

## **Microbiology in mineral exploration**

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Mineral exploration in Canada is becoming increasingly complex as the majority of undiscovered commodities are likely deeply buried beneath significant glacial overburden and bedrock, reducing the effectiveness of existing tools. The development of innovative exploration protocols and techniques is imperative to the continuation of discovery success. Preliminary experimentation has demonstrated the potential viability of microbial fingerprinting through genetic sequencing to identify the presence of mineralization and its geochemical signatures entrained in till. With the advent of inexpensive modern sequencing technology and large dataset evaluation techniques, microbiological approaches to exploration are becoming more quantitative, cost effective, and efficient. The integration of microbial community information with soil chemistry, mineralogy and landscape development propagates the development of an improved decision process in mineral exploration.

Soils over porphyry, kimberlite, and VMS deposits have undergone microbial community profiling. These community genome derived datasets have been integrated with trace metal chemistry, mineralogy, surface geology and other environmental variables including Eh and pH. Analyses of a kimberlite in the Northwest Territories, and a Cu-porphyry from British Columbia, show significant microbial community shifts that are correlated with subsurface mineralization. This relationship between microbial profiles and mineralization could lead to the use of microbial fingerprinting as a method for more accurately delineating ore deposits in glacially covered terrain, with potential for application as a field based technique, as sequencing technology is progressively developed into portable platforms.