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The PaleoIndigenous component of the Ahai Mneh Site (FiPp-33), Lake Wabamun, Alberta

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ABSTRACT

When Jack Brink and I were MA students at the University of Alberta in 1975, I applied spatial analytical methods to disentangle artifact distributions at an important site type in Alberta: those with rich lithic records, but highly compressed stratigraphy. Archaeologists working at these sites run the risk of associating artifacts merely because they occur near each other. Natural disturbances in thinly stratified deposits mean artifacts found near each other can easily come from different time periods. In our 2010-2012 field school research at Ahai Mneh in central Alberta, we returned to these issues and were able to identify a deeper PaleoIndigenous Period component, also present in surface collections from an adjacent cultivated field. Enigmatic and initially unprepossessing artifacts from Ahai Mneh actually have fascinating stories to tell if we are willing to delve into the microcosm of human decisions for which they still preserve traces. Examples include a failed effort at making a fluted point, an unusual Hell Gap-like point, a Scottsbluff point, and a fractured Alberta point base. While the results of such analyses involve inferences, they are much better than casual assumptions about associations, and point to the need for serious regulatory reform in requiring 3-D piece-plotting of artifacts.

KEYWORDS

Fluted points, Cody Complex, Knife River Flint, intersite visibility, heat treatment

1. Introduction

In preparing for the 2022 Canadian Archaeological Association session honouring Jack Brink, it occurred to me that I might be the person in the room who had known Jack the longest. As things turned out, that was the case. Jack was already a graduate student in the Department of Anthropology at the University of Alberta when I arrived to begin my own MA program in 1975. We actually defended our theses on the same day in the spring of 1977, and that would lead to Jack's long career with the Archaeological Survey of Alberta and then the Royal Alberta Museum. W. J. Byrne was the Director of the Archaeological Survey at the time; I had worked with Paul Donahue, then a contractor with the Archaeological Survey of Alberta, in the Caribou and Birch Mountains of northern Alberta during the summer of 1975.

One of the sites we discovered in the Birch Mountains, the Eaglenest Portage site (HkPa-4), was highly productive, and had caught my eye as a candidate for thesis work (Ives 1985a). Like a number of such sites, although rich, the Eaglenest Portage site was also rather thinly stratified. The site is probably 12,000 years of age, but the limited deposition and disturbances (like tree throw) taking place at this strategic location meant that one could not simply trust that artifacts found near each other were in fact temporally related (see also Ives 2017).

A mentor for both Jack and I, Professor Charles Schweger suggested that I learn about the quantitative methods (nearest neighbour and mean square block analyses) plant ecologists used to study plant and seed distributions to see if they might provide an objective means of disentangling these more complex artifact distributions (Ives 1985a). Byrne generously funded my thesis research through the Archaeological Survey of Alberta and then served on my examining committee that May day in 1977.

At loose ends after our defences, I thought we might have a celebratory drink with our committee members, but all had prior commitments. Byrne did not, however, and so after introductions, it was off to St. Albert and the Bruin Inn for the three of us. Jack went on to Memorial University for a summer of teaching, and I was soon to leave for the University of Michigan to begin a Ph.D. program there. That was not before Jack had an interview the next day with Byrne for a new staff archaeologist position for Alberta's eastern slopes, where major developments like Kananaskis Country were to take shape. And so began Jack's long association with the Archaeological Survey of Alberta as well as the Royal Alberta Museum, eventually leading to Head-Smashed-In and so many other highlights of his career.

Preparing for our Canadian Archaeological Association session (and knowing that there would a "blue book" occasional paper to follow) made me reflect on what I was doing in the mid-1970s. After my own 28 years with the Archaeological Survey and the Museum, I was so fortunate as to become a faculty member in the Department of Anthropology at the University of Alberta in 2007. Initially, my responsibilities included forming the Institute of Prairie Archaeology (today, the Institute of Prairie and Indigenous Archaeology) and work with the archaeological field school at Bodo. When those plans changed in 2009, I needed to find a new venue for the University of Alberta archaeological field school. David Link and Brian Ronaghan of the Survey and Historical Resources Division were both most helpful in directing me to FiPp-33, a large site south of Lake Wabamun.

The site was situated on a Transalta coal mining lease, and had originally been reported as an isolated find (during survey of the Sundance-Keephills 138kV Transmission Line (Fedirchuk 1979; ASA Permit 1979-171). It was far from that, however, as was subsequently revealed by mitigative excavations conducted by Altamira Consulting under the direction of Bruce Ball and Kristin Soucey (Soucey et al. 2009). TransAlta elected to set that lease area aside permanently rather than continue with extensive mitigation. Here, then, was another particularly rich site that nevertheless had very little stratigraphic development. This made me think back to that 1970s work, and the potential to do some "disentangling" of artifact distributions at FiPp-33.

When I joined the Archaeological Survey of Alberta myself in 1979, my initial responsibilities there included mitigation of FjPi-29, at what was to become the Strathcona Science Park Archaeological Interpretive Centre, and subsequently, the scene of several University of Calgary and University of Alberta field schools (Ives 1985b). In my earlier Birch Mountains work, I had recorded the three-dimensional provenience of all the artifacts. Because of the many sources of disturbance, I had little confidence in artifact depth as a useful attribute, and relied upon statistical assessments of horizontal distributions. Through the subsequent work of Heinz Pyszczyk and University of Calgary researchers in the 1980s, I became aware that despite disturbance factors at FjPi-29, the Strathcona Science Park Archaeological site, there was a general relationship between temporally diagnostic artifacts (projectile points) and their recovery depth (e.g., Pyszczyk 1985). That relationship was not perfect, but did suggest that more could be done with three-dimensional provenience data including depth.

This became a focus for our 2010 and 2012 University of Alberta field school activities at FiPp-33. We worked with TransAlta and nearby Paul First Nation. Elder Violet Poitras conducted an opening ceremony with the young women in our field school program for work at the site, giving it the name Ahai Mneh. As with a number of Plains societies, women own lodges, and this was certainly an important dwelling place for 12,000 or more years, it would turn out. It was this topic that appealed to me to contribute for Jack's session. Although complex and producing thousands of artifacts, the depth and attributes of some of the artifacts we recovered indicated an Early Precontact Period or PaleoIndigenous[1] occupation of Ahai Mneh had taken place, with a continued record for the next 12,000 years. Here I wish to tease out these indications of an early occupation and to discuss several "in small things forgotten" indications of an early presence. I will conclude by making some suggestions for how mitigative excavations at sites like Eaglenest Portage, the Strathcona Science Park, and Ahai Mneh ought to be conducted in future regulatory work in ways that can be of more benefit both for developers and a more general public.

[1] The term "Paleoindian" is deeply ingrained in the early period literature for the Americas, although it is certainly one that needs replacing. Alberta's "Early Prehistoric Period," or for some, "Early Precontact Period" are regionally restricted terms, not as widely recognized. There are also a number of challenges connected with the idea of an "Upper Paleolithic" of the Americas. Pitblado (2021) has suggested "PaleoIndigenous" as an alternative. That does meet needs for broader North American perspectives on the early time frame and is a term I will use here.

2. Consequences of error vs. untapped data sources

Before doing that, however, it is worth considering the misunderstandings that follow from casual interpretations of this class of sites, which feature rich artifact inventories and significant time depth, but little sedimentary deposition and thinly developed stratigraphy prone to disturbances. One clear example of this was Noble's (1971) Taltheilei Shale tradition of the Northwest Territories (NWT). A number of sites he investigated occurred on beachlines of Great Slave Lake that he felt allowed some temporal resolution. Noble also argued that these sites were "laterally stratified," that is, occupation areas were horizontally offset, so that groups of artifacts were temporally discrete. Noble elaborated a number of temporal complexes within the Taltheilei tradition based on these assumptions. Neither of these assumptions can withstand serious testing. Once beachlines are exposed, they can in practice be occupied in any time range, while the "lateral stratification" of a site would need to be rigorously warranted with spatial analytical studies, refitting nets and other measures. One key conclusion Noble reached (in the absence of these measures) was that an interior version of the Arctic Small Tool tradition (ASTt) that he termed the Canadian Tundra tradition gave rise to the subsequent Taltheilei tradition. He reached that conclusion because ASTt and Taltheilei tradition artifacts co-occurred.

Gordon (1977, 1996) later showed that in well stratified sites in the same region, there was a sedimentary gap between ASTt and Taltheilei assemblages, a gap also reflected in radiocarbon dates from differing strata. This made it clear that Noble's Canadian Tundra tradition in reality involved temporally mixed assemblages of earlier ASTt and later Taltheilei materials from poorly stratified sites.

This might have remained a matter of more esoteric debate amongst archaeologists, but burgeoning genetic research in the 2000s made these problems more acute. In the last several years, paleogenomic studies have converged upon the idea that the founding indigenous population of the western hemisphere diverged into northern and southern lineages as the LGM waned and populations expanded in the Americas (see Willerslev and Meltzer 2021 for a current, summary treatment). The northern lineage (also referred to as NNA or ANC-B) was ancestral to Haida, Tsimshian, Salishan, Algonquian, Tlingit and Dene (or Athapaskan) speakers.

One implication of this robust genetic finding would be that the two dominant language families of the Subarctic—Dene or Athapaskan speakers to the west and Algonquian speakers to east—were in the more distant Holocene past a single biological population[2]. Dene populations became distinct from other northern lineage populations in mid-Holocene times when a substantial component of Siberian genetic heritage entered North America, quite likely as Arctic Small Tool tradition ancestors arrived in Alaska just after 5,000 years ago, and spread rapidly across the high Arctic to Greenland (Flegontov et al. 2017, 2019). Current evidence would suggest that the genetic interaction leading to ancestral Dene populations took place between arriving Siberian populations and Northern Archaic populations in interior Alaska and the Yukon, but not with Shield Archaic populations to the east (very likely ancestral Algonquian populations) (Flegontov et al. 2019; Fortescue and Vajda 2022; see also Ives 2022). In this context, archaeological indications of ASTt-Taltheilei relationships should not be based upon fallacious reasoning about site formation processes in which temporally admixed assemblages are mistaken for indications of contemporaneous interaction.

The Chobot site, on the eastern shoreline of Buck Lake, provides a more egregious example. This rich but thinly stratified site became the subject of avocational collecting activities in which Mr. Chobot recovered thousands of artifacts from tree throws, gardening, excavations connected with his home, and so on. It was repeatedly cited as providing supporting evidence for a cosmic impact 12,800 years ago because of the high frequency of microspherules and nanodiamonds in what were alleged to be Clovis circumstances (e.g., Wittke et al. 2013a). There is a much larger literature concerning the many problems with the notion of a cosmic impact triggering the Younger Dryas that need not detain us here (see Holliday et al. 2023).

There were several specific problems with this contention about the Chobot site (Ives and Froese 2013). The artifact bearing sediments extend only to a depth of 50 centimetres, while the claimed "black mat" denoting the Younger Dryas is simply the organic LFH or Ah horizon at the site's soil surface. The underlying "YDB" layer reflects pedogenically translocated clays and organics, residues from slope wash, or deposits from a higher stand of Buck Lake. The authors claimed there were no radiocarbon dates from the site when they had themselves reported (and simply rejected) dates of 1,520 ± 20 ^{14}C yr BP (UCIAMS 29314) and 3,645 ± 20 ^{14}C yr BP (UCIAMS 29315) on charcoal from depths of 12 and 15 centimetres, respectively, bracketing their "Clovis" layer but very much consistent with the many later projectile point diagnostics common in the assemblage. There were

[2] These more recent findings affirmed an earlier indication of this deeper relatedness that came with recognition that both Dene and Algonquian populations shared high frequencies of the Albumin Naskapi allele (Smith et al. 2000).

not "many" (as Wittke et al. 2013a stated) but just three fluted points in the Chobot collection (two are figured in Ives [2006:17, Figure 6]). Wittke et al. (2013a) went on to assert that there were "tens of thousands of Clovis-age flakes and tools" present at the Chobot site, despite the overwhelming evidence of middle and late Holocene occupation of the site reflected in Middle and Late Precontact projectile points in the Chobot collection[3].

The Taltheilei and Chobot examples clearly show how badly misleading conclusions are reached when investigators pay little or no attention to the complex matter of whether artifacts at rich, but thinly stratified sites are temporally related to each other—especially when there is so much evidence to the contrary.

[3] The response to Ives and Froese (2013) from Witke et al. (2013b) simply ignored these fatal flaws in their Chobot site argument.

3. Site setting

Ahai Mneh is situated on an elevated landform south of Lake Wabamun (Figures 1 and 2). The landform was created as ice thrust moraine, involving glaciotectonically dislocated and deformed rafts of Quaternary sediments from the basin of Lake Wabamun, in this case accompanied by some stagnant ice moraine (Atkinson et al. 2018; Fenton et al. 2013: Alberta Geological Survey Map 601, Surficial Geology of Alberta). There is a notable prominence in the wooded area of the site that we termed Area B. The surrounding areas are either wooded, and enclosed within a protective fence, or part of a large field in regular cultivation at the time of excavation. Between the treed area and the cultivated field (from which artifacts could be surface collected), the total extent of Ahai Mneh may approach 30,000-40,000 square meters.

The view from Area B might actually be construed as the first hint that there could be a very early presence at the site. I recall Maurice Doll, who had served as a curator of ar-

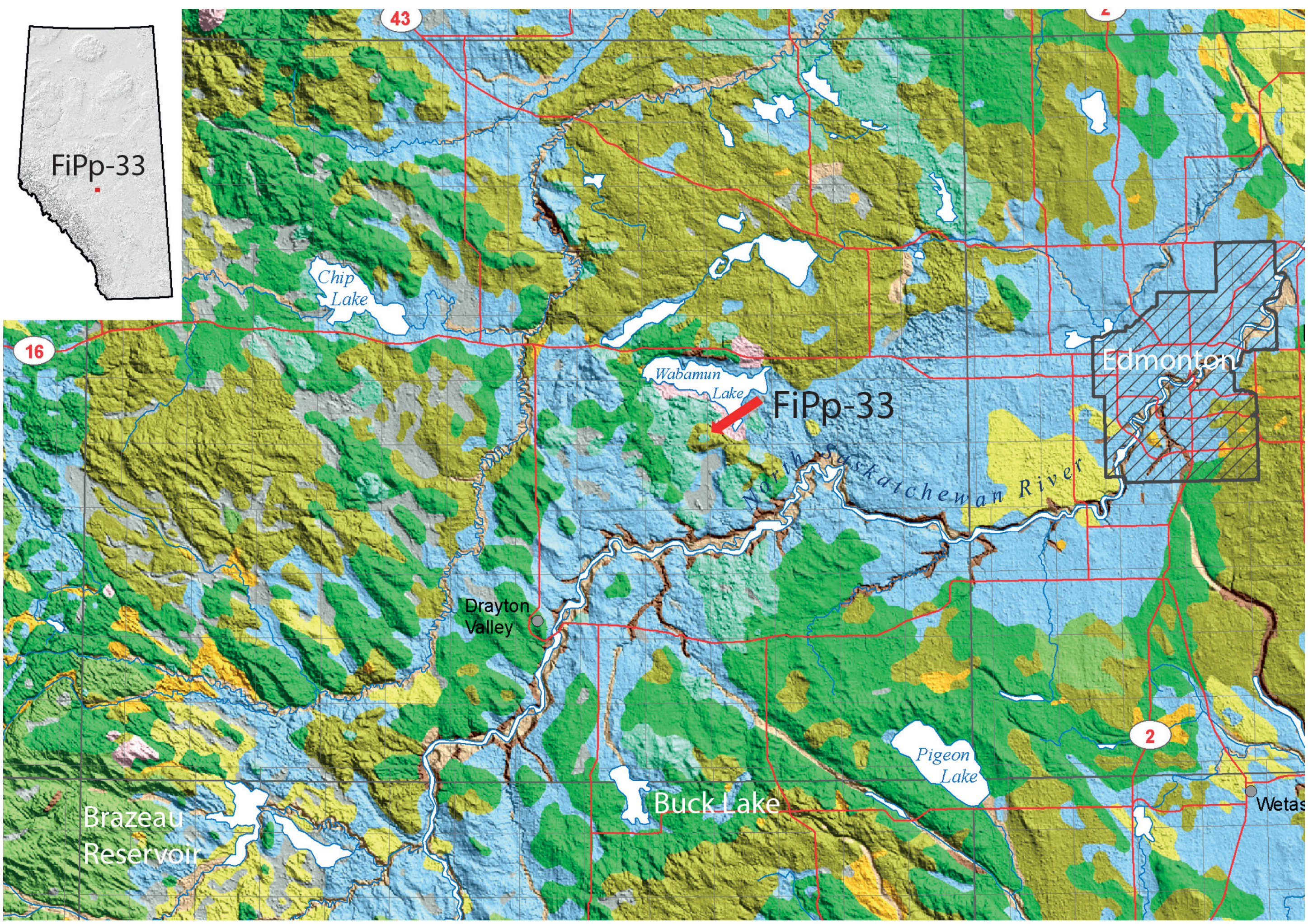

Figure 1. Location of the Ahai Mneh site, FiPp-33, on glacial thrust moraine south of Lake Wabamun. (Map segment from Alberta Geological Survey Map 601, Surficial Geology of Alberta, where the lighter blue codes for glaciolacustrine deposits, Ahai Mneh is situated on ice-thrust moraine with a topographic apex of stagnant ice moraine, and the gray coding immediately south of the site reflects organic terrain involving muskeg).

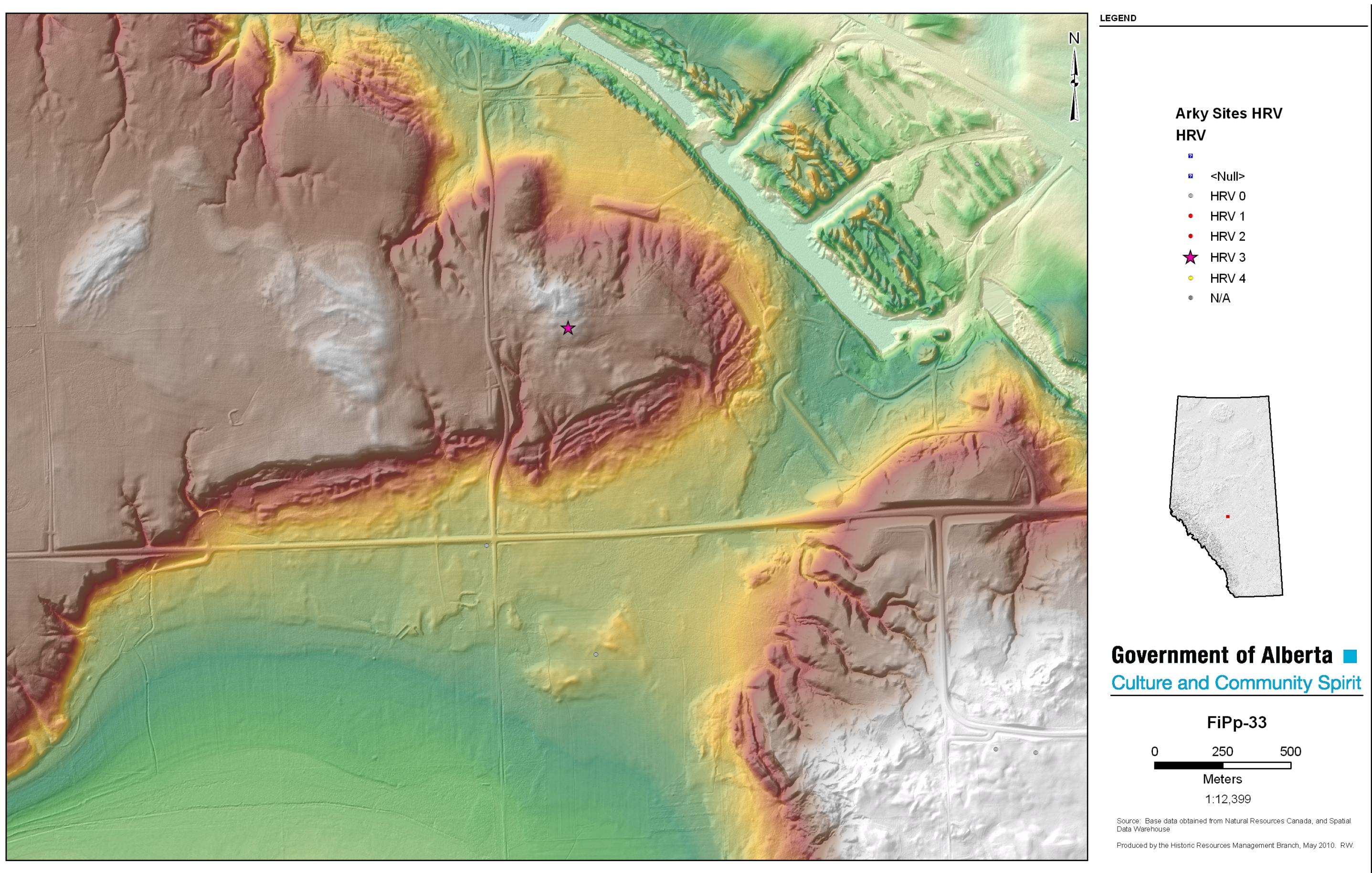

Figure 2. Topographic setting of Ahai Mneh, south of Lake Wabamun, adjacent to the Transalta coal mining operation.

chaeology at the Provincial Museum of Alberta, saying once that the way to find fluted points in Alberta was to go to a microwave tower. His idea was that fluted points do tend to be associated with the topographic eminences useful for transmitting signals today (Doll 1976).

In Early Precontact times, it was likely view planes that were important for First Nations ancestors. This would include monitoring game populations, but would very likely have had a social dimension too: there is every reason to think that human population densities in the deglaciated Ice-Free Corridor region would have been very low, so that knowing where others were would have been highly significant for gathering information, finding spouses, and many other human needs (cf. Ives 2015). Intriguingly, when one looks southwest from Ahai Mneh, Buck Mountain (just to the north of Buck Lake) is clearly visible. Although it seems near, Buck Mountain is actually 54 km in a straight line from Ahai Mneh. Night time fires or day time smoke from them would make human presence evident without undertaking a day or two days' journey to find out if that was so. Buck Mountain and adjacent Buck Lake have themselves produced early, fluted point materials (Ives 2006). The other Paul First Nation Reserve lands are also at Buck Lake.

It is conceivable that Ahai Mneh had a strategic location in a second way: the LiDAR image in Figure 2 shows that the site is situated on the west side of a gap in the raised terrain at the southeast arm of Lake Wabamun. To the southwest of that gap is a large area of lower elevation organic terrain, Low Water Lake. If Lake Wabamun had higher stands in the late Pleistocene and early Holocene, the area to the southwest may have featured a body of water connected with present-day Lake Wabamun, as Losey (1972) suspected. If true, Ahai Mneh would then have been situated at the narrows of a larger body of water, a common site setting productive for fishing and hunting.

Palaeoenvironmental studies of Lake Wabamun were frustrated by the abundance of regional coal deposits, a factor that rendered conventional radiocarbon dating suspect in a number of cases, leaving the presence of Mazama ash the one certain chronological signal. Diatom and pollen data suggested to Hickman et al. (1984) that the initial postglacial setting involved a well-established lake surrounded by birch dominated vegetation. Hickman and Schweger (1991) later concluded that Moonlight Bay in the northwest arm of Lake Wabamun was an integral part of the lake at ca. 11,500 years ago; the blue-green algal record for Lake Wabamun indicated that it was more eutrophic ca. 10,000 years ago, after which productivity declined with increasing salinity and declining lake levels that could be attributed to Hypsithermal warming and aridity. Beaudoin and Oetelaar (2003) concluded that much of the stable physical landscape in southern Alberta between 11,500 and 9,000 years ago supported an open spruce forest or parkland, although perhaps in time and space transgressive form. For the earlier time periods we will consider here, it is likely that Lake Wabamun was an ecologically productive locus on the post-glacial landscape.

4. An "ugly duckling" fluted point?

Initial indications of a PaleoIndigenous occupation of Ahai Mneh came from surface collecting in the adjacent field before our field school excavations commenced. In an early spring visit to the site with teaching assistants for the coming field school, we gathered around the hood of a University of Alberta vehicle for lunch. I could see a quartzite artifact at my feet, picked it up and began clearing adhering sediments from it with my free hand. I stopped abruptly when it appeared that there was a basally thinned base of what could be a lanceolate point. Once the artifact had been completely cleaned, however, it was quite irregular in its outline and flaking. As the late Rod Vickers remarked at the time, "You'll have a hard time convincing colleagues that actually is a fluted point." The artifact is illustrated in Figure 3. As I had more time to study the artifact, I eventually came to the conclusion that this was a fluted point, although one with an interesting tale to tell.

As Figure 3 illustrates, the artifact is made of "mid-grade" quartzite typical of the many rounded quartzite cobbles used as raw material sources all along the North Saskatchewan River, particularly at places like the Stoney Plain Quarry and the Strathcona Science Park site. Many quartzite cobbles are available in Empress Formation (Saskatchewan sands and gravels) deposits exposed along the river (Fenton et al. 1994; Rubin 2022). Better quality cobbles yield a raw material for quartzite bifaces, which are ubiquitous and abundant at sites in the Parkland ecotone, including Ahai Mneh. Though valuable in biface form for tasks like butchering, even the better instances of this quartzite have somewhat of a granular or "sugary" quality that is less than ideal for knapping. The raw material is adequate, but by no means excellent, and would present even a skilled artisan some real challenges—certainly relative to some of the high-quality raw materials seen with other fluted points. This is one underlying factor in the artifact's appearance.

That said, as Figure 3 shows, the artifact had been basally thinned on both surfaces. We do know that some fluting of Clovis points actually takes place at the preform stage, where preform bases are trimmed and then endstruck (sometimes referred to as pseudofluting, as per Knudson 2015:35) (see, for example, the Hogeye Clovis cache biface preforms in Waters and Jennings [2015]). Subsequent flaking can then take place around the channel created by the flake removed

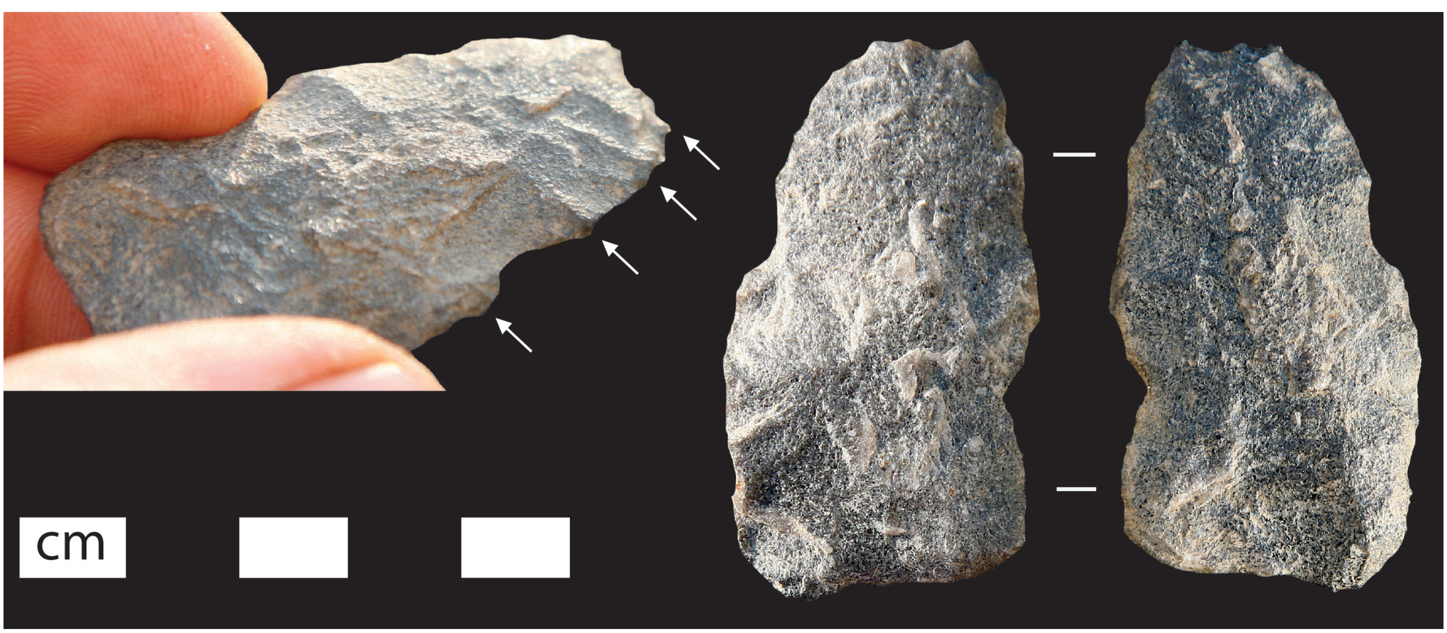

Figure 3. To the right, two endstruck surfaces of a small biface. To the left, an oblique view showing ground and isolated striking platforms suitable for further flaking (at the arrows). Note somewhat better organized, parallel oblique flaking toward the biface tip, accompanied by step fracturing.

from the base. Figure 3 shows that the lateral edges of the artifact have several isolated, heavily ground striking platforms that were never used. There is some fairly well-organized collateral flaking toward the tip of the artifact. Notice also that those and other flakes removed from the lateral edges terminate abruptly in step-fractures, not reaching the mid-line of the artifact and further illustrating the challenges inherent in the raw material.

An interesting dimension of the literature about PaleoIndigenous technology has involved matters of skill transmission (see O'Brien 2019 for a thoughtful evaluation). These could be additional factors that affected the outcome for the point in question. Lohse (2010) explored ways in which levels of skill might be reflected in Clovis macroblade manufacture from cores. He tried to discriminate the work of master craftspersons, those of moderate skill levels, and those with low levels of skill. In the latter category were some artifact instances with egregious knapping errors, along with other moderate skill instances where appropriate blade manufacture strategies were being employed, but the individual had not mastered the execution of those strategies. Lohse considered settings in which novices attempted to emulate more skilled individuals, or were being guided by those more skilled individuals, with variable results. In describing the McNine assemblage, a cache of Western Stemmed Point tradition obsidian points (typed as Parman) and preforms from a Nevada cave, Amick (2004) voiced the intriguing idea that a number of flaking platforms on points and preforms had been isolated and prepared but not removed. He wondered if they "…may have been left intentionally to serve as static representations of the process of Parman point manufacture" (Amick, 2004:139). This may have been of pedagogical value for master artisans instructing novices, perhaps in ritual circumstances (the artifacts had likely been coated in red ochre) (see Mønstad et al. 2022 for another mentoring example).

In the case of this Ahai Mneh artifact, there is a strong case to be made that the quality of the raw material created underlying problems for the artisan. The person making the artifact was knowledgeable, and was not making egregious errors in the work they had accomplished. There were endstruck flakes; there remained clearly defined and ground striking platforms situated at arrises that would orient further bifacial thinning flakes; and there were some well-organized parallel flakes of the sort that would be required to make a finished point. On the other hand, some of those flakes were terminating in step fractures rather than feathering out, and in some cases, the force applied had resulted not just in step fractures, but in "scalloping" the lateral edge, leaving an irregular outline. More "pristine" fluted points from caches and kills are typically longer, in the 40-50 millimetre range or more. When point tips and bases undergo repair work arising from breakage during use, discarded forms that result are shorter (the abandonment threshold for points in the Western Canadian Fluted Point Database is typically ~30 millimetres) (Ives et al. 2013). The Ahai Mneh specimen was not completed and could never have been in that larger size range, suggesting more restricted ambitions from the very outset.

The overall picture is one of a more challenging raw material in the hands of a practitioner who knew what to do in shaping the artifact, but who encountered persistent problems in executing the required strategies. Perhaps that person was highly skilled, but the raw material was defeating them. Or perhaps the person was moderately skilled, knew what to do, but couldn't achieve all the necessary results. By way of comparison, for the Scottsbluff points we will consider below, it is worth noting that broadly similar grades of quartzite did allow skilled craftspersons to fashion high quality points. In any case, the artifact was abandoned, unfinished.

That there could be a fluted point at Ahai Mneh would not be surprising: the Western Canadian Fluted Point database has entries for a fluted point at nearby Genesee Creek as well as clusters of fluted points in the Thorsby, Rocky Rapids, Buck Lake, and Brazeau Reservoir areas (Ives et al. 2019). Moreover, while we cannot date the Ahai Mneh specimen, there are similar artifacts in the literature that are equally rough in appearance, but occur in contexts where they can be dated. Beck and Jones (2009) illustrated one rather misshapen fluted point from the Sunshine Locality in eastern Nevada; that point is known to come from a 12,500 year old context within the fluted point time frame. For all of these reasons then, less than perfect though it is, I do think the Ahai Mneh specimen was abandoned before its intended outcome, which was to become a small fluted point.

5. Endstruck bifaces

The notion of endstruck bifaces mentioned above is not a hypothetical one at Ahai Mneh. The large discoidal, quartzite core illustrated in Figure 4a has a series of four endstruck flakes on one surface and another three, lengthy and parallel flakes on its opposite surface. This a particularly unusual core, featuring a reduction strategy undocumented in subsequent time periods, but using an approach that would be consistent with aspects of bifacial reduction strategies during the fluted point time frame. A second quartzite cobble, shown in Figure 4b features endstruck flakes as the primary thinning method being employed. The artifact in Figure 4c also features endstruck flakes on two surfaces and may have been a fluted point preform. It has strong similarities in both raw material and crafting to the biface cache in close proximity to the ~12,700 year old horse tooth row and a fluted point from Brazeau Reservoir site FfPv-1 (Brink et al. 2017:84, Figure 4). I have had the opportunity to view hundreds of quartzite bifaces of the same quartzite in Parkland ecotone contexts in Alberta. These are the only three I have seen with endstruck flakes as a significant component of the reduction strategy; while they cannot be dated, they likely do reflect activities from the Early Precontact time frame, when fluted points were being made.

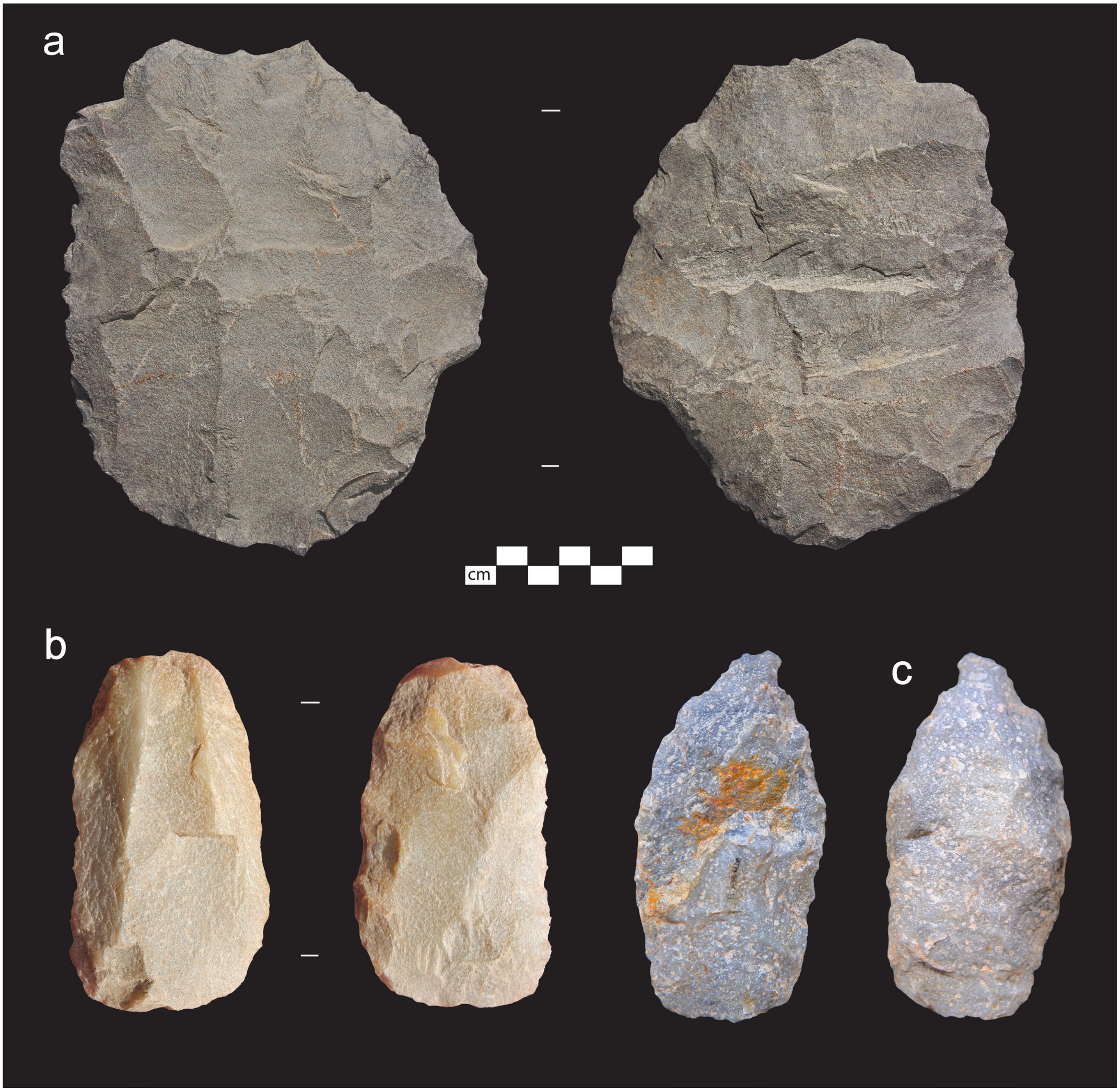

Figure 4. Unusual bifaces from Ahai Mneh. a) Both faces of a large discoidal quarzite biface, with linear, endstruck flakes; b) A split quartzite pebble with linear, endstruck flakes; c) A roughed out quartzite biface, endstruck on both surfaces.

6. A unique Cody Complex artifact

One final surface artifact from a field adjacent to the treed area of the Ahai Mneh site also comes from the Early Precontact Period. Initially, this seemed simply a Knife River Flint fragment, but upon closer inspection, this fragment is actually the base of a Cody Complex point, very likely an Alberta point (Figure 5, Figure 6b). Like the examples of Alberta points in Figure 6a (from the Fletcher site) and b (from the Edmonton area Diederichs collection), it had a series of smaller, oblique flakes trimming the base, and parallel flakes invading from the lateral edge of the fragment. To the right in Figure 6b this fragment is superimposed on the Diederichs Alberta point at the stem location from which it would likely have come on a complete point. Like other larger points, Alberta points were subject to breakage that could be repaired by reshaping the tip of the broken point, as the examples in Figure 6d-f show. Eventually breakage or resharpening would lead to the artifact becoming ineffectual for functioning either as a point or perhaps a knife.

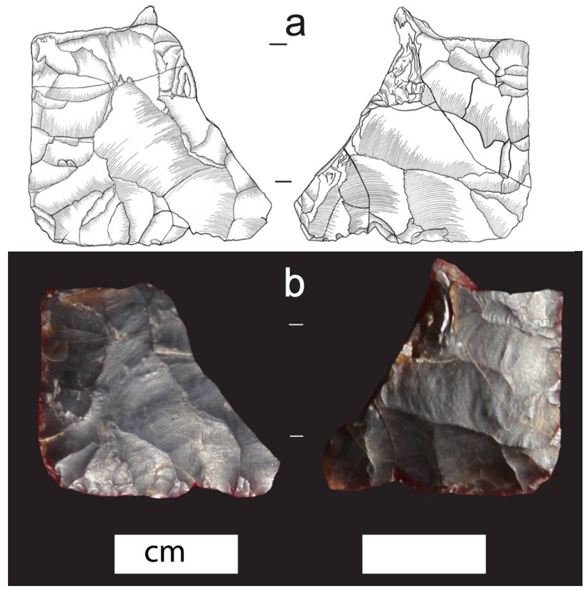

Figure 5. a) Line drawings (courtesy Karlene Dunne) and b) images of a KRF fragment from the base of a Cody Complex point from Ahai Mneh.

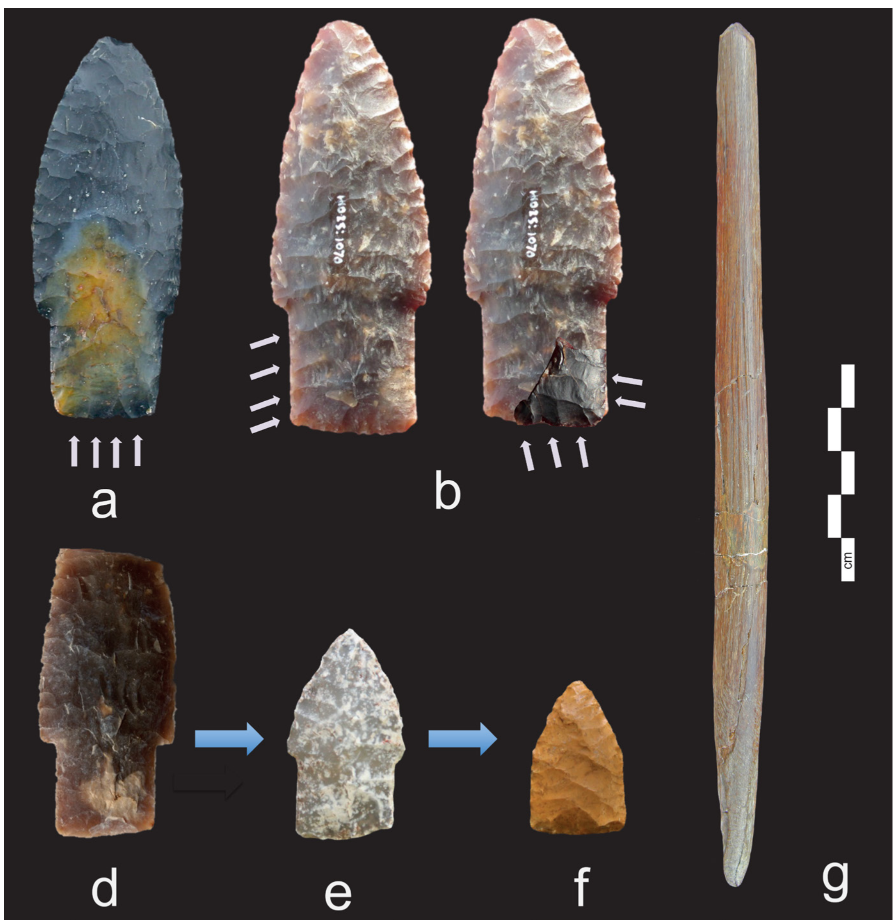

Figure 6. a) A Fletcher site Alberta point with basal trimming flakes; b) a Diederichs collection (greater Edmonton area) Knife River Flint point with parallel oblique flaking along the basal lateral edge (left) and on the right, the Ahai Mneh Knife River Flint fragment superimposed; d) a broken Knife River Flint Alberta point from the Weise collection in the Westlock area; e) a resharpened, chalcedony Alberta point from the Heron-Eden site in southwestern Saskatchewan; f) a Montana chert Alberta point from the Heron-Eden site, where the blade has been resharpened to the width of the original stem; g) the Grenfell bone point, fashioned from bison bone, and dating to late in the Cody Complex time frame. (Fletcher and Diederichs photographs courtesy of the Royal Alberta Museum; Weise collection photograph courtesy Todd Kristensen; Heron-Eden photographs courtesy David Meyer, University of Saskatchewan; Grenfell bone point photographed courtesy of the Canadian Museum of History.)

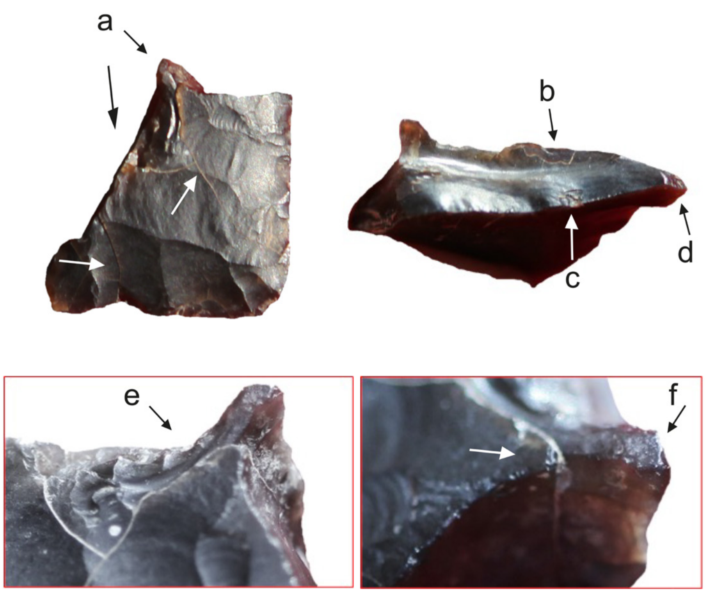

Figure 7. Four views of the Ahai Mneh Knife River Flint fragment, with arrows in a) showing the point of impact and radiating lines of fracture, b) showing lipping, c) an érailleur scar, d) a graver tip, e) a concave spokeshave-like surface with small scale retouch or edge damage from use, and f) use wear on the re-purposed graver tip.

The small fragment had continued use life. As Figure 7 shows (arrows a] through d]), it has all the characteristics of a purposeful radial impact fracture, including an impact scar, an érailleur scar, radial fracture lines, lipping, and a fracture plane that approximates 90 degrees (see Jennings 2011). The artifact continued in use, with a concave surface resembling a miniature spokeshave that has tiny step fractures from use or retouching, plus a projection that functioned as a graver tip, which has use wear (Figure 7, arrows at e] and f]).

Purposeful radial fractures are a feature of PaleoIndigenous assemblages. The Yubetsu technique for manufacturing microblades, known for Diuktai assemblages in northeast Asia and the 14,100 year old Swan Point assemblage in Alaska, relies upon the deliberate fracture of an asymmetrical biface to begin the preparation of a striking platform and fluted microblade face of the microblade core (Coutouly and Holmes 2018). Waters et al. (2011) described bend and radial fractures as a feature of pre-Clovis and Clovis assemblages at the Gault site in Texas. In the Ahai Mneh case, a basal fragment originally from an Alberta point was shattered with a perpendicular blow and then had continued use for finer work in graving and scraping. That may have been for scoring osseous materials (bone or antler) to secure a segment for making bone rods, foreshafts or points like the 9,400 year old Grenfell example[4] (Figure 6g) from Saskatchewan, or for shaping the surface of such an artifact.

This fragmentary artifact connects with the much larger story of Knife River Flint use in Alberta. Knife River Flint consistently occurs throughout the entire time range in Alberta, beginning with a Clovis point that likely came from the Pickardville area north of Edmonton (Brink 2015; Ives 2015). Knife River Flint sources lie in Dunn and Mercer counties along the Missouri in North Dakota (Kristensen et al. 2018). Popular across interior North America throughout time, Ahler (1986:105) estimated that Knife River Flint was used for the production of roughly 640 million tools or cores, examples of which have been found over an area 3.7 million square kilometres in interior North America.

In Alberta, Knife River Flint artifacts are found in all time periods. Nevertheless, these rarer instances are characteristic of "down-the-line" exchange practices where the frequency of valued items drops sharply in a "distance-decay" pattern as one moves away from a source area[5]. There are two exceptions to this pattern, one lying in occasional sites such as Muhlbach or Smith-Swainson in central Alberta, from the Besant and Sonota time frame. At these rarer sites, 80 percent or more of the tool assemblage is comprised of Knife River Flint, even though they may be a thousand or more kilometers from the source area.

As intriguing as that pattern is, it actually pales in comparison to the pattern we see with Cody Complex artifacts in Alberta. Dawe (2013) found that for a sample of 475 Cody Complex artifacts where the toolstone could be accurately determined, 43.8 percent of Cody Knives were Knife River Flint, 42.7 percent of Alberta Points were Knife River Flint, 25.6 percent of Scottsbluff points were Knife River Flint, and 21.9 percent of Eden points were Knife River Flint. It is literally the case in southern and even north central Alberta that for every four Cody Complex diagnostics one sees in a collection, one or two will be made out of Knife River Flint, even though the sites in question will be 1,000 to 1,200 kilometers in straight line distance from the North Dakota sources. Cody Complex points made of Knife River Flint also occur in the Peace River Country of northwestern Alberta and even northeastern British Columbia at 1,500 or more kilometers of straight-line distance from the North Da-

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[4] The Grenfell example was dated to 8,425 ± 40 ^{14}C yr BP (OxA-27376) with a calibrated two sigma range of 9528-9400 cal yr BP (Ives et al. 2014), falling toward the end of the Cody Complex interval.

[5] Some caution in assessing whether Knife River Flint (rather than brown chalcedonies from other sources) is present in Alberta assemblages is warranted. As Kirchmeir (2011) pointed out, this is particularly true of smaller flakes and artifacts, where the full range of macroscopic characteristics may not be present, and other sources could be in play. Steuber (2018) explored alternative sources, such as the Hand Hills of central Alberta, and examined the geochemistry of Knife River Flint and chalcedonies of similar appearance. Kristensen et al. (2018) found that geochemical signatures for Knife River Flint and other brown chalcedonies were too highly variable, and concluded that careful application of macroscopic characteristics—blonde to dark brown coloration, edge translucency, visible bedding planes, plant microfossils and white splotches (internal mottling), patination, a uniform matrix, common feather terminations of flakes, and excellent preservation of features associated with conchoidal fracturing (ripples)—remained appropriate. This strategy is applicable for Cody Complex artifacts because they required larger pieces of raw material to begin with and remained larger in finished form.

kota sources. It is more difficult to say whether this pattern, for diagnostic Cody Complex items, may or may not reflect entire tool assemblages, but one Alberta instance concerns a cache, tool kit or activity locus recovered from a small area of the Wally's Beach site, where two Alberta points, seven endscrapers and six fragments were all made of Knife River Flint (Tolman 2001). Even at this southern location, one is ~800 straight-line kilometers from the source (with travel highly unlikely to have taken place in a straight line). As these extraordinary distances mount, it becomes impossible to explain the high Knife River Flint frequencies as the consequence of high degrees of community mobility, seasonal or otherwise.

There is clearly something extraordinary about Knife River Flint use taking place in Cody Complex times. Root (1997; Root et al. 2013) described instances of systematic over-production of Knife River Flint bifacial preforms within the North Dakota source area. There, skilled Cody Complex artisans made dozens of preforms that would outstrip individual needs over the course of a year, strongly suggesting to him that there was a degree of role specialization taking place, with surpluses being produced for exchange purposes. It is difficult to conceive of such an extensive interaction sphere, in which high levels of exchange in material goods were taking place, without comparable levels of social interaction, whether that might be epic journeying for rites of passage, for instance, or other practices, such as wide circulation of spouses for outward looking, exogamous societies as I have argued elsewhere (Ives 2015; see Speth et al. 2013 for a broader treatment of these issues). Whatever the cause, the Knife River Flint phenomenon with Cody Complex artifacts actually goes against the grain of toolstone patterns across most of then contemporary North America, where raw stone material use was becoming progressively more regionalized or even localized (e.g., Koldehoff and Loebel 2009).

In these terms, then, the tiny Ahai Mneh Alberta point fragment evidently reflects a final bit of use value for intricate graving and shaping tasks, involving a highly prized toolstone that had travelled far from its geological source.

7. Three-dimensional data recovery and the PaleoIndigenous component at Ahai Mneh

Not unexpectedly—given the rich lithic record that Altamira excavations had already documented—the prospects for disentangling piece-plotted horizontal artifact distributions were somewhat restricted. After two field seasons of excavation, it was clear that the Area B eminence was a highly desirable place at which to conduct tool manufacturing and maintenance activities, as Figure 8 shows. Of 8104 lithic artifacts recovered during our Ahai Mneh work, Hallson (2017) analyzed 7709 pieces of debitage with known proveniences. She found that tool production from prepared raw materials (rather than complete cores) and tool rejuvenation were the dominant activities. Artifacts occurring in such high densities make discrete activity areas difficult to discern. The prospects for connecting diagnostic projectile points with activity areas as a way of segregating temporally related artifacts was correspondingly diminished.

The most significant early period discoveries took place late in our field program, when closing out excavation units. We had recovered stemmed points and stemmed point bases at lower excavation levels as our field school excavations came to an end in both 2010 and 2012. In order to ensure that we had reached sterile parent geological materials, to facilitate profiling activities, and to teach students how to go about shovel shaving as another form of excavation, we continued work well below the levels at which artifacts had ceased to be found. This, as many archaeologists might recognize, became the juncture at which two additional discoveries surprised us. In 2010, these deeper excavations yielded a quartzite Scottsbluff point (FiPp-33:13301) well below other artifacts. In 2012, when we once again thought we had reached sterile deposits, our final shovel shaving led to the discovery of a stemmed quartzite point (FiPp-33:13302) in the Agate Basin-Hell Gap morphological continuum.

Depth of artifact discovery, therefore, turned out to be more promising, and became an early focus of our analysis. At its outset, the Institute of Prairie Archaeology was

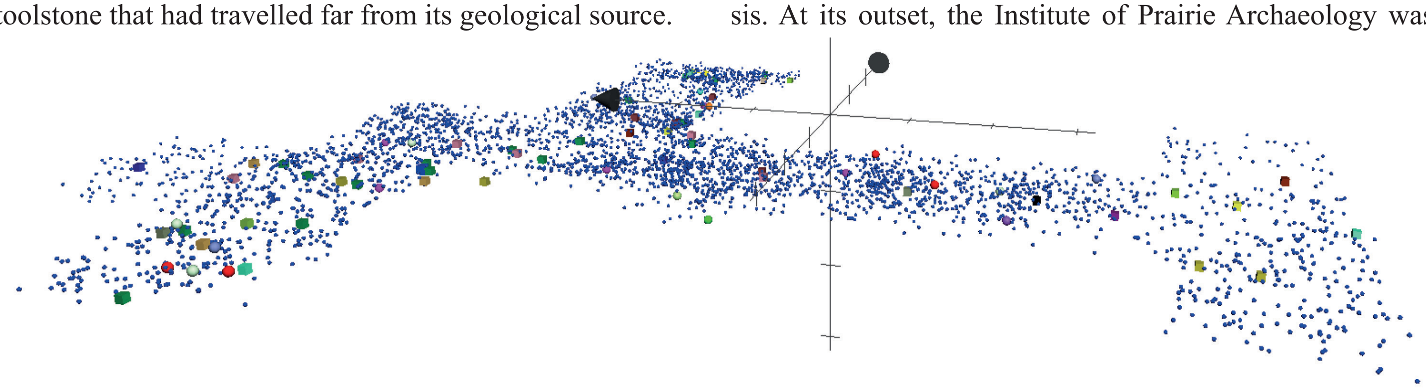

Figure 8. An oblique view of the high artifact density in Area B (the topographic eminence for the site at Ahai Mneh). The plain dots are items of debitage; the coloured symbols are projectile points or other formed tools, like scrapers.

unfunded, and we did not have Geographic Information System (GIS) capacity. In an imaginative application of the freely available Grapher software, teaching assistant Gabriel Yanicki led field school students in plotting artifact depth, using a formula to take into account the slight degree of slope in Area B (see Rawluk et al. 2011).

Figures 9 and 10 present examples of student work. In Figure 9, Cody Sharphead arranged projectile points from the main Area B trench by depth below surface. We will return to the Scottsbluff (FiPp-33:13301) and Agate Basin/Hell Gap points (FiPp-33:13302) at the base of his diagram. Generally speaking, this diagram shows a pattern where later Early Precontact Period points are succeeded by smaller side-notched to corner removed points that would not be out of place in earlier Middle Precontact contexts (e.g., Peck 2011). In middling deposits, note the clear-cut Oxbow example, and above that, an Avonlea point. Other side to corner-notched points from nearer the surface fall within the Cayley Series range of variability (Peck and Ives 2001).

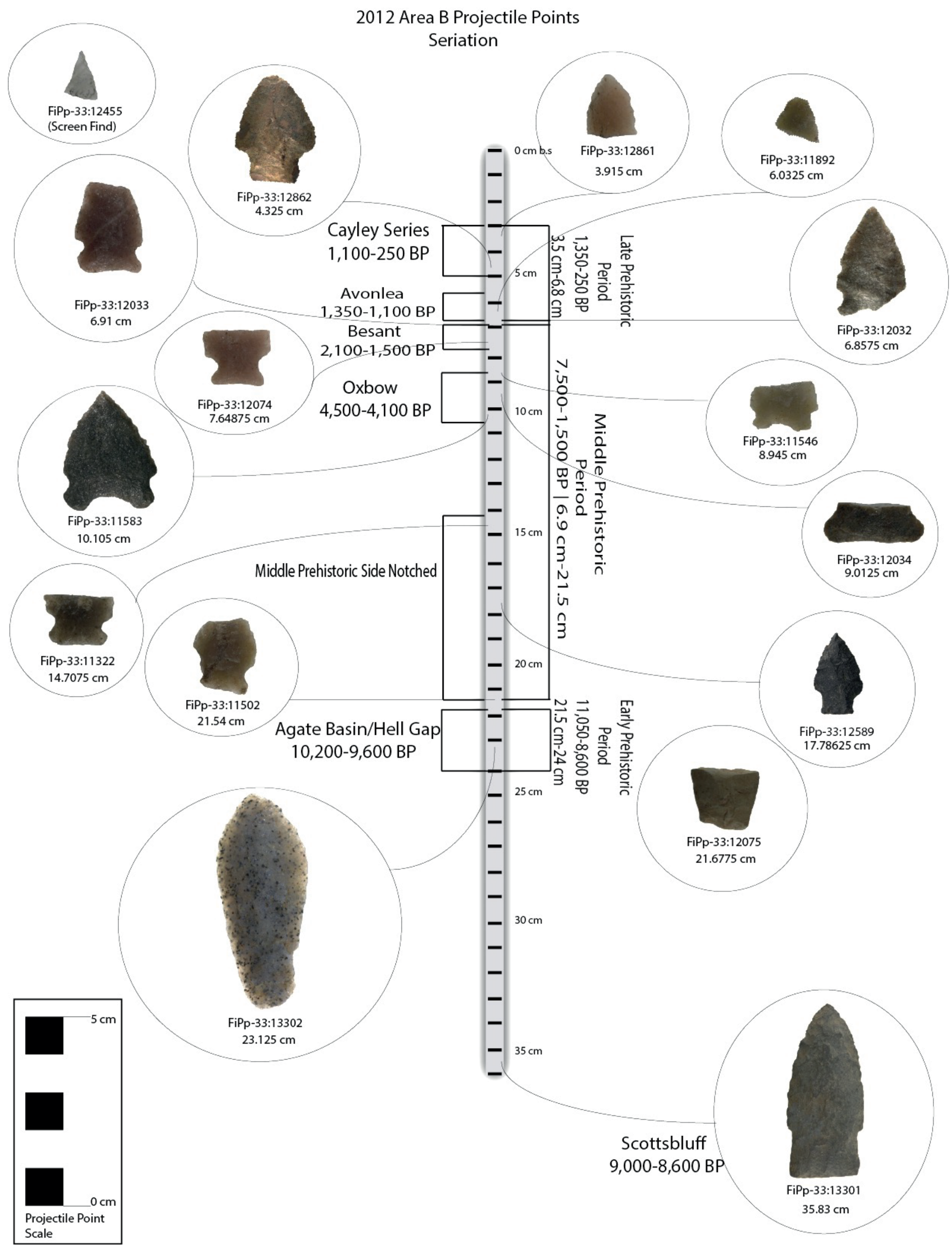

Figure 9. A diagram by Cody Sharphead showing a general relationship between temporally diagnostic projectile points and depth of artifact recovery.

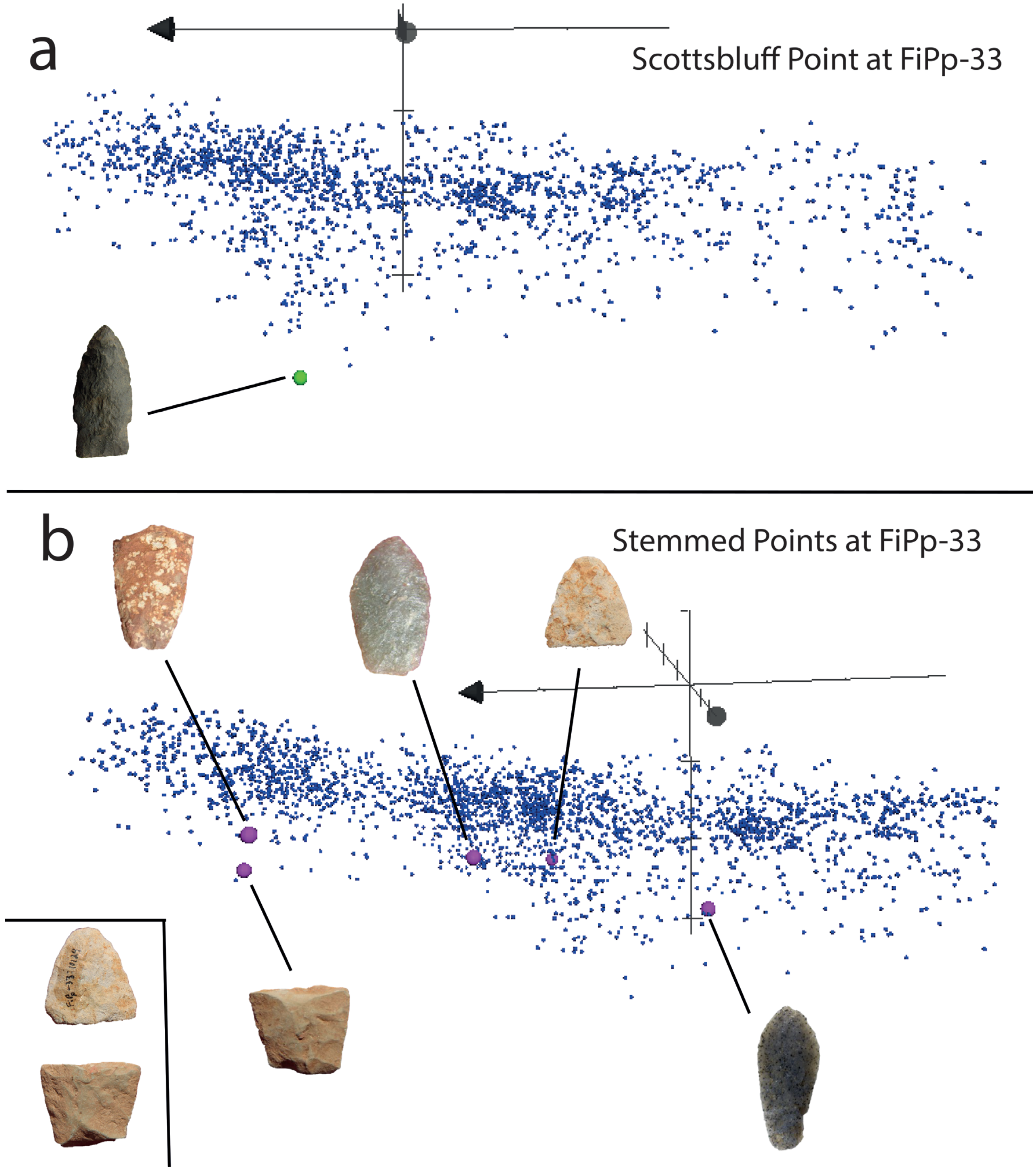

Figure 10. Diagrams prepared by Jennifer Hallson showing a) the depth of recovery for the Scottsbluff point (FiPp-33:13301), and b) stemmed points recovered from lower levels of Area B, including FiPp-33:13302. The two fragments (FiPp-33:10124) in the lower left hand corner of b), the opposite sides of which are shown in the artifact distribution to the right, do not refit, but are suspected of being part of a single artifact.

Jennifer Hallson focused on more deeply buried points and debitage (Figure 10). In Figure 10a, we see that the Scottsbluff point (FiPp-33:13301) was the deepest *in situ* artifact recovery we made. In Figure 10b, the next most deeply buried point (FiPp-33:13302) fits comfortably within the Agate Basin/Hell Gap continuum. Slightly above that stratigraphically are stemmed points and stemmed point fragments that are consistent with latest Early Precontact Period points known elsewhere in Alberta. As Rawluk et al. (2011) noted for earlier diagrams of this type, it is plausible to think that the more deeply buried debitage items are in fact associated with the Early Precontact Period occupation of Ahai Mneh.

While it would not be reasonable to associate debitage with specific point forms, it is possible to make some more focused conclusions. The early occupation of Ahai Mneh Area B appears to have been at a very low intensity, perhaps consistent with hunting stand and observation point activities involving low rates of tool maintenance and replacement. With the exception of FiPp-33:13302, as discussed below), both the points and debitage reflect a strong reliance on locally available raw materials, notably pyrometamorphics and cobble quartzite.

8. Further thoughts on FiPp-33:13301 and 13302

8.1 FiPp-33:13301 (Scottsbluff point)

The small Scottsbluff point (FipPp-33:13301) recovered in situ was fashioned from a darker gray quartzite of moderate quality (Figure 11a). It is precisely shaped, with modest, obtuse-angled shouldering. As well made as the point is, there is evident step and hinge fracturing along the point blade, reflecting the raw material shortcomings. The base of one side has four vertical trimming flakes in much the fashion discussed above with respect to the Knife River Flint fragment from an Alberta point. FiPp-33:13301 has a mate in an orange-coloured quartzite Scottsbluff point from the Royal Alberta Museum Diederichs collection, made in the greater Edmonton region primarily during the 1960s. The points are similar enough that they could have been made by the same person (Figure 11a and b). Many of the flake scars on both points are worn and rounded: it is possible that bag or transport wear affected both of them.

These Scottsbluff points, coupled with the repurposed Knife River Flint fragment from an Alberta point discussed earlier, draw together two threads of Alberta's unusual Cody Complex story. Although some Cody assemblages have a variety of artifacts made from Knife River Flint at great distances from the source area, the higher frequencies of Knife River Flint are normally confined to the Cody Complex diagnostics. In at least the Ahai Mneh case, the debitage found at similar depth to the early points is dominated by quartzites, pyrometamorphics and other locally available raw materials. The implication would be that some Knife River Flint reached the site, but primarily in the form of specialized points and knives. Highly proficient Cody Complex artisans present at Ahai Mneh made well-formed Scottsbluff points and presumably other artifacts from the locally available quartzites.

If the high frequency of Knife River Flint for Alberta, Scottsbluff, and Eden Points, as well as Cody knives, really was fuelled by some degree of craft specialization and over-production in the source area, as Root found, what mechanisms brought higher frequencies of Knife River Flint Cody diagnostics into central Alberta, and beyond, to the Peace Country? It could be that non-analogous environ-

Figure 11. a) A Scottsbluff point (FiPp-33:13301) excavated from Ahai Mneh; b) a Scottsbluff point from the Diederichs collection, greater Edmonton area (Diederichs Scottsbluff photographed courtesy of the Royal Alberta Museum).

ments were involved: the post-glacial landscape for a time remained well-watered despite severe Holocene warming trends. Perhaps a mixture of grasslands and spruce gallery forests (that did not yet have their full complement of tree and other species) provided a unique environment, as noted earlier. The Fletcher site in southern Alberta, in what is today dry prairie, once featured a large, freshwater lake beside which Cody Complex hunters ambushed several large bison (Vickers and Beaudoin 1989). Many of today's large alkali lakes in southern and central Alberta likely were freshwater then; to the north, the closed boreal forest was only beginning to take shape. In these terms, one group of late PaleoIndigenous societies may have been responding to unique lifeway opportunities that would be a final echo of the possibilities that had existed in the preceding three millennia. Perhaps high rates of exogamy, sophisticated trade arrangements, or regular seasonal aggregations based upon the hunting of bison chronospecies and other remaining large game, supplemented by fishing, waterfowl and other freshwater resources, promoted this unusual pattern for an exotic toolstone.

8.2 FiPp-33:13302 (Agate Basin or Hell Gap point)

The next most deeply buried point (FiPp-33:13302) falls on the Agate Basin-Hell Gap morphological continuum (Figure 12a), and would ordinarily have been expected to be older than the more deeply buried Scottsbluff point (FiPp-33:13301) nearby. Depths could reflect the actual age relationship, but it is more likely that FiPp-33:13302 is the older of the points and the depth discrepancy (~12 centimetres) results from minor topographic variation in Area B or some modest source of human or natural disturbance. This small biface (or possibly, resharpened knife) had experienced significant lateral edge damage, perhaps leading to its discard.

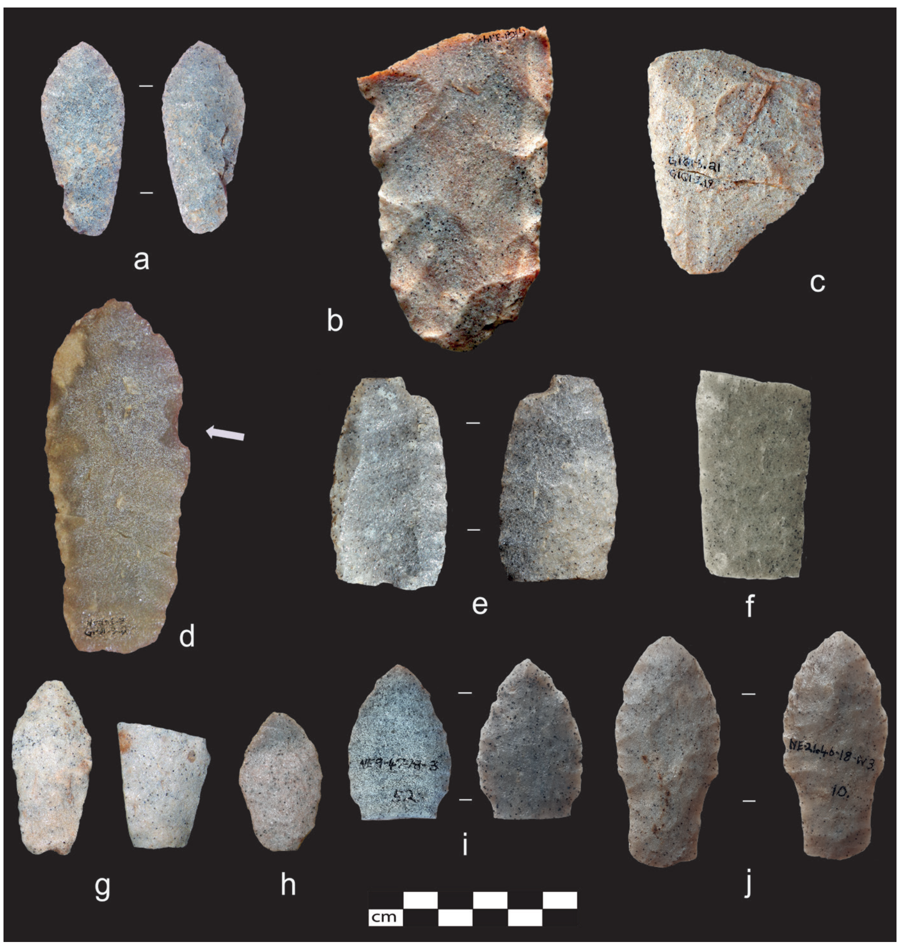

Figure 12. a) A stemmed point (Agate Basin/Hell Gap) excavated from Ahai Mneh; b) a larger biface from the Poohkay cache, Eaglesham area, northwestern Alberta (note thermal aureole and oxidized iron); c) a large unifacial (refitted) implement from the Poohkay collection; d) the patinated side of one of the Poohkay collection stemmed points, with the arrow indicating unpatinated Northern Quartzite at a more recent chip; e) a fluted biface from Ireland collection (Peace River Country), but fluted from the tip downward, with a worn tranchet tip at its distal end; f) a stemmed point fragment from the Hoover collection (Peace River Country); g) two small stemmed points from a Grande Prairie region collection; h) a small stemmed point from the Craig collection (Grande Prairie region), and i) and j), two stemmed points from the Iverson collection in the Turtleford area of northwestern Saskatchewan. (Poohkay collection artifacts photographed courtesy the Royal Alberta Museum; Hoover and Ireland collection artifacts photographed courtesy Todd Kristensen; Iverson collection photographs courtesy Dale Fisher.)

The raw material for FiPp-33:13302 tells an interesting story. In northern Alberta, one of the dominant raw materials is a vitreous quartzite that Gryba (1988, 2001) has termed "Northern Quartzite." It comes in two macroscopically discernable forms: uniform gray or somewhat honey-coloured varieties, or the identical raw material with a mafic fleck in it. Sometimes called "salt and pepper" quartzite, there never in my experience is any "salt" (i.e., white flecks). The dark "pepper" flecks are revealed by SEM analysis to be entirely silica dioxide, a black chert inclusion along with the majority of quartz grains. (Ives 2016).

Like the North Saskatchewan River raw material sources, Northern Quartzite also comes from river valleys and lake shores. Unlike the tan, purple, pinkish, orange and other Aspen Parkland quartzites (where brighter coloration likely does reflect some degree of heat treatment), Northern Quartzite is more highly metamorphosed and is a superior raw material (e.g., see the semi-translucent Arctic Small Tool tradition artifacts from the Birch Mountains in Ives 2017:300, Figure 8.5). While no geoarchaeological study has been undertaken, Northern Quartzite is typical of the Peace and Athabasca drainages; I have rarely seen it in Aspen Parkland assemblages. This raw material has likely also been dispersed by eastward flowing rivers since the Tertiary time frame, the suspicion being that in these cases a more highly metamorphosed, more northerly source in the Rockies was being tapped.

In conducting that thesis research in 1976, I became curious about a similar looking quartzite at the Eaglenest Portage site. These less common instances resembled the more translucent Northern Quartzite, but were opaque white to bluish white in colour. I placed a surface collected fragment of Northern Quartzite into our campfire and found that in a short period of time it shifted from the somewhat translucent, vitreous form to the opaque white being discussed here. That same effect can be seen in two artifacts of the Poohkay (GlQl-3) cache from the Eaglesham area, between the Peace and Smoky Rivers (Figure 12). Figure 12b is a biface of the same material that has been severely heated, creating a thermal aureole around the edges of the artifact, also involving oxidation of iron minerals in the raw material[6]. Figure 12c is a large unifacial implement (refitted) from the Poohkay site with the same raw material attributes and evidence of heating. Note that all of these instances—the Ahai Mneh stemmed point and these last two Poohkay artifacts—have the chert flecks in them.

Northern Quartzite can be affected in another way. Fluted points and other early specimens often have an "oolitic" or tapioca-like appearance where quartz grains within the quartzite matrix are clear, but are surrounded by a creamy effect for the matrix itself (cf. Gryba 2001; Ives 2016). This is a different, patina phenomenon. Whereas heated Northern Quartzite is altered to opaque white coloration throughout, the patination effect is surficial. This is evident in the Poohkay collection stemmed point preform in Figure 12d, where one can see that the more recent chip on the right lateral edge of the Poohkay preform reveals a vitreous, underlying honey colour typical of this raw material. Curious about this, I used SEM microscopy to explore the patinated matrix, the unpatinated matrix, recently chipped areas of the preform, and the clearer quartz grains throughout the raw material. The quartz grains, the unpatinated matrix, and the recently chipped areas all return signatures of silica dioxide only. The patinated matrix is different, and features a suite of elements (e.g., potassium, calcium, iron, magnesium, sodium) consistent with clay minerals that are either adhering or bonding to the matrix, scattering light and resulting in the cream colour to the naked eye[7]. The Luvisols and Brunisols in which these points are found feature translocation of clay minerals in the soil profile.

The Ahai Mneh stemmed point (FiPp-33:13302) is made from a quartzite that is not typical of the Aspen Parkland ecotone, suggestive of some form of contact farther to the north. The common occurrence of more intense heating of early period northern quartzite artifacts is suggestive that something else may be going on: none of the Poohkay preforms have black flecks, and none of them have been heated. Six of eight non-preform tools in the Poohkay collection have the black chert flecks, and those six have all been heated to the white to bluish white opaque condition, like the Ahai Mneh point. Figures 12e-j illustrate Northern Quartzite from a sampling of Peace Country as well as Iverson collection (Turtleford area of northwestern Saskatchewan) Early Precontact Period points that also have black chert flecks and have been heated to opaque form. Kristensen and Haukaas (2020:21, Figure 11) illustrated additional northern Alberta examples. The opaque white background certainly causes the "pepper," the black chert flecks, to stand out. The heating involved leaves no discernible functional impact, leading me to wonder if it took place merely by chance or if artisans were after a distinctive aesthetic effect.

[6] To be clear, this larger biface was found some distance away from the small topographic feature upon which all the other Poohkay cache artifacts were recovered. Mr. Poohkay felt that it was likely moved ~75 meters by ploughing or harrowing, to an area where he had burned scrub piles.

[7] This would be an additive pattern of patination, whereas the patination of Knife River Flint is subtractive, and results from desilicification of the surface (the two processes are compared in Ives 2016).

9. Discussion

Like the Strathcona Archaeological site mentioned earlier, our excavations at Ahai Mneh support the idea that excavation depths for temporal diagnostics do tend to occur in proper stratigraphic order—even if sediment depths are thin and there is an ever-present possibility of disturbance for any given artifact. Clearly recognizable PaleoIndigenous or Early Precontact Period points occur in the Ahai Mneh assemblage. Where they are recovered in situ, they are invariably among the most deeply buried artifacts. Other artifacts at similar depth (primarily debitage) occur in low density, suggesting that initial occupations at Ahai Mneh were of low intensity. The majority of these other, early artifacts principally involve local and regionally available raw materials (notably cobble quartzites and pyrometamorphics).

Although these early occupations are of low intensity, Ahai Mneh is situated on an elevated landform, with extensive view planes for activities that could range from monitoring game populations to being aware of other human groups. The distribution of artifacts in undisturbed deposits at Ahai Mneh, coupled with dispersed artifacts in the adjacent cultivated field, indicate that it was a massive site capable of sustaining large aggregations of people. This was especially so given its proximity to Lake Wabamun, which may have been a more ecologically productive locus in a non-analogous post-glacial environmental setting. For the remainder of Holocene until its historic role for Paul First Nation, Ahai Mneh undoubtedly hosted many large gatherings of people.

10. Coda: How should we research or conduct mitigative excavations at sites like Ahai Mneh?

During the years a number of us spent at the Provincial Museum of Alberta (today the Royal Alberta Museum), I wanted to see if a public lecture series in archaeology could be developed and sustain itself. In planning for the 1994 Canadian Archaeological Association meetings, and with the insightful assistance of Tim Willis, we developed the Time Travellers lecture series, with inaugural guest lectures featuring the Tyrolean Ice Man (Ötzi), Pompei, the Franklin expedition graves, as well as Paleolithic work we were doing in Heilongjiang, China. Subsequent lectures over the years included offerings on Chauvet Cave weeks after its discovery, the Xinjiang "mummies," Haida Gwaii, Polynesian expansion in the south Pacific, the Custer battlefield and many others. The high profile, international topics were certainly intended to attract a paying audience, which made the series self-sustaining. Yet, there was an ulterior motive, that being to cultivate interest in Alberta archaeological topics with a general public that in earlier years had supported the impetus for Alberta's heritage legislation. Annual lecture series each had Alberta content, from the dramatic late Pleistocene findings in the St. Mary Reservoir to Head-Smashed-In.

As years went by, I began casting around for more Alberta topics and at one point decided to try a lecture entitled "Ten Remarkable Things About Alberta Archaeology." The idea was to provide ten vignettes with interesting stories taken directly from regulatory as well as research findings about sites and artifacts in Alberta. Colleagues were most generous in sharing information and ideas that could be used in topics that ranged from the metal scraps leaving behind the negative image of an arrow tip (Vivian et al. 2005) at a protohistoric site in the west end of Calgary to the presence of Arctic Small Tool tradition (ASTt) artifacts in northeastern Alberta. I was uncertain as to how our audience might receive this idea for a lecture, but was pleasantly surprised that it really struck a chord—and wound up doing several of them over the years.

Of course, anyone who knows Jack Brink will be well aware that he was a gifted raconteur, both in everyday life, and certainly in his professional capacities (witness the award-winning reception for Imagining Head-Smashed-In). The Time Travellers experience grounded my own notion that telling stories, large or small, must be an integral part of the archaeological endeavour. That public experience can be paired with meetings in which somewhat frustrated developers would sometimes confide "Why do we have to keep mitigating this site when we are not learning anything new?" It is vitally important in all phases of archaeological work that we seek and tell interesting stories, both large and small. There are many ways to tell compelling stories, and by encouraging this strategy, it should not be concluded that I am suggesting that we freely imagine interpretations of the past or abandon scholarly rigour in our efforts[8]. In *Houston, We Have a Narrative (Why Science Needs a Story)*, Olson (2015) makes the case that human beings are uniquely programmed to respond to stories, that scientific and scholarly methods can and should follow a story telling framework (whether that is in an "Introduction, Methods, Results and Discussion" format or another suitable framework), and that the most effective publications in impact journals do exactly that.

[8] Unless, of course, the context is one in which both the archaeologist and audience are clearly aware that some interpretive liberties are being taken in order to illuminate an aspect of the human past.

This brings me to my closing thoughts, with a plea for conducting some of our research—and particularly regulatory work at rich, thinly stratified sites—in a different, more thoughtful manner. The vignettes we might tell about Ahai Mneh or Alberta archaeology more generally do capture peoples' imaginations. In the case of Ahai Mneh, a number of these stories are founded upon the piece-plotting of three-dimensional locations of artifacts. In expressing these ideas, a colleague chided me that this was a nineteenth century technique, and not by any means novel. My response was yes indeed, that was true, but this was the 21st century: why were we not more frequently applying it?

It is true that the piece-plotting of artifacts is more time consuming and therefore a more expensive endeavour in both research and regulatory contexts. Particularly in regulatory contexts, consulting archaeologists proposing that these methods be applied could be faulted by a client for undertaking something that could cost considerably more. This could certainly lead to situations in which calls for proposals that accomplished a larger extent of excavation for less cost would be favoured. Sites with considerable time depth, like Ahai Mneh, the Strathcona Science Park, or Eaglenest Portage, are not common, but they do occur and potentially contain much more information than current methods often extract. In a thesis I was delighted to see, one of our 2010 Ahai Mneh fieldschool students, Matt Rawluk, used Geographic Information System (GIS) methods to make a renewed, thorough exploration of the original Eaglenest Portage (HkPa-4) piece-plotted data (Rawluk 2019). Relative to my 1970s work, or even our 2010-2012 Ahai Mneh research, the GIS spatial analytical tools now commonly available allow for ready parsing of even very high-density artifact distributions. Conversely, as noted earlier, casual assumptions about whether or not artifacts from such sites are genuinely temporally associated can lead to highly fallacious conclusions.

Especially in mitigative work arising from regulatory processes, I would strongly advocate that we be prepared to make trade-offs. We need to ask ourselves questions like "Would we rather have less spatially extensive, but higher confidence data, or just more lower quality data excavated with fewer controls?" In the scheme of things, for the largest developments likely to affect rich, thinly stratified sites, archaeological mitigation is not expensive in relative terms. There is a case to be made for simply requiring and doing more, including three-dimensional piece-plotting. Where costs might have a prohibitive impact, we should definitely consider acquiring more high-quality data in less expansive excavation units. Use of the word "requiring" above is deliberate. To create a level playing field for private sector consultants bidding mitigative projects, the regulator must be involved in stipulating the terms of a mitigative strategy, so as to avoid unfair competitive circumstances.

By proceeding in this way, we can best position ourselves to convey interesting stories, stories that can engage the wider public needed to support heritage legislation.

11. Acknowledgements

Violet Poitras graciously named the site (Ahai Mneh is a Stoney Nakoda rendering of the Cree name for Lake Wabamun), and conducted a ceremony with the young women in our 2010 field school. Thanks also to Dennis Paul and Doris Rain. David Link and Brian Ronaghan were instrumental in guiding us to Ahai Mneh as a field school destination. We thank Transalta for setting the site aside, and for allowing us to conduct our 2010 and 2012 field schools. At the outset of our work, we were grateful for the Highvale Mine report and framework provided by Kristin Soucey and Bruce Ball of Altamira Consulting. We appreciated a field visit from Krista Gilliland of Western Heritage, assessing the Ahai Mneh soil and sediment conditions. Daryl Bereziuk and Robin Woywitka provided invaluable field, GIS and LiDAR information.

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