

## Late Devonian Fish from Southern Ellesmere Island

Neil Shubin

This proposal is an extension of work undertaken by us during seven field seasons during 1999-2014. The general goals of this study are to yield new fossils that tell of the diversity of Late Devonian fishes, the origin of limbed vertebrates, and a knowledge of the environment in which this important evolutionary transformation happened. This work holds promise to reveal important new data on a critical moment of evolution with broad impacts across multiple lines of scientific inquiry: paleontology, geology, phylogeny, and functional anatomy.

Our plan for the 2023 field season (which has been delayed for three years by Covid) is to investigate new areas of southern Ellesmere Island (in particular, rocks of the Fram Formation) for fossils discovery and analysis.

Previous work in the Okse Bay Group on southern Ellesmere Island has identified two other areas with high potential for important new discoveries. The Fram and Hell Gate Formations (lower to middle Frasnian Stage) at Goose Fiord are the major targets of the 2023 field season. We propose to collect along the west side of Goose Fiord in 2023, particularly at Skrap Valley, a location of considerable historical interest. It was in this location where the 2nd Fram Expedition collected the first specimens of Devonian fish from Ellesmere Island in 1899. With very good exposures of the Fram Formation and proven potential for fossil discoveries, the Skrap Valley area along the west side of Goose Fiord certainly has high potential for meeting our objectives.

The evolutionary transition from life in water to life on land is one of the major events in the history of life. The discovery of *Tiktaalik roseae* was an important moment in the study of this time period because it revealed to both scientists and the general public how this event happened and, importantly, how geological and paleontological work can reveal ancestral creatures. This work reveals fundamentals of evolutionary biology, anatomy, and climate change. The Devonian is a period in the history of life with major events changing the world's environments. Understanding the organisms that lived at that time reveals fundamentals of how creatures respond to changing environmental conditions.

The primary and satellite camps on the Simmons Peninsula of Southern Ellesmere Island will provide access to the target rocks and allow us to cover a broader area than a single camp. Given the plethora of river cuts and glaciated valley walls, there is fresh rock exposed throughout. Once a fossil is found, it is logged via GPS and photos and then the site is explored to find the layer that the specimen came from. This typically involves either sweeping or lightly shoveling the rock above the fossil. Promising sites contain either skeletons or abundant fragments of bones. Field notes record information about the site, specimen, and specimen collection conditions. In the laboratory the fossil is removed from the rock either manually, using dental tools, or digitally, using high energy CT