

## Deep Underground Laboratory Integrated Activity in biology (DULIA-bio)



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### Examining the biological effects of ultra-low background radiation exposure within SNOLAB

The aim of our research is to examine the effects of prolonged exposure to ionizing radiation levels well below natural background. Our research group, along with others, have demonstrated that exposure to low-dose radiation slightly above background levels can have beneficial effects on biological systems. We hypothesize that natural background radiation is essential for life and maintains genomic stability in living organisms, and that removal of background radiation could have detrimental effects. This research will be conducted within SNOLAB in Sudbury, Ontario, Canada. SNOLAB is located within an active Nickel mine 6,800 feet (approximately 2 km) below the Earth's surface. The laboratory is a class 2000 clean room and has approximately 50 million times less cosmic radiation and 100 million times less radioactivity than would be found in the above-ground environment. Initial experiments will utilize both a cell culture and a whole organism (lake whitefish) model. Cell cultures will be grown for many generations underground and the rate of spontaneous DNA damage and mutations will be compared to surface controls. Low background adapted cells will also be tested for their response to an induced stress. We have previously shown that exposure to low-dose radiation can stimulate growth in developing lake whitefish embryos. Embryos will be raised within SNOLAB and in our surface control laboratory to examine how an ultra-low background radiation environment impacts survival, development rate and growth.