

Introduction

- 2 microbial mats collected from Lake Kleifarvatn, Iceland. The lake is a site of active hydrothermal activity
- Lake Kleifarvatn is seen as an analog for planetary environments offering insight into extraterrestrial habitability
- Goal: characterize taxonomic composition and infer metabolic differences between Proximal and Distal communities using short-read classification (Kaiju) and Krona visualizations.

Figure 1. Distal microbial community exhibits greater phylum-level diversity, seen by the increase of Cyanobacteriota and Bacillota. All listed phylums are >2% relative abundance classified by Kaiju.

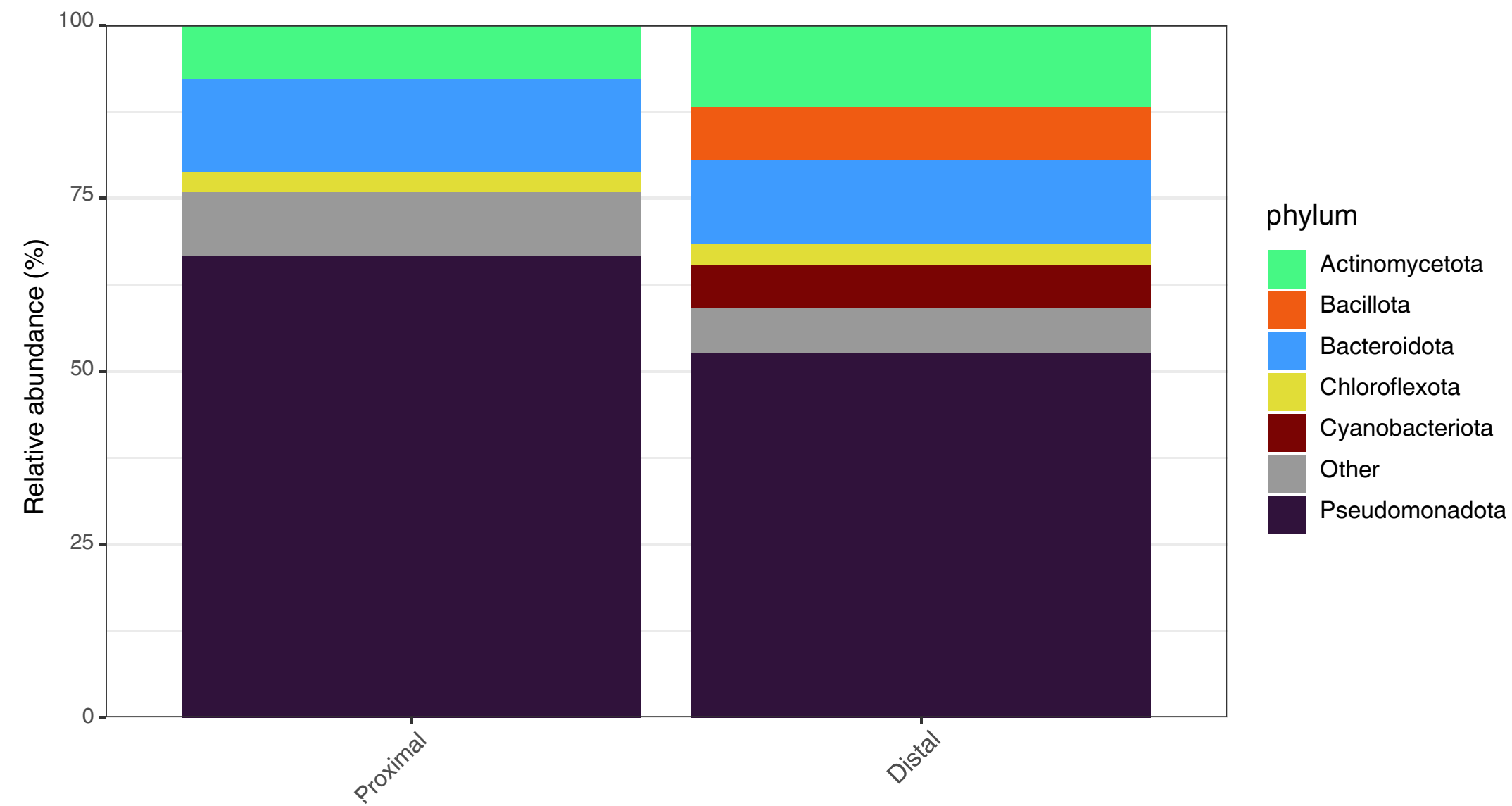
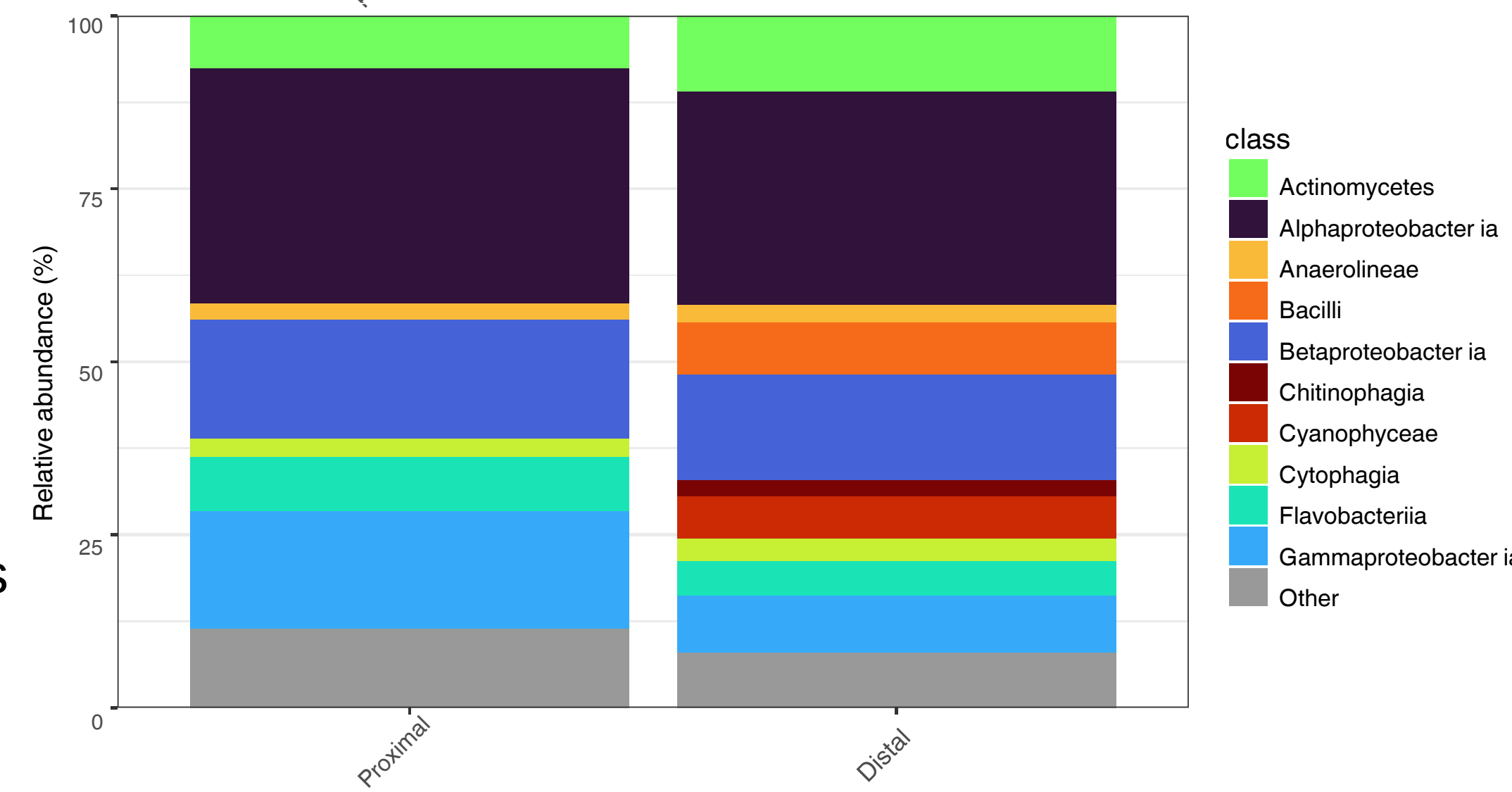


Figure 2. Class-level composition shows an increase of relative abundance of bacteria Cyanophyceae, Chitinophagia and Bacilli in the Distal sample. All listed classes are >2% relative abundance classified by Kaiju.



Methods

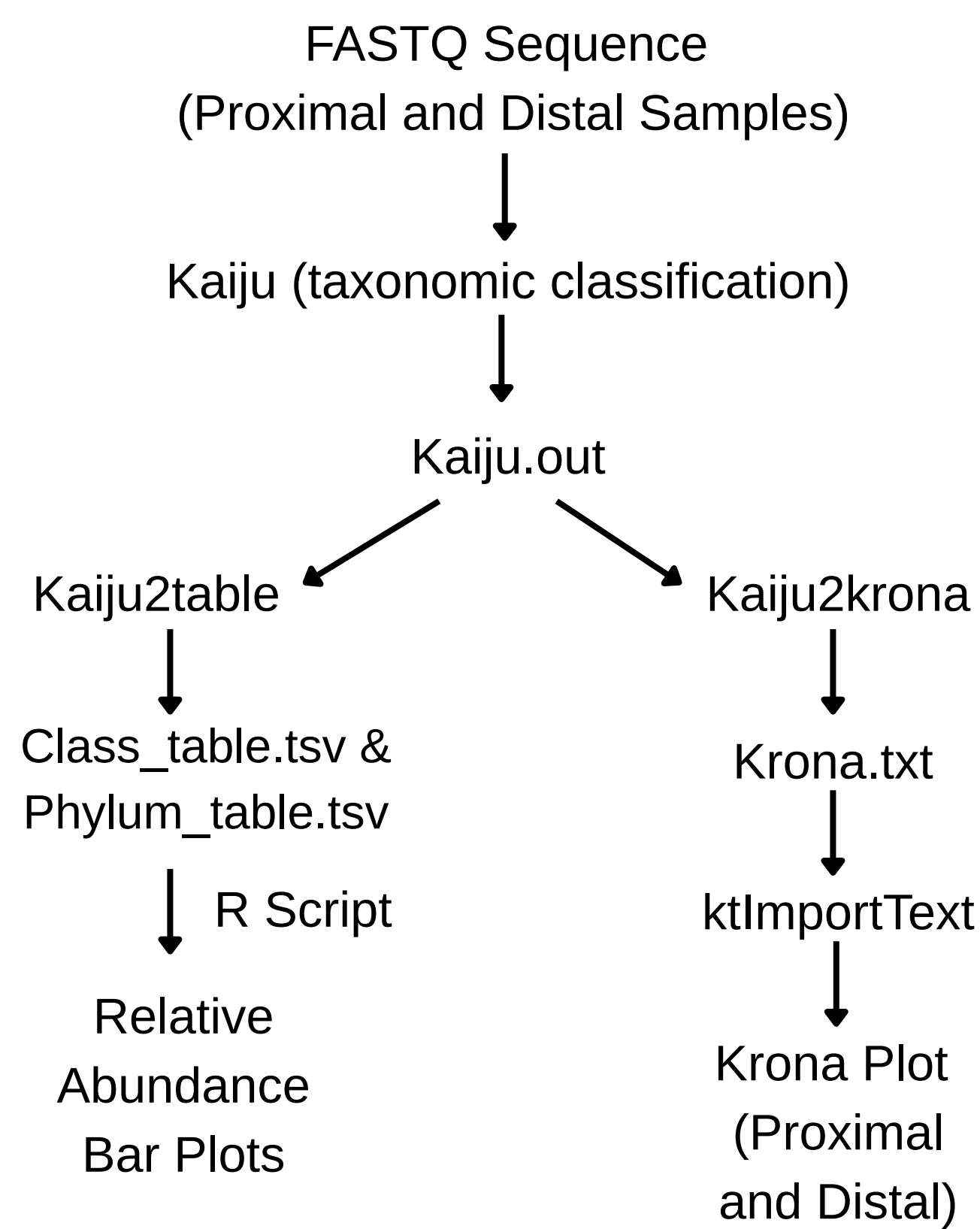


Figure 3. Krona plot of Proximal sample shows higher percentage of chemolithotroph bacteria supporting a vent-driven bacterial community. Plot displays full taxonomic hierarchy and relative abundance (%) of bacterial classifications based on Kaiju read classification.

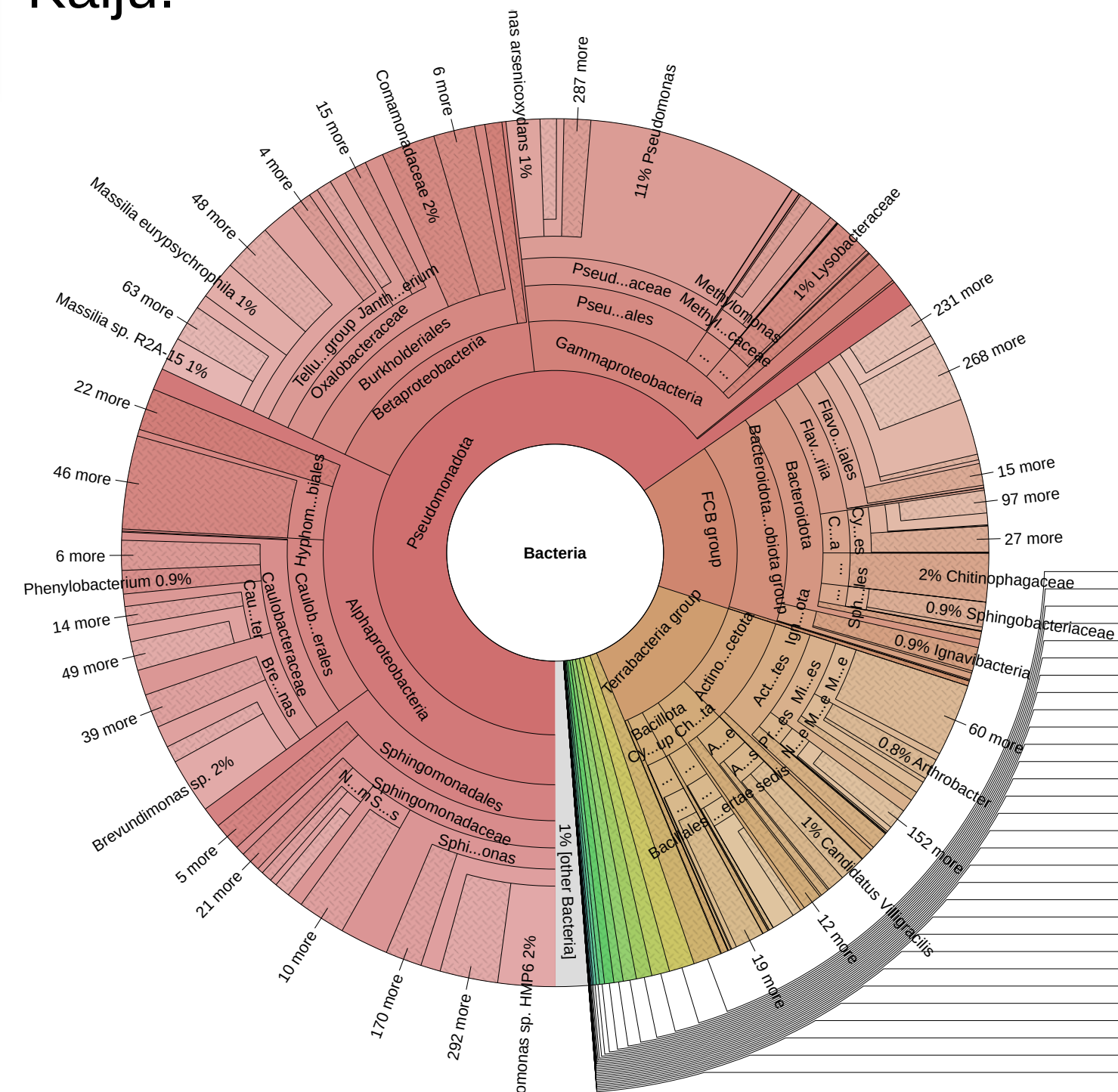


Figure 7. Krona plot of the Distal sample shows higher percentage of bacteria driven by carbon and nitrogen cycling for energy. Plot displays full taxonomic hierarchy and relative abundance (%) of bacterial classifications based on Kaiju read classification.



Discussion

- Phylum/class level: Distal has greater percentage of Cyanophyceae, Chitinophagia, and Bacilli, while Gammaproteobacteria drops ~8%
- Pattern suggest Proximal communities favor chemolithotrophy tied to vent chemistry, while Distal communities support more diverse metabolisms (photosynthesis and nitrogen fixation) under milder thermal/chemical conditions.
- Sphingomonas and Methylobacterium were found more in the Proximal sample compared to the Distal sample.
- Terrabacteria relative abundance increased in the Distal sample which is tied to carbon/nitrogen cycling.
- Consistent pattern across phylum, class, and genus-level (Krona) data strengthens the conclusion that vent proximity structures microbial metabolic capabilities.

References

- Menzel, P., Ng, K. L., & Krogh, A. (2016). Fast and sensitive taxonomic classification for metagenomics with Kaiju. Nature Communications, 7(1). <https://doi.org/10.1038/ncomms11257>
- Arroyo, Y., & Barry, C. (2026, February 9). NASA fieldwork spotlight: Iceland. NASA Science. <https://science.nasa.gov/solar-system/planetary-analogs/nasas-goddard-instrument-field-team-iceland-2025/>

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