Final Report

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Project Title: *New Fossil Invertebrates from the Clearwater Formation, Northeastern Alberta*

1.1 Project Summary

Fossil-rich limestone layers that I discovered in Canada's famous Burgess Shale (Cambrian Period, Yoho National Park, UNESCO World Heritage Site) contain the remains of organisms that have been replaced by silica during deep geologic burial. Immersion of limestone samples in acid liberates the acid-resistant fossils from the enclosing limestone. Study of the fossil remains as well as the associated rock layers reveals new insights about the animals of the Burgess Shale and the ancient environments in which they lived.

1.2 Project Outcomes and Impacts

Approximately 1500 fossil specimens were recovered in the lab from acid dissolution of the limestone samples. A variety of Cambrian molluscs, brachiopods, phosphatic tubes, and echinoderms are represented in the faunal assemblage. Of particular interest are the remains of a problematic group, the Stenothecoida, the relationships of which have baffled paleontologists for more than a hundred years. The new material recovered provides new morphological information that resolves this long-standing fossil mystery. Additionally, x-ray diffraction analyses, and petrographic and stratigraphic study, electron dispersive spectra, and microprobe and other analyses on the associated rocks have strengthened our earlier hypothesis that an ususual geologic phenomenon known as mud volcanism was an important agent in the ancient environment inhabited by the Burgess Shale animals.