Biology Seminar

Western
UNIVERSITY · CANADA

12:30 - 1:30 pm
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BGS 0165

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Gold Rush 2.0 – The role of microbes in precious metal geomicrobiology

Gold is a precious metal that has been valued for its physical qualities and has primarily been used as adornments across cultures since antiquity. Today, our demand for gold continues to increase with the development of new technological and biomedical applications. Supplying this demand, however, is challenging because primary gold sources are becoming more difficult to find. Geomicrobiology bridges the disciplines of biology and geology, providing insight on microbe-minerals interactions that occur within natural or engineered environments. Over the past two decades, geomicrobiology research has revealed a consistent story–microbes have profound impacts on gold. In natural environments, gold begins its "journey" as soluble complexes or as electrum grains, i.e., a gold-silver alloy, weathered from host rock. Soluble gold complexes are unstable in the presence of microbes and are reduced to stable nanoparticles, which can be aggregated by biofilms. Evidence from placer environments around the world suggests that biofilms also play a key role in transforming the surface of electrum grains. As such, the gold biogeochemical cycle involves redox processes promoting electrum dissolution, pure gold precipitation, or gold/silver mobilization. The kinetics of gold biogeochemical cycling has been estimated from natural environments; however, this cycle likely differs in environments impacted by anthropogenic activity, such as historic and abandoned mine sites. Our geomicrobiology research is a Gold Rush 2.0–the role of microbes in gold biogeochemical cycling could be used to recover residual precious metals, and potentially critical minerals, from secondary sources conventionally considered to be waste materials, e.g., mine tailings. Therefore, as we transition to a low-carbon economy, the application of geomicrobiology research will be important for balancing resource resilience with environmental sustainability.

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