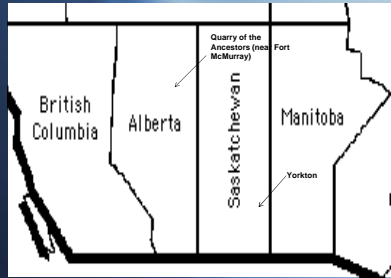


Effects of Heat Treatment on the Stone Tools from the “Quarry of the Ancestors”

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The research into Fort McMurray’s, Quarry of the Ancestors, is key to the discovery of information regarding the way in which Beaver River Sandstone, the archaeological tool stone mined there, can be shaped into a working tool. These stone tools were imperative to the citizens of Fort McMurray’s past. An important principle of shaping these stone tools is that heating the rock allows for easier flaking while unheated rocks are generally regarded as difficult to shape due to their tendency to fracture inconsistently rather than in regular flakes as is desired. Archaeology regards the heat treatment of stones as a method that was commonly used by ancient groups to enhance the stone’s workability; however, there is no previous research that explains this change. Prior research at the Canadian Light Source had uncovered hints of elemental shifts in the rock; shifts that may have involved elements, specifically iron and manganese, moving from the internal areas of the stone towards the exterior of the stone.

The research into Fort McMurray’s stone quarry aims to explain why stones become more workable after heat treatment. The use of the synchrotron as a powerful tool that can delve into the elemental composition of a stone unearthed from the quarry allows scientists to analyze which elements are present in the quarry’s stones and whether these elements actually move from the interior of the stone after the heating process. This discovery may lead to archaeology’s understanding of heat treatment effects on a stone’s elemental composition.

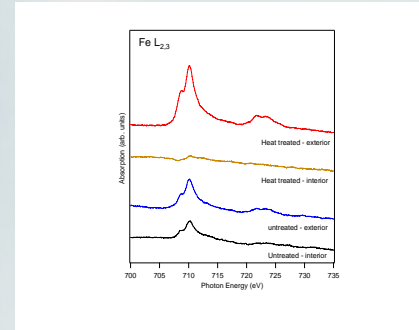


Figure 1 XANES spectra of heat treated and raw rock samples

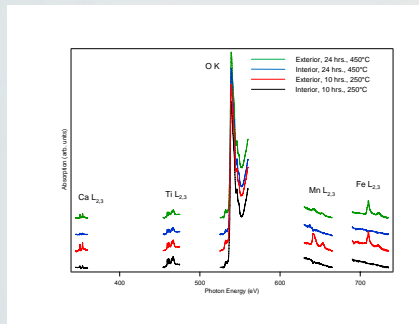


Figure 2 XANES spectra of heat treated rock samples

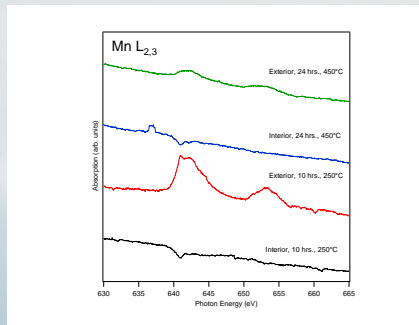


Figure 3 XANES spectra of Mn for heat treated samples

The results of the research into Fort McMurray’s stone quarry were rewarding. The new data acquired (Figure 1) reinforces the previous data acquired by scientists that led them to their initial belief in iron’s tendency to migrate following heat treatment of the Beaver River Sandstone.

Figure 2 shows the presence of manganese in the Beaver River Sandstone from the Quarry of the Ancestors. Manganese was focused upon by the team of students involved in the research because of interest in elements other than iron that may reside in the stones, as well as their potential to migrate from the stone during heat treatment. Prior to the students’ data there was no definitive proof of the existence of manganese in the stones; however, this second piece of data acquired by the students confirms the presence of manganese – only in the exterior of the stones – and raises the question regarding whether manganese acts in similar fashion to iron.

Figure 3 shows that the manganese on the exterior of the stones is not lost following the heat treatment. These three pieces of data serve to enlighten the archaeological community and add to the previously sparse knowledge on the topic of heat treatment. Further research that delves deeper into other elements found inside the stones and the elements’ behaviours in response to heat treatment will continue to add to and enhance the information found in this knowledge base.

