Figure 1. Tiny Earth Arctic isolates screened for antibacterial activity against human pathogens including *Klebsiella pneumoniae* C0859. 14 Arctic isolates were inoculated in TSB in triplicate and stamped on TSA plates with a lawn for each pathogen (repeated for 350+ Arctic isolates). Antibacterial activity was assessed after 1 week incubation at room temperature.

2. Compounds produced by Arctic isolate 5-2018 show antibacterial activity against human pathogens

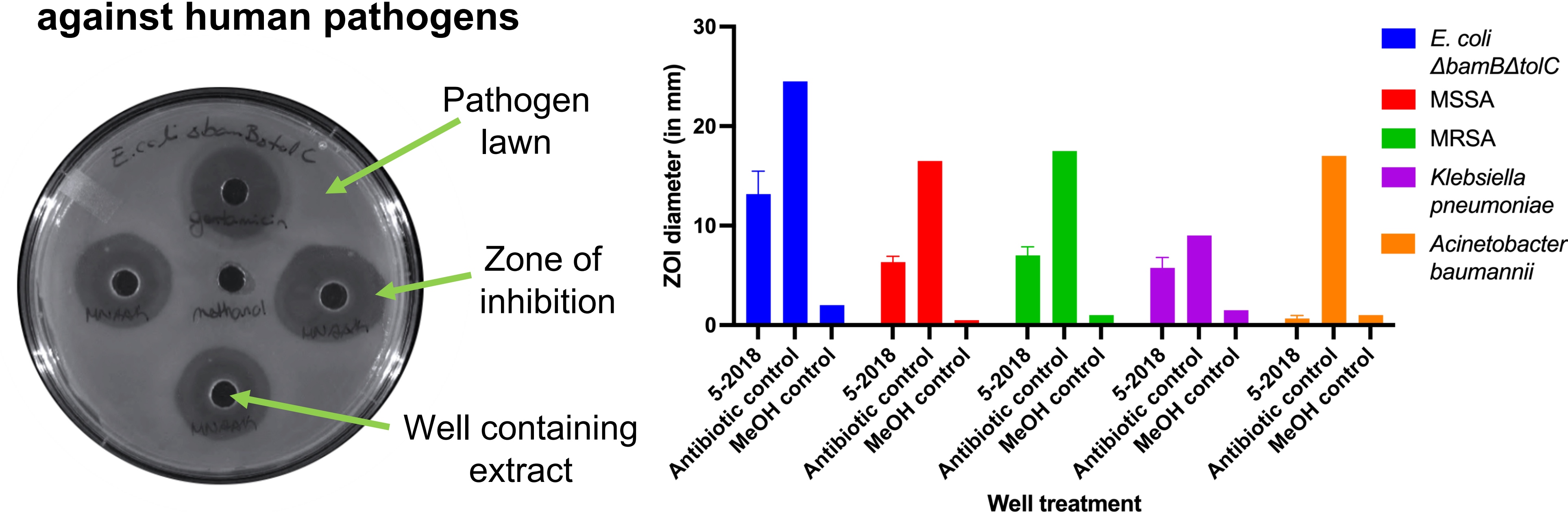


Figure 2. Antibacterial activity of crude extracts from Arctic isolate 5-2018 against clinically relevant human pathogens. Crude extract from strain 5-2018 was obtained by ethyl acetate extraction, resuspended in methanol, and tested against human pathogens by agar well diffusion assay on TSA (5 mg/well). Antibacterial activity was assessed after 24 hours incubation at 37 °C.

DISCUSSION

- 25 Arctic strains with inhibitory activity against have human pathogens have been identified.
- Crude extracts from Arctic isolate 5-2018 display antibacterial activity against certain strains of *E. coli*, MSSA, MRSA, and *K. pneumoniae*.
- Future directions include further compound investigation and optimization of culture conditions.

REFERENCES AND ACKNOWLEDGEMENTS

¹Antimicrobial Resistance Collaborators. Global burden of bacterial antimicrobial resistance in 2019: a systematic analysis. *Lancet* 399, (2022).

²Miethke, M. *et al.* Towards the sustainable discovery and development of new antibiotics. *Nature Reviews Chemistry* 5, (2021).

³Jo Handelsman *et al.* (2018). Tiny Earth – A Research Guide to Studentsourcing Antibiotic Discovery.

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