Project Description

PoLAR-FIT Project 2019:
Pliocene, paleo climate, paleontology, and paleo ecology, Ellesmere Island

We are hoping to study the paleontology on Ellesmere Island at two sites that we have studied before, and to search for new sites for future research. Our interest is to determine the climate and the ecosystems that were present in the high Arctic during the Pliocene, which was the last very warm period. It lasted between 5.3 and 2.6 million years ago.

Our previous findings showed that the area had a forest with plenty of animals, including beaver, black bear and camel. Over the past two decades, members of our team have answered many questions. The most significantly, we discovered an interesting fossil on Ellesmere Island. We collected pieces of a leg-bone of a giant camel! The camel lived on Ellesmere Island about three and a half million years ago, near Strathcona Fiord, at a time when Ellesmere Island was warmer and had a nice boreal forest (even though the average Earth temperature was only 1.5 degrees warmer than today). When we published an article about the camel in a science journal, we were quickly contacted by news agencies from around the world, including from countries in Europe, Russia, China, and Africa. It was also covered by CBC's Quirks and Quarks, and newspapers and TV shows around the world showed maps of Ellesmere Island, which made us very proud. In fact, last November there was a TED talk about the camel. If you would like to see the TED talk, you can go to this site: www.ted.com/talks/latif_nasser_you_have_no_idea_where_camels_really_come_from

We have also published a summary of PoLAR-FIT research, in a journal that is meant for non-experts: https://journals.lib.unb.ca/index.php/GC/article/view/25300/29610 Grise Fiord is acknowledged for your support of our project in our publications.

In 2019 we would like we would like to extend our knowledge of the climate, landscape, and ecosystems at a time when the Earth was as warm as it may be by the end of this century. The key goals we propose are (1) return to Beaver Pond Site on Strathcona Fiord where we have not visited for three years, to determine if more fossils have been revealed by natural erosion and thawing of the permafrost. We would like to collect and study those fossils (e.g. mammal teeth, small bone fragments, seeds, insects, tree parts). (2) We would like to return to Fyles Leaf Bed (south of Strathcona Fiord) to collect cores through the sediment. This is the first time that coring has been attempted, and if we can collect intact cores (frozen tubes of sand) in the permafrost we will have a nearly continuous record of the important site which offers one of the world's best record of paleo climate during the Pliocene. This enables much finer sampling than we can do in the field. (3) We would like to investigate a number of other sites around Strathcona Fiord and Vendom Fiord in hope to find new fossil remains. Proposed field time: July 1 to 13, 2019.

In addition to fossil fragments that will be collected for analysis through the Canadian Museum of Nature, two experts in the field of ancient proteomics, the study of proteins in fossils, will be a part of the team. They will attempt to collect plant, animal, and sediment specimens to study the evolution of the inhabitants of Ellesmere about 3 million years ago. Past samples have been very small fragments of plants, bones, and teeth. However, the quality of the preservation of the fossils is very high because of the "freeze-dried" nature of this permafrost sandy deposit. If successful, it will be the oldest application of proteomics ever achieved, and we will be able to test evolutionary hypotheses that could not otherwise be tested. This is why these sites are so important.

In addition to the PoLAR-FIT scientists, we again have the pleasure to work with Mr. Jarloo Kiguktak, from Grise Fiord. He has worked with PoLAR-FIT team members in the past, and knows the kind of field work we conduct (mostly hiking, and then stopping at a site to look for fossils on or near the surface of the ground). In the past he has been successful at finding fossil fragments for the group. He will be hired again as a Paleontology Technologist for the entire two weeks plus some time before and after for planning and logistical support.

While our research is mostly an academic study to understand how northernmost ecosystems and landscapes change with global warming, our research indirectly impacts Northern communities. For instance, our group revealed that the poles of our planet warm much more than the rest of the planet during a global warming. In fact, the Beaver Pond site at Strathcona was used to document than when the globe is 1.5 deg. Celsius warmer than today, central Ellesmere is 19 deg C warmer! It was these data that helped climate modellers refine their models to better predict the impact of global climate change on northern communities.