Chert Sourcing and Palaeo-Eskimo Stone Tool Technology

Report on Work Conducted Under Nunavut Archaeological Permit No. 2012-26A

Dr. S. Brooke Milne
Department of Anthropology
438 Fletcher Argue Building
15 Chancellor's Crescent
University of Manitoba
Winnipeg, MB
R3T 2N2
(204) 474-638
(204) 474-7600 FAX
Brooke.Milne@ad.umanitoba.ca

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Introduction

This report describes archaeological fieldwork activities conducted between July 30 – August 4, 2012 under Nunavut Archaeologist Permit 2012-26A. This research represents the first year in a four-year program headed by the principal investigator, Dr. Brooke Milne, University of Manitoba.

Permits

Other relevant permits and exemptions were acquired by Milne in advance of this research from the following agencies:

- Nunavut Impact Review Board File no. 12YN028
- Nunavut Scientific Research License no. 01 16 12N-A (Nunavut Research Institute)
- Qikiqtani Inuit Association no. Q12X022
- Aboriginal Affairs and Northern Development Canada (AAND)

Separate copies of this report were sent to these agencies describing the work that was conducted in 2012.

Acknowledgements

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Project Objectives

Archaeologists refer to the original inhabitants of the Arctic as Palaeo-Eskimos, and chert or ammaaq was the most common type of stone they used to make their stone tools. However, very little is known about how these people acquired this stone, when, and from where exactly. Oral histories have described the presence of chert in the interior and Amadjuak Lake or Ammaaq Lake is thought to be an especially good place to find it.

Our previous research in the area has identified widespread surface scatters of this stone thereby confirming its presence in the interior of the island. We have also been able to

determine that the surface chert derives from the same geological source, possibly the local bedrock weathering *in situ*. However, our analyses of archaeologically derived chert indicate that other yet unidentified sources of this stone were being used by Palaeo-Eskimo peoples for their toolkits. As such, one of our main research objectives for this project is to locate these unknown source areas so as to gain a more complete understanding of human technological organization in this region of Nunavut.

Stone is fixed geologically yet human populations must move geographically to hunt, visit, etc. As such, stone-tool using peoples had to acquire the stone they needed to make their tools and then carry it with them as they moved across the landscape away from source locations. Stone is a reductive medium so as tools are made, used, and maintained, pieces of the stone are removed and discarded at various places on the landscape. If we can geochemically fingerprint the sources of the stone and then trace where people were carrying it during their seasonal round, it will enable us to use the stone as a proxy for human behaviour to interpret settlement, mobility, trade, and culture change over time.

Our current four-year research project builds on our previous results (see Milne et al. 2009, 2011) and will apply a sourcing methodology we've developed for chert toolstone to achieve the following objectives: (1) identify other potential sources of chert used by the Palaeo-Eskimos in the interior of southern Baffin Island; (2) determine if the Palaeo-Eskimos who used neighbouring coastal regions also used chert from these same inland sources; (3) combine our inland and coastal findings in order to reconstruct Palaeo-Eskimo mobility patterns and settlement using chert as a proxy; and, (4) develop a database of chert distribution, both from archaeological sites and raw sources, and make it available as a resource of others studying stone tool technology in Nunavut.

To meet our objectives, we will conduct two seasons of geological and archaeological field survey in the interior of southern Baffin Island (i.e. 2012, 2013) to collect additional raw chert samples to expand our existing comparative database, and to locate and test new Palaeo-Eskimo sites in the region. Ideally, we hope to identify quarry locations in the interior where chert was mined from exposed outcrops. These surveys will contribute important new information of the geological formations present in the interior of the island and on the diversity of chert sources areas that exist there.

Activities in 2012

The 2012 fieldwork intended to focus on geological and archaeological survey near Mingo and Amadjuak Lakes, the mouths of the Hone and Nuvungmiut Rivers where they meet the south shore of Amadjuak Lake, and to explore a location referred to informally as "chert island." Daily trips via helicopter from Iqaluit to these locations were planned from July 30, 2012 to August 4, 2012.

However, due to unforeseen weather conditions, the helicopter scheduled to fly us through PCSP was stranded in Coral Harbor on Southampton Island, NU for the entire duration of

our planned fieldwork. As such, and much to our disappointment, the surveys scheduled for the 2012 field season could not be completed.

Geological Survey

On August 1, 2012, we made a request to NRI to do some geological survey near Iqaluit. We were granted permission and headed out to locations near Koojesse Inlet and the Sylvia Grinnell River. We walked to the end of the causeway at Akilliq Road and over the outcrops towards the Shaymark site (KkDn-2). Thereafter, we walked further along the edge of the river up to the Crystal II site (KkDn-1).

Using geological hammers, small areas of the outcrops were randomly broken off so as to examine in more detail their structures and composition (see Figure 1). Through this limited survey, Fayek noted that the geology in vicinity of Crystal II consists of rocks that are Paleoproterozoic in age, characterized by migmatitic gneisses, that range from granodiorite to quartz monzonite, with pegmatitic quartz-rich sweats (see Figure 2). These sweats may be the source for the crystalline quartz that is found among archaeological sites in the area.

Figure 1. Example of an outcrop that was exposed using a geological hammer to examine in more detail the rock's structure and composition.

Figure 2. Rock outcrop near Crystal II site (KkDn-1) illustrating an example of a pegmatitic quartz-rich sweat.

In at least two locations near Crystal II, Fayek noted narrow rectangular cutouts in the bedrock that did not look natural. In other words, these cutouts look deliberate as though someone was trying to extract the stone or some part of it (see Figure 3). The surfaces that were exposed post-extraction are covered in lichen suggesting these activities, if human induced, occurred a long time ago. Two naturally occurring pieces of quartz found near the cutouts were collected for testing. If the quartz was being "mined" for tool making purposes, having a geochemical signature for the raw stone will make it possible to match up to archaeologically derived samples.

Perhaps of greatest interest to our project is the fact that no evidence for the Proterozoic and younger siliciclastic and carbonate rocks of the Penrhyn Group on the southern Melville Peninsula, and their along-strike correlatives of the Piling Group (central Baffin Island) were found in the surveyed areas near Iqaluit. This means that there are no naturally occurring sources of chert in this area and that the chert artifacts found at large sites like Shaymark and Crystal II must have been brought in from non-local sources.

These chert-bearing formations do occur in the interior of the island and we suspect that they may contain the chert beds that could be the source of the chert artifacts found in Palaeo-Eskimo sites nearby. As such, our research planned for 2013 will focus on accessing areas of interest in the interior to verify if this is the case.

Figure 3. Unusual "cutout" in the bedrock near the Crystal II site.

Upon departing the area several chert artifacts exposed on the surface were noticed. The artifacts included two burin spalls, several chert flakes, and a broken burin tip as well as several chert flakes (see Figure 4). All of the items were clustered together near some rocks that resembled a hearth-like feature (see Figure 5).

The location is nestled in a small gully just a few meters above Crystal II (see Figure 6). There was a path right beside the artifact scatter where people were using motorized quads to access campsites and the ground was churned up from the tires (see Figure 7). The tire tracks were examined to see if any artifacts were scattered among them but fortunately there was nothing further.

Dr. Stenton was notified that afternoon of what was found and the proximity of campsites and vehicle traffic. However, all materials were left in situ, photographed, and recorded the using GPS.

Archaeological Survey

On August 3, 2012, the original permit issued by CLEY (i.e. 2012-26a) was amended so that the artifacts located at Crystal II could be collected. The survey was expanded to cover the linear extent of the ridge where the artifacts were located (i.e. approximately 77 meters between 19 -26 meters above sea level). This allowed us to collect other chert flakes and a crystal-quartz microblade core.

Figure 4. Chert flake and burin tip lying on surface near Crystal II (KkDn-1).

Figure 5. Hearth-like feature near Crystal II (KkDn-1) where early Palaeo-Eskimo artifacts were found exposed on the surface. (Scale of yardsticks is 1 m x 1 m.)

Figure 6. View facing north along ridge where early Palaeo-Eskimo artifacts and chert flakes were found scattered on the surface.

Figure 7. View of hearth-like feature in foreground with ATV path to the right leading down to camp sites located on top of Crystal II (KkDn-1).

The expanded survey identified two recent fire pits that both contained chert flakes (see Figure 8). At the most southerly extent of the gully, another chert flake was found beside a rusty tin can on the surface (see Figure 9). Several rocks that were deeply embedded in turf, moss, and willows were observed at the end of the gully. They appear to have a concentric configuration but it is not possible to determine if there is a tent ring present based on surface survey alone (see Figure 10). No other artifacts were visible on the surface in this area.

Figure 8. Recent fire pit containing chert flakes in the foreground right with Fayek and Landry to the left looking for additional surface artifacts.

The locations of all surface collected artifacts were recorded using GPS and photographed in situ prior to collection. The thickness of the vegetation in the area is considerable with moss, grass, willows, and lichen. Despite the widespread activity associated with the recent campsites, there may be an undisturbed archaeological deposit along this ridge. Given the presence of Pre-Dorset artifacts, it would appear that an earlier occupation of Crystal II occurred thereby increasing the culture-historical complexity of this important archaeological site in Nunavut.

The site appears to be stable in its present condition but the threat of ATV traffic and fire pits will compromise this if activity levels increase and become more expansive in their spatial distribution.

Figure 9. Chert flake located beside rusty tin can.

Figure 10. Most southern extent of ridge above Crystal II (KkDn-1). The embedded rocks are in the foreground near the crossed meter-sticks while the second recent fire pit is located beside the plywood just above it.

Analysis of Finds

Analysis of the artifacts found in 2012 has begun and will be completed by mid-February 2013. The geochemical analysis of the quartz samples will begin in summer of 2013. This will involve thin sectioning the stone and polishing it prior to mounting the samples into a resin base. Once that step is complete, the samples will be analyzed in Fayek's lab using secondary ion mass spectrometry. This will allow us to determine the geochemical and isotopic composition of the quartz so that we can obtain a precise fingerprint for the stone. Future analysis of archaeologically derived quartz debitage is planned and we will compare these signatures to the quartz from the Iqaluit area to assign it a geological provenance.

Discussion

While our original research objectives were not met this summer, our limited geological and archaeological survey near Iqaluit did provide some new and useful information. First, the areas surveyed near Koojessee Inlet and the Sylvia Grinnell River are not chert-bearing formations. Therefore, Palaeo-Eskimo toolmakers that were reducing chert tools at sites like Shaymark and Crystal II brought this stone into the area with them from another local. We plan to test debitage acquired from these sites geochemically and compare the signatures to those from the inland chert to determine if this is where the stone was originally acquired. If it is, then we would have unequivocal evidence that people were moving between these coastal and inland areas. If the signatures do not match, then we will know that other viable chert outcrops are present in the region and need to be identified. Second, we identified Pre-Dorset artifacts in the vicinity of the Crystal II site, which is more famously known for its Dorset and Thule occupations. Even though subsurface excavations were not carried out in 2012, there may be an undisturbed Pre-Dorset component present at the site, which in itself, is worthy of further investigation.

Future Research Plans

Another field season is planned for this project in 2013 that will aim to survey those areas that we could not access in 2012. This fieldwork will span approximately 12 days in late July and early August, and focus on the Mingo and Amadjuak Lakes region, the Hone and Nuvungmiut Rivers, and "chert island."

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Artifact Plate

Formal artifact types found at Crystall II (KkDn-1) in 2012.
Top row: left – burin spall; middle – burin spall; right – burin tip.
Bottom row: left – crystal-quartz microblade fragment; right – crystal-quartz microblade core