Silicification is a mode of fossil preservation in which a fossil is replaced with the silica containing mineral quartz (SiO$_2$). The process of silicification is poorly understood. The patterns of silica replacement in trilobite exoskeletons (originally low-Mg calcite) from the Cambrian (~500 million years old) Weeks Formation (House Range of Utah) have been studied during our undergraduate research project. To better understand the origination of silicification, we performed acid testing to dissolve away any material that did not contain the SiO$_2$ mineral, quartz. The remains of the samples were then sorted through to determine whether there were any ontological differences which would affect the processes of silicification. By generating a better understanding of the patterns of silicification, we hope to understand the mechanism(s) involved.

One of the unique things about the Weeks Formation limestone is that trilobite exoskeletons there are partially replaced with quartz. Through studying thin-sections of limestone from the Weeks Formation, we found that, under polarized light, the trilobite fragments were not replaced by fibrous quartz crystals but were instead replaced by blocky quartz crystals (obliterating the original structure of the shell). Additionally, the quartz crystals encased tiny, relic calcite crystals, which would normally have been completely replaced by the quartz. These are thought to possibly be the remains of the calcite exoskeleton, and indicate that the process of silicification had not acted completely on these elements of the trilobite.