11. THE LA PRELE MAMMOTH SITE, CONVERSE COUNTY, WYOMING, USA

Todd A. Surovell[1,*], Spencer R. Pelton[2], Madeline E. Mackie[1], Chase M. Mahan[1], Matthew J. O'Brien[3], Robert L. Kelly[1], C. Vance Haynes, Jr[4], George C. Frison[1]

[1]*Department of Anthropology, University of Wyoming, Laramie, WY 82071, U.S.A.*
[2]*Office of the Wyoming State Archaeologist, University of Wyoming, Laramie, WY 82071, U.S.A.*
[3]*Department of Anthropology, California State University Chico, Chico, CA 95929, U.S.A.*
[4]*School of Anthropology, University of Arizona, Tucson, AZ 85721, U.S.A.*
[*]*surovell@uwyo.edu*

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ABSTRACT

The La Prele Mammoth site is a Clovis archaeological site in Converse County, Wyoming (U.S.A.) that preserves chipped stone artifacts in spatial association with the remains of a subadult Columbian mammoth (*Mammuthus columbi*). The site was discovered in 1986 and initially tested by George Frison in 1987, but work ceased there until 2014 due to a disagreement with the landowner. In the intervening years, questions arose as to whether the artifacts and mammoth remains were truly associated, and the site was largely dismissed by American archaeologists. Recent excavations have not only demonstrated that La Prele was the location of a mammoth kill by Clovis hunters around 12,850 years ago, but it also preserves a campsite in close proximity to the kill. The camp includes multiple hearth-centered activity areas that appear to represent domestic spaces, reflected by the presence of a diversity of stone tool forms, bone needles, a bone bead, a large area of hematite-stained matrix, and the butchered and cooked remains of at least one other large mammal species. The site has the potential to inform us about aspects of the social organization of Clovis bands, particularly with respect to mammoth hunting and butchery.

11.1 INTRODUCTION

From the Middle Pleistocene and continuing to nearly the onset of the Holocene, evidence for the predation of proboscideans in the archaeological record is concentrated at the edges of human global existence, where the range of *Homo* intersected with those of species in the order Proboscidea (Surovell et al., 2005, 2016). In the Old World, sites showing clear hominin interaction with proboscideans migrate slowly to the north and east as the geographic range of the genus *Homo* expands in the same direction. Outside of Africa, Lower Palaeolithic sites with direct evidence of the exploitation of proboscideans concentrate in the Mediterra-

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nean zone, but also as far north as southern Great Britain (e.g., Goren-Inbar et al., 1994; Yravedra et al., 2010; Anzidei et al., 2012; Rabinovich et al., 2012; Wenban-Smith, 2013; Boschian and Saccà, 2015; Panagopoulou et al., 2018; Espigares et al., this volume; Wenban-Smith, this volume). Middle Palaeolithic sites are found from the Channel Islands (U.K.) and France in the west to Germany in the east (e.g, Gaudzinski, 2004; Cliquet, 2008; Scott et al., 2014). Direct evidence for hunting of proboscideans is found farther east and north in the Upper Palaeolithic, in areas of Eastern Europe and Siberia (e.g., Zenin et al., 2003; Nuzhny et al., 2014; Sinitsyn et al., 2019; Wojtal et al., 2019). This pattern continues in the New World. When humans entered the Americas after the Last Glacial Maximum, a temporally brief, but spatially extensive record of exploitation of mammoths, mastodons and gomphotheres is evident in the centuries surrounding 13,000 BP (e.g., Haury, 1953; Haury et al., 1959; Leonhardy and Anderson, 1966; Warnica, 1966; Graham et al., 1981; Frison and Todd, 1986; Nuñez et al., 1994; Haynes and Huckell, 2007; Surovell and Waguespack, 2008; Sanchez et al., 2014; Hannus, 2018; Mothé et al., 2020). This pattern in time and space provides a unifying thread tying together the records of the Old and New Worlds, and suggests that not only did modern humans and our hominin relatives regularly prey upon taxa in the order Proboscidea when the opportunity was available, but also that we very likely contributed to the extinction of these animals over much of their range (Martin, 1984; Martin and Steadman, 1999; Surovell et al., 2005, 2016; but see Grayson and Meltzer, 2002, 2015).

Successful proboscidean hunts present a series of technical and logistical challenges that are largely unique to animals of massive body size (Johnson et al., 1980; Byers and Ugan, 2005; Bird et al., 2013; Lupo and Schmitt, 2016; Agam and Barkai, 2018; Ichikawa, this volume; Lewis, this volume; Yasuoka, this volume). As Surovell and Waguespack (2009) have observed, the difference in body mass between hunter and proboscidean prey can be two orders of magnitude or more. Although humans have developed several solutions to address the large difference in body size between themselves and elephants (Johnson et al., 1980; Agam and Barkai, 2018), other animal species have not. Elephant hunting is almost exclusively a human activity (but see Power and Compion, 2009).

Logistical challenges attend the process of efficiently using the bonanza of food produced by elephant hunts, which produce an estimated 2,000,000 kcal, or enough to feed 30 people for more than a month (Lupo and Schmitt, 2016). Processing a yield this large requires large numbers of people working long hours (Byers and Ugan, 2005; Lupo and Schmitt, 2016). In such cases, it can be more energetically efficient to move a camp to the site of a kill (e.g., Turnbull, 1962; Bailey, 1989; Fisher, 1992, 1993; Duffy, 1995; Ichikawa, this volume), as opposed to transporting the kill back to camp. Successful elephant hunts thus present one case in which the human tendency for central place foraging can break down, and human mobility patterns mimic those of other large predators where consumers move to kills.

Direct evidence for humans overcoming the technical challenge of proboscidean hunting is sometimes found in the archaeological record, but archaeological evidence for the human solutions to logistical challenges attending proboscidean hunts is less common. Humans answered the technical challenge of proboscidean hunting by producing large, sharp weapons used by groups of hunters, and weapons of this sort are found in proboscidean bone beds throughout the world. In Eurasia, for example, wooden spears and lithic and osseous projectile tips have been recovered from sites containing proboscidean remains (Movius, 1950; Zenin et al., 2003; Nuzhny et al., 2014; Sinitsyn et al., 2019; Wojtal et al., 2019). In North America, kill sites of mammoths, mastodons and gomphotheres are typically found associated with fluted stone projectile points (e.g., Haury, 1953; Haury et al., 1959; Leonhardy and Anderson, 1966; Graham et al., 1981; Frison and Todd, 1986; Haynes and Huckell, 2007; Sanchez et al., 2014; Hannus, 2018) with a few possible

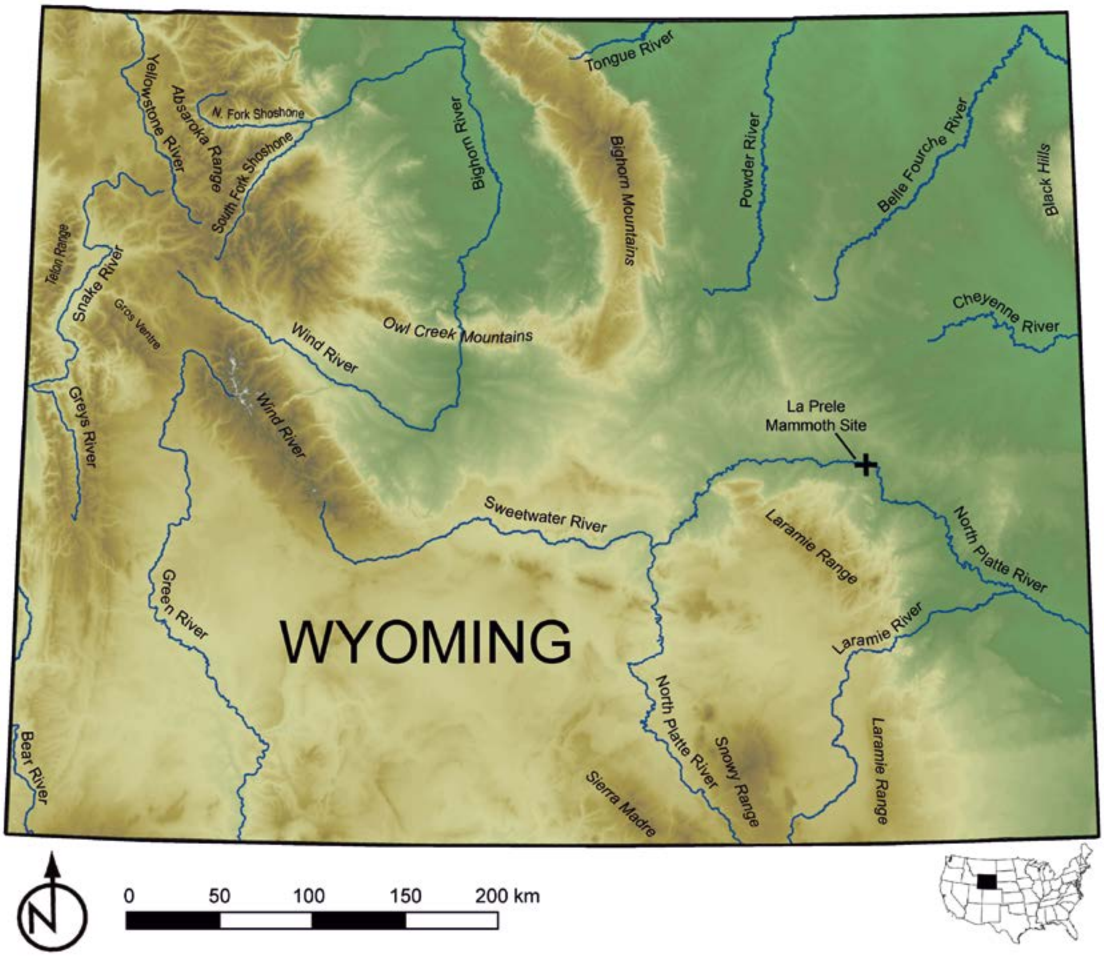

Figure 11.1: Map of the state of Wyoming showing the location of the La Prele Mammoth site relative to major rivers and mountain ranges.

exceptions (Aveleyra Arroyo de Anda and Maldonado-Koerdell, 1953; Gustafson et al., 1979; Waters et al., 2011), and an actualistic study has shown that such weapons are effective at penetrating elephant hide (Frison, 1989).

Archaeological evidence reflecting the human solutions to logistical challenges of elephant hunting and butchery should be present in the campsites associated with hunts, but those locations are seldom found in the archaeological record. Mammoth kill sites are typically just that, their spatial extents limited to the bonebed itself. In North America, there are two sites at which camps have been identified in association with proboscidean kills. At the Murray Springs site in southeastern Arizona (U.S.A.), a camp area was found more than 50 m away from the location of a mammoth kill (Haynes and Huckell, 2007). A similar situation exists at Fin del Mundo in western Sonora (Mexico), where a Clovis camp area occurs more than 500 m away from a Clovis gomphothere (*Cuvieronius*) kill locality (Sanchez, 2010; Sanchez et al., 2014).

In this paper, we introduce a third Palaeoindian site where proboscidean remains were found associated with a short-term camp, the La Prele Mammoth site in Converse County, Wyoming. This site was once largely dismissed by archaeologists as insignificant (Byers, 2002; Grayson and Meltzer, 2002; Cannon and Meltzer, 2004), but recent investigations have shown that it contains what is very likely a mammoth kill area associated with a camp space. Herein, we present a summary of the findings and major insights from the first five seasons of excavations (1987, 2014–2017).

Figure 11.2: Aerial photograph of the La Prele Mammoth site (dashed line) looking north. La Prele Creek is the stream in the foreground, and the valley of the North Platte River can be seen toward the top of the image.

11.2 SITE SETTING AND HISTORY OF INVESTIGATIONS

The La Prele Mammoth site was discovered in 1986 when two residents of Douglas, Wyoming, Bill Hinrichs and Mike Earnst, found mammoth bones in a cut bank of La Prele Creek (Fig. 11.1). At a large scale, the location of the site is quite understandable. The site occurs very close to a major pathway through the Rocky Mountains, the historic route of the Oregon Trail, which followed the North Platte to the Sweetwater River, leading to South Pass, a gap between the Southern and Central Rocky Mountains. La Prele Creek is a tributary of the North Platte, and the site sits 1.6 km upstream of their confluence. Not only did the Oregon Trail pass through the area, but so did the Bozeman Trail, and the Chicago and Northwestern Rail Line. The elevated fill of the now abandoned rail line as well as a wooden bridge built to cross the creek are directly adjacent to the site (Figs. 11.2, 11.3). Interstate 25 follows a similar route, but 6 km to the south. Just over 1 km to the north/northwest was Fort Fetterman, built by the United States Army in 1867 to protect migrants on the Bozeman Trail from hostile Native Americans. The Bozeman trail turned north from the Oregon Trail just to the south of the site. All of this is to say that the site occurs along a major travel corridor that allows low cost movement across the continent. For that reason, the general location of the site is predicted remarkably well by Anderson and Gillam's (2000) least cost pathway analysis of likely routes of New World colonization.

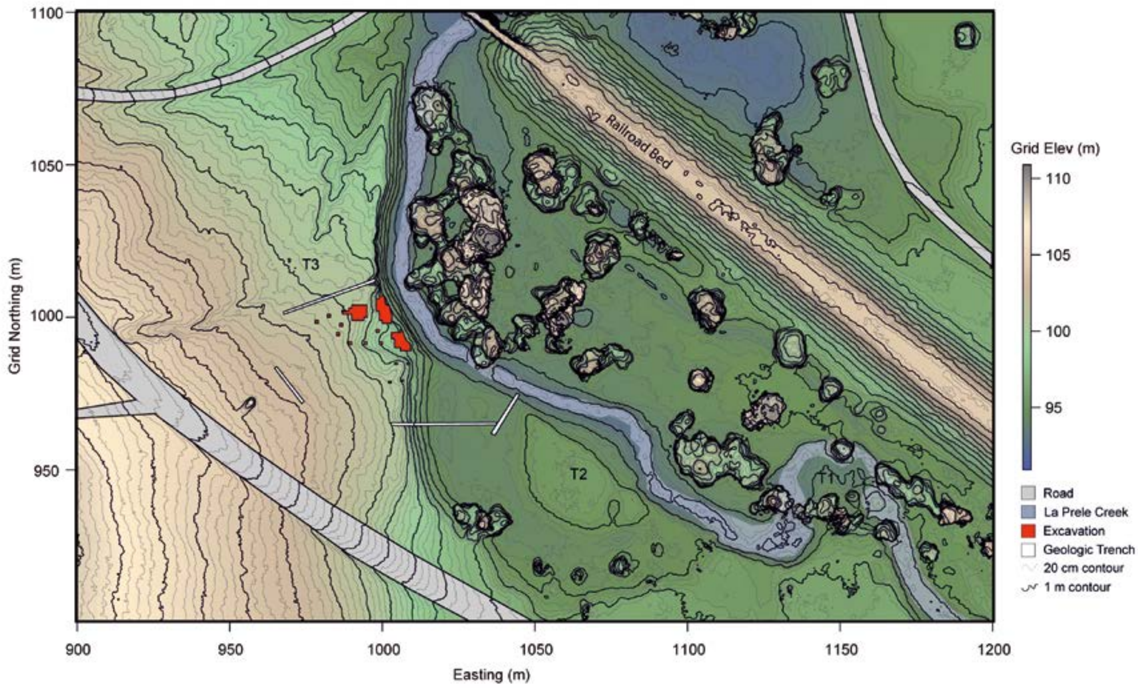

Figure 11.3: Topographic map of the La Prele Mammoth site made using structure from motion photogrammetry from drone aerial photography. Note that vegetation (trees and shrubs) appear as elevated areas within the lower areas of the La Prele valley. The railroad bed of the Chicago and Northwestern Rail Line can be seen running from southeast to northwest.

However, when the site's location is considered at smaller scales, it occurs in a rather unexceptional location. The occupation is buried ~3 m beneath the surface in an alluvial terrace containing a single occupation dating to the Clovis period (13,100 to 12,700 BP), even though some 6,000 years of overlying Late Pleistocene and Holocene deposits have the potential to, but do not contain prehistoric occupations. There are also pre-Clovis sediments at the site, but they are archaeologically sterile. Though the site sits next to a perennial stream and near its confluence with a major river in the area, this specific location was not a place humans used repeatedly. That is likely because the creek itself flows continuously over a distance of more than 40 km out of the Laramie Range before entering the North Platte, which itself flows continuously for hundreds of kilometers out of Colorado, through Wyoming, and into Nebraska, where it joins the Missouri. In other words, there are many good places to live, camp or do other things in the nearby area such that the exact site location was anything but magnetic.

George Frison learned of the discovery of the mammoth remains in the spring of 1987 and excavated a ~3 × 4 m excavation block at the site. At the time, the site was called the Hinrichs Mammoth, named after one of its discoverers. Frison and crew recovered nine flakes, a hammerstone and one unifacial tool in association with much of the axial skeleton of a subadult Columbian mammoth (Fig. 11.4). The head and mandible were not recovered, although tooth enamel plates were found on the actively eroding bank. Parts of the rib cage remained in anatomical position and the mammoth, though somewhat dispersed, was more or less in anatomical order with the anterior skeleton to the south and the posterior to the north. An abstract on the site was published for the 1988 meeting of the American Quaternary Association (Walker et al., 1988), but additional fieldwork was prohibited after a disagreement with the landowner. In 2002, David Byers, then a graduate student at the University of Wyoming, published a taphonomic and geoarchaeological analysis of what was renamed the Fetterman Mammoth us-

Figure 11.4: The mammoth bone bed from the 1987 Frison excavations, looking northwest. The photographic scale is 1 m in length.

ing the assemblage and available field notes (Byers, 2002). Based partly on slight differences in elevation between four mapped artifacts and the reconstructed surface on which the mammoth remains rested, Byers (2002: p. 437) questioned whether the artifacts and bones were truly associated: "The analysis presented here suggests that the lithic artifacts may not be contextually associated with the faunal assemblage. Instead the cultural materials could have been deposited at the site well after the mammoth died…" Because of Byers's (2002) analysis, the site was largely dismissed as insignificant (e.g., Grayson and Meltzer, 2002; Cannon and Meltzer, 2004).

In 2014, we learned that we had an opportunity to return to the site, and we did so with the University of Wyoming Archaeological Field School. Our primary intent was to further examine the question of whether there was a true association between the mammoth and cultural materials. To that end, we excavated nine 1 × 1 m units surrounding Frison's excavations and gave the site its third, and hopefully final name[1], the La Prele Mammoth site. A chance find of a chopper eroding from the cut bank 12 m south of the mammoth suggested the presence of a second activity area in the same stratum as the mammoth. From 2015 through 2017, our excavations expanded to new areas of the site, and as they did, so did our understanding of it. Additional work showed unquestionably that the artifacts and mammoth remains are associated (Mackie et al., 2020). From 1987 to today, our understanding of the site has morphed from a likely mammoth kill site to a possible accidental association of Pleistocene arti-

1 Frison originally named the site after Dr. William Hinrichs, one of the two individuals who discovered it. When a dispute arose with the landowner, it was decided that a more neutral name should be chosen, so the site was deemed "Fetterman", after nearby Fort Fetterman. Fort Fetterman was named after William J. Fetterman, an officer in the United States Army, who was killed in action in 1867 along with 80 individuals under his command in a battle with the Oglala Chief Red Cloud and a huge party of Arapaho, Cheyenne, and Lakota warriors. Because the site had nothing to do with Fetterman (who died more than 200 km away), we renamed the site after the creek on which it sits.

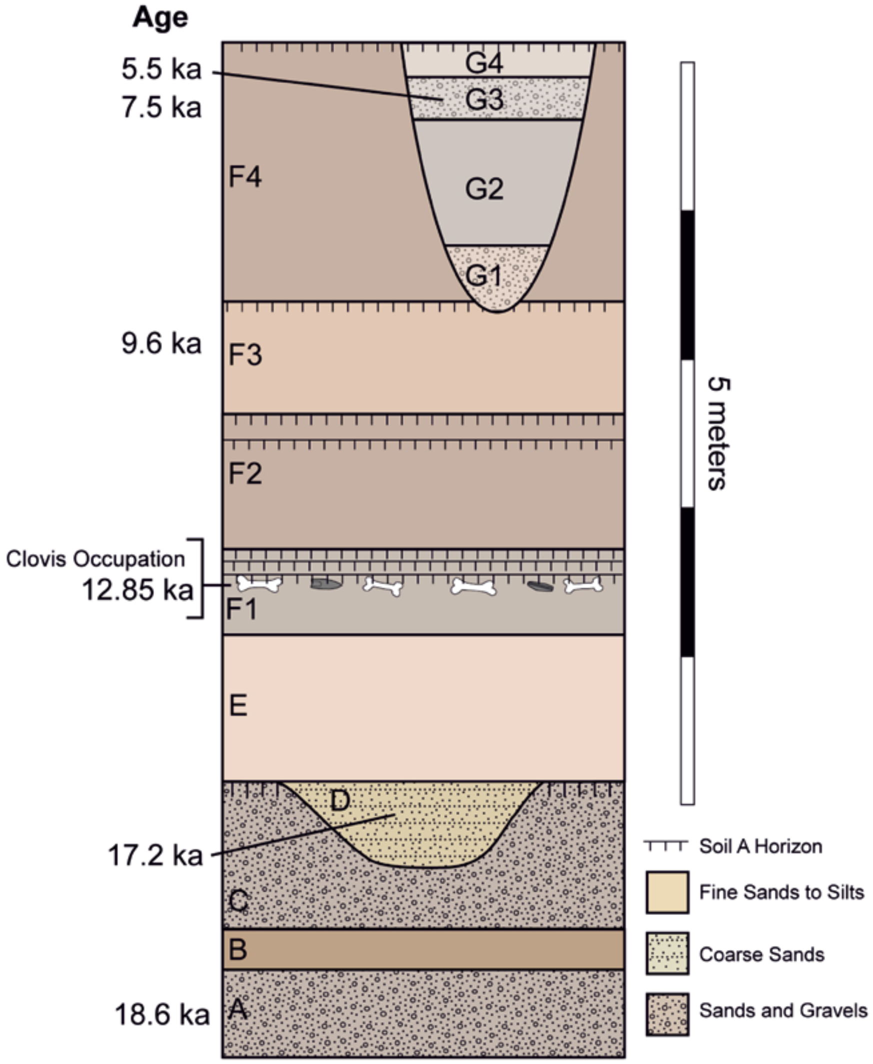

Figure 11.5: Generalized stratigraphic profile of the excavation area.

facts and megafauna to what is almost certainly a mammoth kill and associated campsite preserving multiple hearth-centered activity areas flanking the bonebed.

11.3 GEOLOGY, AGE AND SITE FORMATION

The Clovis occupation is buried approximately 3 m beneath the ground surface in alluvial deposits within the third terrace of the La Prele Creek. A generalized stratigraphic profile of T3 is presented in Figure 11.5. Bedrock in the immediate site area includes sedimentary rocks of the Palaeocene Fort Union Formation, which includes coal beds, and particulate coal makes up a recognizable fraction of the alluvial deposits of La Prele Creek, something which has likely affected some radiocarbon dates at the site. The oldest dates (OSL ages) we have on bedload alluvium (Stratum A) near the base of the third terrace suggest aggradation began over 18,000 years ago, probably around or just after the Last Glacial Maximum. Fine-grained alluvial deposition indicating periodic overbank events begins with Stratum E and continues through Strata F1 to F4, although it is possible that Stratum E represents a local facies of Peoria loess (Mason et al., 2008), whether primary or secondary. A series of buried soils mark brief episodes of stability fol-

Lab Number	Material	Fraction	Taxon	Area	Conv. 14C Age (BP)	Δ13C	1Σ Cal. Age (BP)
CAMS-74661	bone collagen	XAD-gelatin hydrolyzate	mammoth	Block A	8,890 ± 40		10,028 ± 88
CAMS-72350	bone collagen	gelatin	mammoth	Block A	9,060 ± 50		10,223 ± 46
OxA-36958	bone collagen	ultrafiltered collagen	mammoth	Block A	9,320 ± 45	-19.5	10,523 ± 68
AA108894	bone collagen	ultrafiltered collagen	large mammal	Block B	10,654 ± 58	-17.9	12,623 ± 49
UCIAMS-40174	bone collagen	gelatin	mammoth	Block A	10,760 ± 30		12,699 ± 10
AA108895	bone collagen	ultrafiltered collagen	large mammal	Block B	10,776 ± 59	-16.4	12,696 ± 31
UCIAMS-206764	bone collagen	XAD-gelatin hydrolyzate	mammoth	Block A	10,965 ± 30		12,796 ± 36
OxA-X-2736-14	bone collagen	hydroxyproline	mammoth	Block A	11,035 ± 50	-22.7	12,900 ± 68
AA108893	bone collagen	ultrafiltered collagen	mammoth	Block A	11,066 ± 61	-20.3	12,926 ± 74
AA107104	calcined bone	apatite carbonate	unknown	Block B	11,190 ± 130	-23.0	13,036 ± 135
AA109297	calcined bone	apatite carbonate	unknown	Block B	13,997 ± 90	-19.7	16,991 ± 140

Tabelle 11.1: Direct radiocarbon dates on the Clovis occupation at the La Prele Mammoth site.

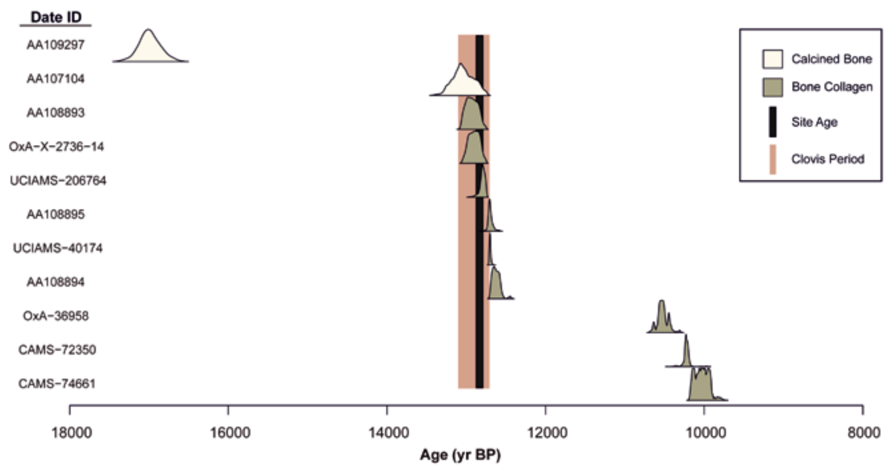

Figure 11.6: Direct dates on the Clovis occupation. All ages are calibrated radiocarbon age distributions. Rectangles indicate the Clovis period (brown) and a 2σ age estimate of the occupation of the site.

lowing flood events. A cut and fill dating to around 5,000 to 6,000 BP removed stratum F4 in places including the site area, after which the stream incised downward leaving the T3 surface on valley margins. Aggradation in the valley appears to have not occurred again until sometime after 3,000 BP.

The Clovis occupation occurs within Stratum F1. In most of our excavation areas, the archaeology sits at the base of a heavily bioturbated and thick mollic A-horizon that in other parts of the site separates into two or three thin A-horizons (Fig. 11.5). The mammoth remains themselves are heavily weathered on the upper surfaces (Byers, 2002; Fig. 11.4), suggesting they sat on the surface probably for a number of years prior to being buried by a few small flood events. The formation of these palaeosols post-date the Clovis occupation by decades to a few centuries. Intensive bioturbation coupled with a robust microfauna record that includes rodents, birds and gastropods, suggest that like today a rich riparian zone occurred on the floodplain of La Prele Creek in the area in the terminal Pleistocene (Fig. 11.2). Bioturbation caused significant upward and downward dispersal of cultural materials (Mackie, 2019; Mackie et al., 2020), which explains Byers's (2002) finding that a few of artifacts recovered in early excavations were found at slightly higher level than the mammoth bone.

We have produced more than 50 radiocarbon and OSL dates from the site area (Mackie et al., 2020), but for the purpose of this paper, we only present those most relevant to estimating the age of the occupation. A total of eleven radiocarbon dates have been produced on mammoth and other large mammal bone collagen or calcined bone from the site (Table 11.1, Fig. 11.6). Initial dates produced on collagen from mammoth bone (Byers, 2002) were anomalously young and post-dated mammoth extinction in North America by more than 2,000 years. These are not the only anomalous dates on the site, however. More recent dating efforts have also produced dates that are both too young and too old for a Clovis site (Waters and Stafford, 2007; Devièse et al., 2018; Mackie et al., 2020). Seven of the radiocarbon ages cluster within a fairly narrow range from ca. 12,600 to 13,000 BP. Because bone collagen dates when in error are usually too young, we estimate the age of the site using the four oldest ages within this cluster. Those dates form a statistically homogenous grouping and include one date on calcined bone (AA109297, 11,190 ± 130 BP), one on ultrafiltered collagen (AA108893, 11,066 ± 61 BP), two dates from Devièse et al. (2018), a collagen hydroxyproline date (OxA-X-2736-14, 11,035 ± 50 BP) and an XAD hydrolysate collagen date (UCIAMS-206764, 10,965 ± 30 BP). After calibration using the BChron package v. 4.3 (Haslett and Parnell, 2008) for R v. 3.6.2 (R Core Team, 2019) and the IntCal13 calibration curve (Reimer et al., 2013) and averaging using the Long and Rippeteau (1974) method, we estimate the age of the Clovis occupation to be 12,846 ± 29 cal BP.

11.4 SITE DESCRIPTION

Excavations at La Prele between 2014 and 2017 were conducted in three Blocks (A through C) and twelve test units for a total of around 96 m^2 of excavation completed as of 2017. Excavations have sampled an area of 29 m north to south by 29 m east to west, establishing a minimum site area of 530 m^2. Our recent excavations use the grid that Frison established in his test excavations. Post-1987 excavations were completed in 50 × 50 cm quadrants within 1 × 1 m excavation units. We excavated all units in 5 cm arbitrary levels and water-screened all excavated sediments through 1/16 inch (1.6 mm) mesh. Because the chipped stone assemblage is dominated by very small (<5 mm in maximum dimension) flakes, most artifacts are found in the screen. Screens are picked in the field and again in the lab. Lab picking of screen matrix is ongoing, so artifact counts presented are preliminary. An overview map of excavations is presented in Figure 11.7, and photographs of artifacts are shown in Figure 11.8.

11.4.1. BLOCK A

Block A contains direct evidence of mammoth hunting[2] by Clovis foragers, including the partial remains of a single subadult Columbian mammoth and associated stone artifacts. The mammoth bonebed primarily contains the ribs and vertebrae of the axial skeleton, but also contains small

2 We acknowledge the possibility that the mammoth was scavenged but consider it much less likely than hunting.

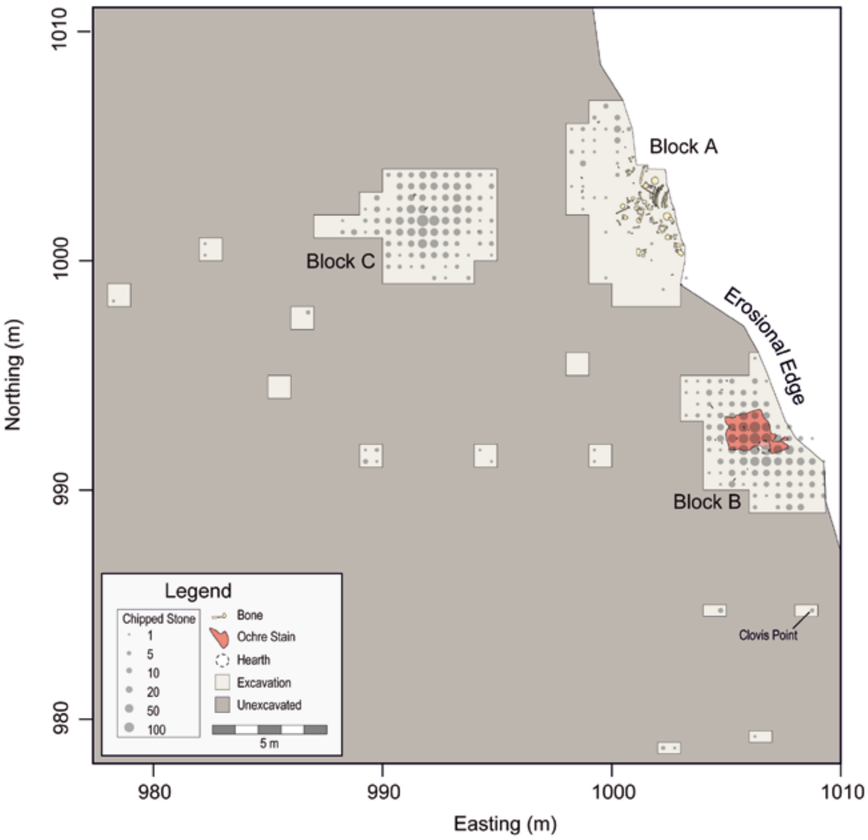

Figure 11.7: Plan map of excavations the La Prele Mammoth site showing major excavation areas, features, large pieces of mapped bone and chipped stone artifact counts.

portions of both the anterior and posterior appendicular skeleton, including a scapula, phalanx and at least one as yet unidentified appendicular element (Byers, 2002). The eastern margin of Block A is truncated by erosion caused by La Prele Creek, which likely removed most appendicular elements and the cranium in the recent past. Sided elements present in the bonebed (i.e., ribs and scapula) are almost invariably from the right side of the skeleton, and the skeleton is loosely arranged in anatomical position with the cranial portion facing the south-southeast and caudal portion facing the north-northwest. Because it remains mostly in anatomical order, the mammoth likely has moved little from its place of death. Given depositional and weathering evidence that the skeleton was exposed for some time prior to burial, the left side of the skeleton was most likely removed due to post-depositional processes such as erosion, weathering, or human or carnivore transport, while the right side was buried prior to disturbance.

Mammoth remains are directly associated with a sparse chipped stone flake scatter not exceeding 32 flakes per m^2, a unifacially-retouched flake tool (Fig. 11.8d) and a hammerstone. Flake raw materials subsume a modest variety of quartzites and cherts derived from at least two source areas, including the Hartville Uplift region of eastern Wyoming, around 80 km southeast of La Prele, and areas in western or southwestern Wyoming in which cherts of the Green River Formation crop out, at least 250 km west and/or southwest of La Prele. The single flake tool is unifacially retouched along one lateral margin and resembles cherts derived from the Eocene Green River Formation. The hammerstone is a small river cobble that has one flake removal on its end but otherwise lacks signs of battering. As a large cobble-sized clast, it was out of place in otherwise fine-grained site matrix. Flakes are relatively abundant in the northern portion of Block A, around the posterior portion of the mammoth

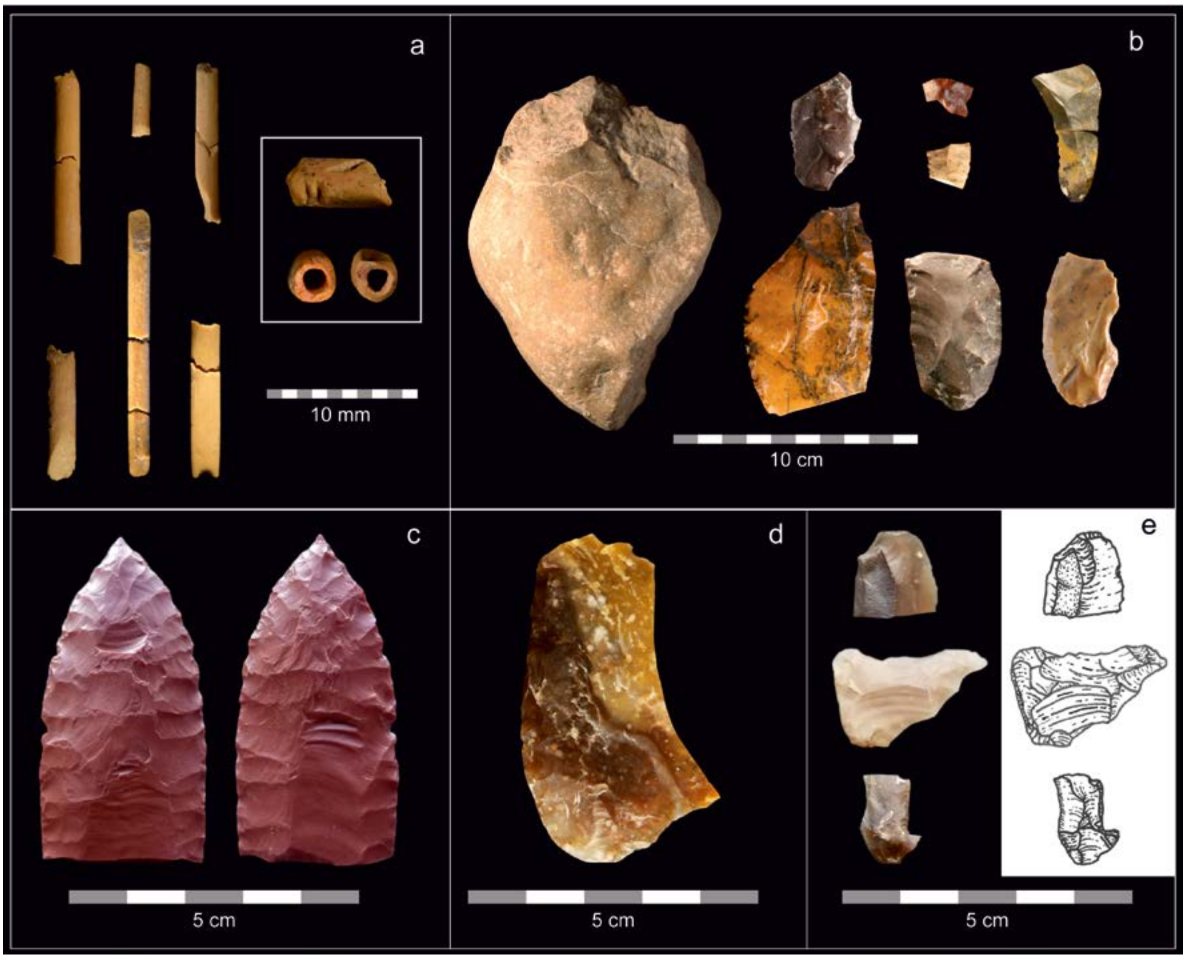

Figure 11.8: Tools from the La Prele Mammoth site including **(a)** bone needles and bead from Block B, **(b)** the chopper and flake tools from Block B, **(c)** Clovis point from a test unit, **(d)** flake tool from the mammoth bonebed in Block A, and **(e)** tools from Block C.

remains. Burned flakes (i.e., crazed and potlidded) in the northern portion of Block A suggest the presence of a controlled fire, but no hearth was discerned during excavation.

11.4.2. BLOCK B

Block B contains a hearth-centered activity area that may have incorporated a dwelling whose center is located around 10 m south-southeast of the Block A mammoth (Mackie et al., in press). Block B contains at least three bone needles, a bone bead, eight stone tools, more than 1,000 flakes, large mammal bone, and a red ocher stain. Block B flakes reach a maximum density of around 300 flakes per m^2 near the center of the block. There was no evidence observed during excavations for a hearth nor a dwelling, but the spatial distribution of flakes, bone and ocher in Block B was used by Mackie et al. (in press) as a means of estimating the location of a hearth-centered dwelling. The structure likely measured around 3 m in diameter and the northeastern one-third was truncated by erosion. A 3.2 m^2 red ocher stain subsumes the northwest portion of the dwelling (Fig. 11.7), extending from the edge of the hearth to the northwest edge of the dwelling. Nodules of red ocher extend beyond the margins of stained sediment and were recovered in large numbers from all areas of Block B. The dwelling contains fragments of at least three very thin bone needles, typical of those of the Palaeoindian period (Frison and Craig, 1982; Lyman, 2015; d'Errico et al., 2018) and an incised bone bead derived from an unknown species. The needles and bead represent some of the earliest dated examples of these objects from North America (Holliday and Killick, 2013; Osborn, 2014; Lyman, 2015).

Block B contains seven chipped stone flake tools and a large, expediently-produced cobble chopper. Chipped stone tools exhibit a wide variety of edge modifications, including graver tips, concave spoke-shave/notch margins, denticulated margins, long steeply-retouched unifacial margins and the steeply-retouched "bit" end of at least one endscraper (Fig. 11.8). The cobble chopper is a large, locally-procured cobble with three large flakes taken off one end to form a sharp chopping tool. All identified chipped stone raw materials from Block B (except the cobble chopper) are cherts and quartzites derived from the Hartville Uplift around 80 km southeast of La Prele. The red ocher from Block B was also geochemically-sourced to the Hartville Uplift (Zarzycka et al., 2019), rounding out a cohesive raw material procurement pattern for Block B.

Block B contains a small number of fragmented large mammal bones, tentatively identified through ancient DNA analysis as *Bison* sp. (Mackie, in press). Although most large specimens are unidentifiable long bone fragments, comparative analysis indicates the presence of non-mammoth archaeofaunal remains. In total, three rib fragments were identified with one rib neck present, two vertebral spinous processes, a radius, a metapodial and a molar. Only the enamel from Block B can be definitively assigned to *Bison* sp., as can a near complete lumbar vertebra from Block C. Although the remaining elements are likely bison, the degree of weathering and fragmentation cannot exclude other similarly sized large mammals (e.g., perissodactyls or artiodactyls). Impact-fractured long bone fragments alongside small pieces of calcined and carbonized bone indicate subsistence use of at least one large mammal species other than mammoth.

11.4.3. BLOCK C

Block C incorporates a circular, approximately 5 m wide, hearth-centered activity area whose center is located around 12 m west of the Block A mammoth. Block C contains the densest concentration of artifacts thus far discovered at La Prele, with flake densities reaching around 440 per m^2. Comparable to Block B, no hearth was observed during excavation of Block C, but clustering of burned artifacts near the dense center of the flake scatter strongly suggests the presence of a phantom or invisible hearth (Sergant et al., 2006; Alperson-Afil et al., 2009). Block C tools include four use-retouched flake tools, which are generally more expedient in comparison to those recovered from Blocks A and B (Fig. 11.8e); they are also small in size, like those described by Marinelli et al. (this volume). Most Block C chipped stone is a translucent, brown chalcedony most likely derived from the Green River Formation. In support of a Green River Formation provenance, a single oolitic chert flake from Block C is characteristic of a source area in the area of Farson, Wyoming. Block C contains a small number of faunal specimens, the most notable of which are a mostly complete *Bison* sp. fourth lumbar vertebra and a large long bone fragment. Burned bone fragments are also present.

11.4.4. TEST UNITS

Eight 1 × 1 m and four 0.5 × 1 m test units delineate the known extent of La Prele toward the southwest and suggest the presence of additional artifact clusters comparable to Blocks B and C. Ten of twelve test units yielded chipped stone artifacts. Chipped stone flakes exist at a maximum density of 12 per m^2 in a 1 × 1 m test unit around 13 m west of Block B and 7 m south of Block C. Test unit raw materials are largely derived from Hartville Uplift chert and quartzite, but a test unit 4 m west of Block C contains Green River Formation chert and the furthest west test unit contains both Green River Formation chert and a single quartzite flake. The most significant test unit artifact is the distal end of a Clovis point discovered 4 m south of Block B (location shown on Figure 11.3). The Clovis point is fluted on both faces and contains a small amount of grinding on one edge in preparation for hafting (Fig. 11.8c). The point is produced from a homogenous opaque red chert, potentially from the Phosphoria or Goose Egg Formations, which crops out widely in north-central Wyoming, anywhere between 100 and 300 km from La Prele.

11.5 SUMMARY AND CONCLUSIONS

Over the 30 years of investigations at La Prele, each year of excavation yields surprising new empirical insights. Frison was surprised in 1987 when his excavations showed that what first appeared to be palaeontological remains of a mammoth were associated with chipped stone artifacts. Our renewed investigations in 2014 yielded the surprising finding that the site extends well beyond the bonebed, as evidenced by the presence of a chopper in stratigraphic association with the mammoth, a relatively common tool type found in Clovis mammoth sites (Haury et al., 1959; Frison and Todd, 1986; Haynes and Huckell, 2007). A large, red ocher stain with associated domestic artifacts was yet another surprise and may be unique to La Prele in comparison to other mammoth kill sites in the Palaeoindian record and to other proboscidean kill sites globally. The realization that clusters of artifacts surrounded the mammoth surprised us yet again, opening the door to the possibility that each cluster represents a distinct household unit.

Although our investigations at La Prele have been surprising at every turn, the cumulative results are exactly what one might expect of a highly mobile, mammoth-hunting population (Kelly and Todd, 1988) traversing the North American continent along major least-cost pathways (Anderson and Gillam, 2000) during the earliest period of New World colonization. La Prele provides an uncommon glimpse into the way Clovis foragers solved the logistical challenges of mammoth hunting in the New World, and it fits many of the traditional ideas of Clovis adaptations (e.g., Haynes, 1966, 1969; Martin, 1973; Kelly and Todd, 1988).

As expected of successful proboscidean hunts (e.g., Turnbull, 1962; Bailey, 1989; Fisher, 1993; Duffy, 1995; Ichikawa, this volume), Clovis foragers appear to have moved their campsites to the kill in order to butcher the mammoth for its meat and fat, solving the logistical challenge of efficiently processing a proboscidean kill. At least one of the multiple clusters surrounding the La Prele mammoth appears to represent the remnant of a hearth-centered, ephemeral dwelling. Clovis foragers also appear to have maintained a large network of social ties to facilitate mammoth hunting, meeting the logistical challenge of amassing enough people to stage a successful hunt. Raw materials from La Prele span at least 350 km, suggesting social ties across distances spanning most of the state of Wyoming. Further, Clovis foragers at La Prele maintained a highly formal chipped stone toolkit and practiced extremely conservative stone tool use on site, a solution to the challenge of maintaining a lithic toolkit while living a highly mobile existence (Meltzer, 1984; Kelly and Todd, 1988; Goodyear, 1989; Amick, 1996; Surovell, 2000, 2009). Although flakes are abundant, they rarely exceed 1 cm in length, and are indicative of resharpening formal tools.

Beyond addressing some long-standing questions regarding the logistical challenges of mammoth hunting in the New World, we are excited by the prospect of La Prele providing a window into the social challenges of mammoth hunting, the largest among which might have been dividing hunt spoils among participants. Such sudden and enormous influxes of caloric wealth can be leveraged by hunters to gain social prestige, but they can also be the source of conflict when the spoils of a hunt are to be divvied up (Hawkes, 1991; Hawkes and Bliege Bird, 2002; Lewis, 2002; Bird et al., 2013; Lupo and Schmitt, 2016; Yasuoka, this volume). Given that raw materials are segregated by artifact cluster at La Prele, we are optimistic that further excavations of artifact clusters will identify inter-cluster differences in tool constituents, faunal remains, and other characteristics that might provide a window into the social dynamics at play during the La Prele mammoth hunt nearly 13,000 years ago.

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