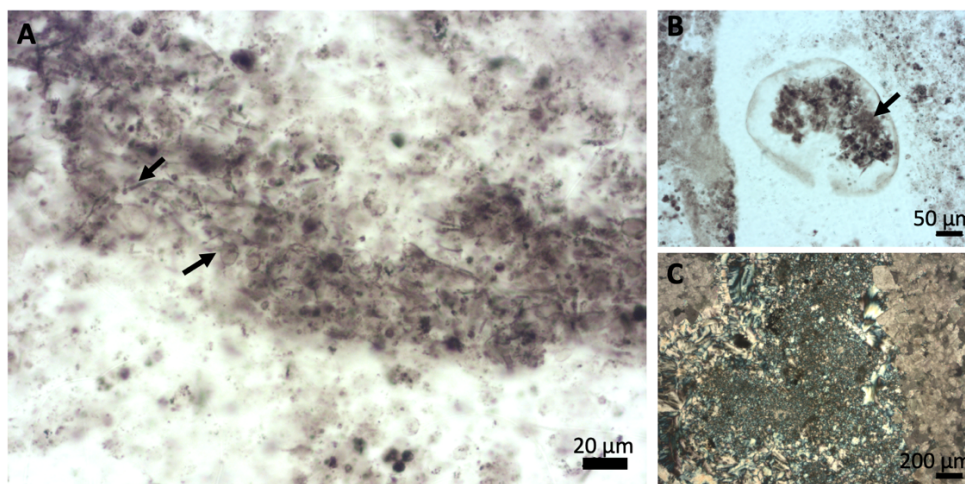


My NASA Early Career Collaboration Award was centered on re-examination of microfossils within the 1.9-billion-year-old Gunflint Formation, Canada. Many Gunflint microfossils contain cryptic subcellular structures; these structures were originally interpreted as fossil nuclei – a defining character of eukaryotic organisms – and thus, had been attributed as the earliest fossil evidence of complex life on Earth. However, it is currently unclear whether these structures represent genuine biologic features or are artefacts of preservation.

In my application, I proposed to test the hypothesis that subcellular structures within Gunflint microfossils represent organelles, thus confirming these fossils as the earliest eukaryotes by using confocal laser microscopy and synchrotron tomography to characterize the fossil anatomy in three dimensions in high resolution. In June 2025, I traveled to the Oxford University Museum of Natural History to work on Gunflint material within the Brasier Collection. Under the mentorship of Drs. Frankie Dunn, Luke Parry, Ross Anderson, Russell Garwood and Philip Donoghue, I examined the microscopic paleobiology and petrography of the samples to assess which samples would be best for confocal laser and synchrotron tomographic analysis.

Although I was not able to personally access the UK National Synchrotron facility during my five week visit, my work while at Oxford was a crucial first step in beginning this project. In addition to microscopy, I started a literary review of the Gunflint Chert, which I hope to publish in *Journal of the Geological Society Lagerstätten* this year; the review focuses on Gunflint Chert paleobiology, the environmental context of the formation, and evaluates evidence for eukaryotic organisms within the Gunflint microfossils. My trip to Oxford helped me make new connections with UK researchers and has paved the way for continued work on Gunflint Chert microfossils in a future postdoctoral position.



Microfossils and mineral textures in the Gunflint Chert. (A) Filamentous and coccoidal microfossils. (B) Granule containing organics and microfossils. (C) Fine grained silica matrix surrounded by rhombic carbonate crystals.