
To haft and to hold: Evidence for the hafting of Clovis fluted points

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Abstract:

Clovis fluted points vary considerably in technology and morphology, but also share a set of attributes, the most diagnostic of which are the flute scars, the remnants of the flake removals from the basal region that travelled up towards the tip. Fluting on Clovis and Clovis-like points generally extends no further than a third of the way up the face of the point. Finished points are usually ground smooth along the base and lower edges, suggesting facilitation of the hafting (attachment) to a wooden shaft or handle by way of an ivory or bone socket. The points may have been hafted directly to a main-shaft and used as a thrusting spear during close encounter attacks, or in the hand as knife or butchery tool. Alternatively, an intermediary shaft, or foreshaft may have been used to secure the point. The suggestion of foreshafts being used by Clovis hunters received support after the discovery of bone rods in association with mammoth remains and Clovis points at the type site at Blackwater Draw, New Mexico in 1936. Several other Clovis-aged sites across North America have yielded ivory and beveled rods that have also been associated with foreshafts and the hafting of Clovis points. Scratches that are present on a couple of Clovis points made on varieties of obsidian, have been identified as being “hafting abrasion” evidence, this roughening of the surface would have helped in securing the point into the shaft or socket. In one example from the Hoyt site in Oregon, remains of a “pitch” or hafting adhesive was discovered in the abrasions in the fluted area of the point.

Keywords: Paleoindian; Clovis; fluted points; hafting; osseous tools

1. Introduction

Clovis fluted points (see Howard 1990) are found across all of contiguous North America and are now generally accepted as dating to *ca.* 11,500 ¹⁴C years BP (*e.g.*, Waters & Stafford 2007, but see Haynes *et al.* 2007). Two primary technologies dominated Clovis stone tool flaking, bifacial and blade (Collins 1999a). Bifacial flaking was used to produce the large flake blanks or preforms on which fluted points were produced, and it is these points that will be the main focus of this paper. The other technology produced long regular pieces, known as blades, which were shaped into various tool forms such as scrapers, burins, graters and other small unifacial tools. There is a considerable variation within Clovis-aged fluted points (see Buchanan *et al.* 2014; Miller *et al.* 2013), and research into the causes of the variation and the



morphological forms play an important role in contemporary studies in early Paleoindian archaeology (e.g., Amick 2017; Buchanan & Hamilton 2009; Prascianus 2011). Understanding variability in Clovis point shape and size not only assists in establishing material culture that is vital for archaeological studies (see Buchanan *et al.* 2014; Miller *et al.* 2013), but can also reveal Clovis landscapes, hunting practices and social behaviour (see Buchanan *et al.* 2011; Morrow & Morrow 1999). One particular suggestion for Clovis point variability concerns how they were affected by the hafting process (Buchanan *et al.* 2012). Hafting Clovis points could influence the size and shape of the basal section, whilst not affecting the blade section (Judge 1973; Keeley 1982; Musil 1988), the basal area being the most diagnostic section of the point. A recent study of Clovis and Clovis-like points carried out on basal morphology and basal concavity morphometrics, supported this hypothesis (Slade 2018). It was during research on certain Clovis fluted point specimens for that study, that evidence for hafting was recognised on certain specimens and led to a presentation at the conference that in turn led to the inclusion of this paper in this volume (Slade 2016). This paper will look at the material evidence for Clovis hafting that is available; this includes examples of Clovis fluted points that display evidence of hafting and bone and ivory artefacts associated with the hafting process, the various sites and locations where this evidence is present, and as part of the current study, whether there is a suggestion that hafting does affect the point's morphology.

2. Osseous rods as Clovis foreshafts

The exact way in which Clovis points were employed has been the subject of much discussion almost since the first discoveries were made at Blackwater Draw, Locality No. 1. in a gravel pit in New Mexico, back in the 1930s (Hester 1972) and Clovis was recognised (e.g., Frison 1991a). The points may have been hafted directly to a wooden main-shaft and used as thrusting weapons at close quarters. Alternatively, an intermediate shaft, or foreshaft may have been used to secure the point, whilst the opposite end would have either been spliced onto or inserted into the main-shaft (e.g., Lahren & Bonnicksen 1974; Stanford 1996), and used as a projectile weapon, such as an atlatl, allowing attack from a safe distance. Both of these methods were possibly available to the Clovis hunters and used in a hunting situation (Frison 1991a). Another theory was put forward based on the assumption that bi-beveled rods were indeed foreshafts (Pearson 1999, but see Lyman & O'Brien 1999). It proposed combining two bi-beveled rods on their ventral sides to form a clothes peg-like foreshaft, allowing two 'v' shaped openings permitting the insertion of a Clovis point and a main shaft. With a Clovis point securely attached to the composite foreshaft, it becomes an efficient hand-held thrusting weapon or spear-like cutting tool. The strength of this proposal is that it links each characteristic of the bi-beveled rods to a specific purpose and to function as a whole. The other two ideas rely on pieces or sections of the composite tool, that do not appear in the archaeological record (*i.e.*, wooden or bone splints, antler bits, foreshaft sockets. *etc.*). However, an antler artefact from an Indiana peat bog was sent to the Smithsonian Institution for identification (Stanford 1996: 45) and was recognised as being a possible foreshaft socket, and would fit perfectly on a single-beveled osseous rod, such as the examples from the Anzick site in Montana (Wilke *et al.* 1991). Although the AMS date taken from a portion of extracted collagen postdates Clovis, the hafting technology of which it may be part of may well resemble that employed during Clovis times (Stanford 1996: 46).

The discovery in 1936 at the Blackwater Draw site of two cylindrical bone rods in direct association with mammoth bones and fluted points, strengthened the suggestion of a foreshaft and evidence of hafting (Cotter 1937). Cotter proposed that that the rods, with either one or both ends beveled, served as the foreshafts on Clovis spears. The suggestion was further

advanced through the discovery of more examples at a site near Wilsal, Montana in 1968, now known as the Anzick site (Taylor 1969), and the reconstruction models proposed by Lahren & Bonnichsen (1974). Known examples of these osseous rods, and their possible foreshaft association, come from other Clovis-aged locations across North America; most notably the Sheaman, in Wyoming (Frison 1982), East Wenatchee, in Washington (Gramly 1993), and Aucilla River sites in Florida (Dunbar & Webb 1996), and from various site types which include caches, campsites and kill sites (Table 1). These tools are the most common non-lithic artefacts found in the Clovis archaeological record, but vary in size and shape. Some rods are beveled at only one end, some at both, while others are beveled at one end and the other pointed (Figure 1). Some specimens are very long and thin, others are shorter and fatter (see Lyman *et al.* 1998). Since the discoveries of the osseous rods, the idea of them as foreshafts has never seriously been challenged. However, some researchers have questioned their description, and suggested that the rods were commonly and erroneously referred to as “foreshafts” (*e.g.*, Hemmings 2004).

Several alternative ideas of their function have been put forward (see Boldurian & Cotter 1999; Bradley 1995; Pearson 1999). It was suggested that they were used as projectile points (*e.g.*, Frison & Stanford 1982; Jenks & Simpson 1941), as tip breaks on some of the examples have been found in kill sites, in direct association with mammoth bones, and also in campsites (Bradley 1995). Wilke *et al.* (1991) put forth the idea that the bone rods from Anzick, Montana, were handles for pressure flakers, while Taylor (1969) originally suggested the Anzick specimens were fleshing tools. Another idea was that they were used as pry bars: a bone crowbar used in mega fauna butchery (*e.g.*, Saunders & Daeschler 1994). Another theory, developed from the East Wenatchee specimens, was that they served as shoes for the underside of sled runners (Gramly 1993), and Bradley (1995) suggested that the rods from East Wenatchee may have been ceremonial staffs and held some spiritual significance. These latter two suggestions are not supported by many Paleoindian specialists, and so the most widely accepted hypothesis is that of Cotter's in 1937 (Lyman *et al.* 1998; Pearson 1999; Stanford 1991).

An interesting find, and currently the only one its kind from a Clovis context, is a bone tool discovered at the Murray Springs site in Arizona (Haynes & Hemmings 1968). The shape and structure of the tool appears to be well suited for the purpose of straightening wooden shafts. Experimentation with casts of the bone tool indicate that it would be highly effective for straightening shafts (Haynes & Hemmings 1968: 187).

3. The fluted point evidence

Several of the osseous rods display evidence of criss-crossed grooves or cross-hatching on the beveled ends (Haynes 1982: 390). Roughening the surface like this would increase friction with the adjoining, opposing bevel that would strengthen and make the tool more effective as the binding would have something to grip onto, and if covered with a resin-like pitch acting as an adhesive, the cross-hatching on the beveled ends of the rods would aid the securing of the flat fluted area of the point to the foreshaft (Lahren & Bonnichsen 1974: 149). At least one of the rods from the Anzick site have remains of a black substance present in the cross-hatching on the beveled ends; this material is believed to be an adhesive pitch (Wilke *et al.* 1991: 258). On one of the rods, cat #88.08.10 (Wilke *et al.* 1991: 260), incised lines occur at right angles on the back of the beveled surface, that suggests the incisions were made to prevent slippage of the binding, and on another, cat #88.68.13 (Wilke *et al.* 1991: 261), the short diagonal cuts to the side of the bevel could have functioned as slots where traces of a pitch were found, used as a binding agent (Lahren & Bonnichsen 1974). For the purpose of this paper the use of the term “pitch”, used as a synonym to describe a tree resin and other

materials that could have been used as an adhesive in the hafting process (see Frison 1989: 770; 1991a: 107), will now be just referred to as an adhesive.



Figure 1. One of the Clovis osseous rods from the East Wennatchee cache that might be a foreshaft which Clovis fluted points were hafted to (after Gramly 1993). Metrics of the rod: length: 26.3 cm; width: 2.4 cm; thickness: 1.8 cm; weight: 75.1 g.

Table 1. Clovis or Clovis-era sites where bone or ivory rods have been found (after Haynes 2002).

Location and site type	Description and quantity	Associations	Primary source
Anzick, Montana cache	11 bone rods (2 complete, 4 beveled ends, 5 midsections, some display a resin or mastic substance)	8 fluted points, 85 other lithics	Lahren & Bonnicksen 1974; Jones & Bonnicksen 1994
Aucilla River sites, Florida campsites or kill	33 ivory rods	possible fluted points and other lithics	Dunbar & Webb 1996
Blackwater Draw, Locality No. 1, New Mexico kill camp	4 bone rods (1 complete, 3 fragmentary)	fluted points, other lithics, and faunal remains	Cotter 1937; Boldurian & Cotter 1999
Broken Mammoth, Alaska campsites and kill	1 ivory rod	lithics (mammoth possibly much older than the lithics)	Yesner 1994
Drake, Colorado cache	1 ivory rod (possibly)	13 fluted points	Stanford & Jodry 1988
East Wenatchee, Washington cache	13 bone rods (a possible 14 th found in fragments in a separate carnivore scatter). 2 of the rods are decorated	14 fluted points, 15 bifaces	Gramly 1991; 1993
Gault, Texas campsites	1 bone tool (possible bone rod)	fluted points, other lithics, and faunal remains	Waters <i>et al.</i> 2011
Goose Lake, California campsites	6 bone rods		Riddell 1973
Klamath Lake, Oregon campsites	2 bone rods		Cressman 1941; 1956
Murray Springs, Arizona campsites	1 bone rod, shaft wrench (unlike any other specimen), used to straighten foreshafts	fluted points, other lithics, and faunal remains	Haynes & Hemmings 1968
Grenfel, Saskatchewan, Canada isolate	1 bone rod	no known associations	Wilmeth 1968
Sheaman, Wyoming campsites	1 ivory rod	1 fluted point, other lithics	Frison 1982; Sellet 2015
Sheriden Cave, Ohio campsites	1 bone rod	non-fluted point, other lithics	Tankersley 1997
Wizards Beach, Pyramid Lake, Nevada campsites	1 ivory artefact (possibly a point and not a rod) and barbed, 11 bone or antler pieces		Rendall 1966

Traces of an adhesive to bind fluted points to the beveled osseous rods interpreted as foreshaft components, were discovered in scratches on the channel-flake scars of an obsidian Clovis point recovered from the Hoyt site in Oregon. This Clovis point (Figure 2) was the first suggestion of original hafting adhesive preserved on the surface of a point (Rondeau 2009a; 2009b; Tankersley 1994). The Hoyt site is part of a large Clovis workshop which may be part of the same campsite complex that includes the Dietz site (Fagan 1986), which also has specimens of Clovis points that exhibit similar scratches to the fluting area (Rondeau 2008) and had possible evidence of hafting adhesive present. The Hoyt Clovis point was found by an amateur archaeologist, Mr. J. Dyck, who made the point available for study. It is made on an opaque black obsidian, both faces of the point have scratches on the fluted surface. During analysis of the point traces of the resinous material were found, believed to be an amber-like tree resin that was a binding adhesive. (Tankersley 1994, but see Beck 1996; Tankersley 1996). The texture and position of the substance suggested it was a hafting adhesive, an amber-like substance had also been previously reported from the later Paleoindian Folsom site Lindenmeier (Wilmsen & Robert 1978), but should also be disregarded as resembling amber (Beck 1996). The outline of the scratches on the point morphologically and metrically correspond to the dimensions of the beveled ends of the Clovis osseous rods, thus supporting the foreshaft hypothesis further and the possible evidence for hafting (Tankersley 1994: 123).



Figure 2. One of the Clovis fluted points from the Hoyt site. This specimen was the first to display evidence of hafting adhesive in the scratches or striations on the fluted areas of both faces (image after Slade 2016). The scale bar is 2cm wide (in 1 cm segments).

The scratches on the fluted surface of Clovis points are found most commonly on specimens made from obsidian, and these seem to be limited to the far west (see Frison 1991a: 44; Harrington 1948; Wormington 1957: 61;). Examples have been recorded in Oregon, California, Nevada, and Utah (Table 2). However, some obsidian Clovis points that display these flute scratches have been recorded further east (Table 2). One of the best examples being an obsidian point: specimen #107 (Frison & Bradley 1999: 19), from the Fenn cache, somewhere along the borders of Utah, Wyoming and Idaho (Figure 3), and it has been suggested that the purpose of the scratches on this point may have been to enhance the facilitation of the binding of a point to the foreshaft (Frison 1991b: 330). This Clovis point was also reported to have similar traces of a pitch in the striations in the fluted area, similar to those of the Hoyt specimen (Frison & Bradley 1999). Another Clovis fluted point with flute scratches was identified by this author in the Blackwater Draw, New Mexico assemblage (Figure 4) whilst carrying out my research on Clovis fluted point variability (Slade 2010, 2018). The point was discovered in the 1930s by George Roberts and donated to the Colorado Museum of Natural History (now the Denver Museum of Nature and Science) in 1936, although believed to come from the main Blackwater Draw Locality No. 1 site, it is possible that it was collected from one of the nearby blowouts at Blackwater Draw (Holen 2004). I was unable to examine the original, but I did have access to a very good quality epoxy resin cast replica, that had the flute scratches and abrasions present (Slade 2017). The cast was part of the Blackwater Draw Clovis fluted point assemblage, part of the C.V. Haynes Cast Collection, Arizona State Museum, Tucson. I believe that this is the first time the scratches and their association with the points hafting has been reported anywhere. The original specimen is made on an obsidian sourced in Utah but was found in New Mexico (Holen 2004), and it is thought that this is the first instance that the flute scratches on this specimen have been identified. Two other Clovis points that were recognised as having flute scratches and were until now unrecognised can be recorded (Table 2). Both specimens are in private collections but good quality casts have been made and were available to study (Slade 2017). The Utah Clovis fluted point was identified and studied by several Paleoindian specialists whilst in the Smithsonian Institution, but no mention was made of the flute scratches on both faces of the point. The large Clovis fluted point, or possibly a hafted knife, was found only 12 km from the East Wenatchee site in Washington, and was recorded in the publication, but again no mention of the flute scratches and the hafting association was made (Gramly 1993). To date there is only one recorded non-obsidian Clovis point that displays flute scratches (Rondeau & Temple 2010). The specimen is an isolated surface find from the Shell Rock Butte area of Malheur County. It is made on a semi-translucent mottled variety of agate (Rondeau 2009c).

Table 2. Occurrences of Clovis points that display scratches and or abrasions that may indicate evidence to facilitate hafting.

Notes:

1. This Clovis point was discovered in 1986, it is in a private collection and is to date unpublished elsewhere. The point was examined by several Paleoindian archaeologists at the Smithsonian Institution. There is a good quality cast of the point in the University of Southampton (Slade 2016).

2. This specimen was found in New Mexico, but the obsidian was sourced in Utah and the process of scratching the fluted area to facilitate the hafting is believed to have taken place at the source when the point was produced and there is no suggestion that this process took place at Blackwater Draw. * This is the first instance to the authors knowledge that the scratches on these specimens have been reported, and associated with the possible hafting to osseous foreshafts.

Assemblage	Description	Comment	Primary source
Hoyt, Lake County, Oregon	Clovis fluted points made from various unnamed obsidians, campsite assemblage	Pronounced scratches in the fluted areas of one point, and traces of a hafting adhesive on another	Tankersley 1994; but see also Beck 1996; Tankersley 1996
Dietz site vicinity, Lake County, Oregon	Clovis fluted point and several basal sections made on a semi-translucent obsidian from Glass Butte Mountains, surface-collected campsite finds	Pronounced scratches in the fluted area on both faces of the points	Fagan 1986; Rondeau 2008
Shell Rock Butte, Malheur County, Oregon	Clovis fluted basal section made on a semi-translucent banded agate, isolated surface find	Intentional scratches present in the fluted area on both faces	Rondeau 2009c; Rondeau & Temple 2010
Copper Creek, Wallowa County, Oregon	Clovis fluted point made on Gregory Creek obsidian, isolated surface find	Pronounced scratches in the fluted area on both faces	Reid <i>et al.</i> 2008
Seneca, Douglas County, Oregon	Clovis basal section made on Buck Mountain obsidian, surface-collected campsite find	Pronounced scratches in the fluted area on both faces	Ozgun & Fagan 1996
Sheep Mountain, (35HA3667), Harney County, Oregon	Small Clovis fluted point made on Buck Springs obsidian, surface find	Flute scratches present on one face, may be evidence for hafting	O'Grady <i>et al.</i> 2009
Sage Hen Gap, Harney County, Oregon	Several Clovis basal sections made on local obsidian varieties, surface finds	Pronounced flute abrasions present on several of the specimens	Thomas <i>et al.</i> 2011
Borax Lake, Lake County, California	Several Clovis basal sections made on varieties of obsidian; including Borax Lake, campsite	Intentional scratches present in the fluted area on both faces of the points	Harrington 1948; Wormington 1957

Assemblage	Description	Comment	Primary source
CA-SBR-5350, San Bernardino County, California	Fragmentary Clovis fluted point made on Coso Hot Springs obsidian, isolated find	Faint intentional scratches are present on both fluted areas of the point	Sutton & Wilke 1984
Poker Brown, Pershing County, Nevada	Clovis basal section on an unnamed obsidian, no further information	Pronounced scratches in the fluted area on both faces	Rondeau 2006
42BE903, Blaine County, Utah	Clovis basal section made on an unnamed obsidian, surface find	Intentional scratches on both fluted faces	Copeland & Fike 1988
Dugaway Proving Ground, Tooele County, Utah (Note 1)	A large Clovis fluted point made on an unidentified Utah obsidian, isolated surface find	Possibly intentional scratches on one fluted face	Slade 2017
Blackwater Draw, New Mexico - (vicinity of)	Clovis fluted point made on Wild Horse Canyon obsidian from Utah (Note 2), isolated find	Intentional scratches on one fluted face of the point, and possible evidence on the other face*	Holen 2004
Seagull Bay, Power County, Idaho	Clovis fluted point made on Big Southern Butte obsidian from Idaho - no further information	Intentional scratches on one fluted face	Hughes 2008
Heil Pond, Owyhee County, Idaho	Clovis basal section and possibly fluted points surface-collected campsite	Intentional scratches on the fluted area	Reid <i>et al.</i> 2015
Fenn Cache, Idaho, Utah, Wyoming border	Clovis fluted point made on an unnamed obsidian, cache assemblage	Pronounced scratches in the fluted area on both faces and traces of amber residue in the scratches	Frison & Bradley 1999
Badger Mountain, Douglas County, Washington	Large Clovis fluted point, or fluted knife, made on a semi-translucent Rainbow Obsidian, that turns sea green in the light, isolated surface find	Scratches on the surface of the fluted areas on both faces may be evidence for the facilitation of hafting*	Gramly 1993

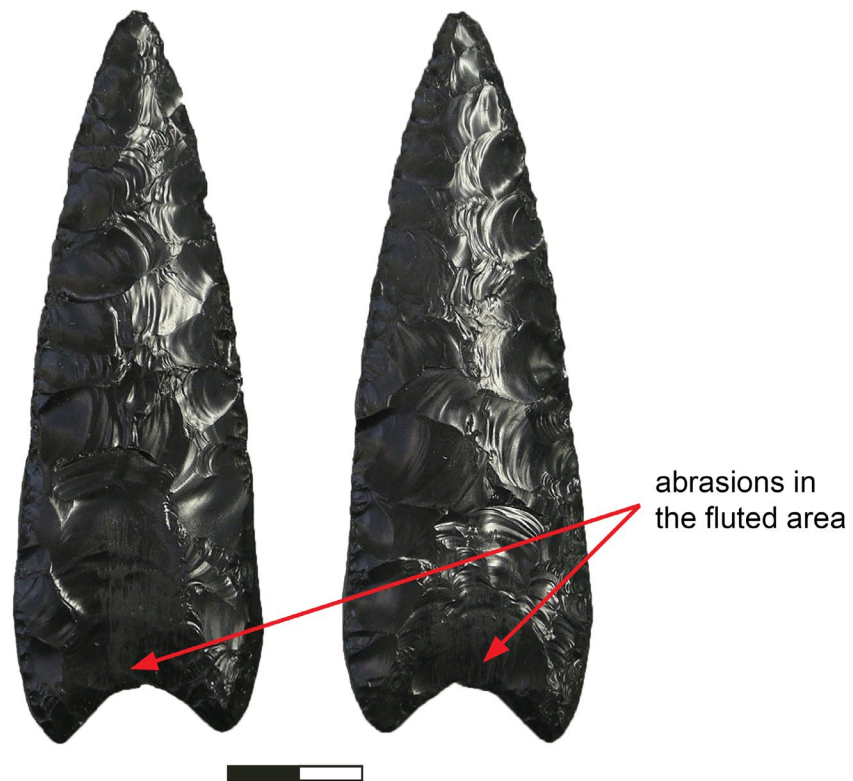


Figure 3. Clovis fluted point from the Fenn cache that has pronounced scratches in the fluted areas on both faces, and may display evidence of an amber mastic (image after Slade 2016). The scale bar is 2cm wide (in 1 cm segments).

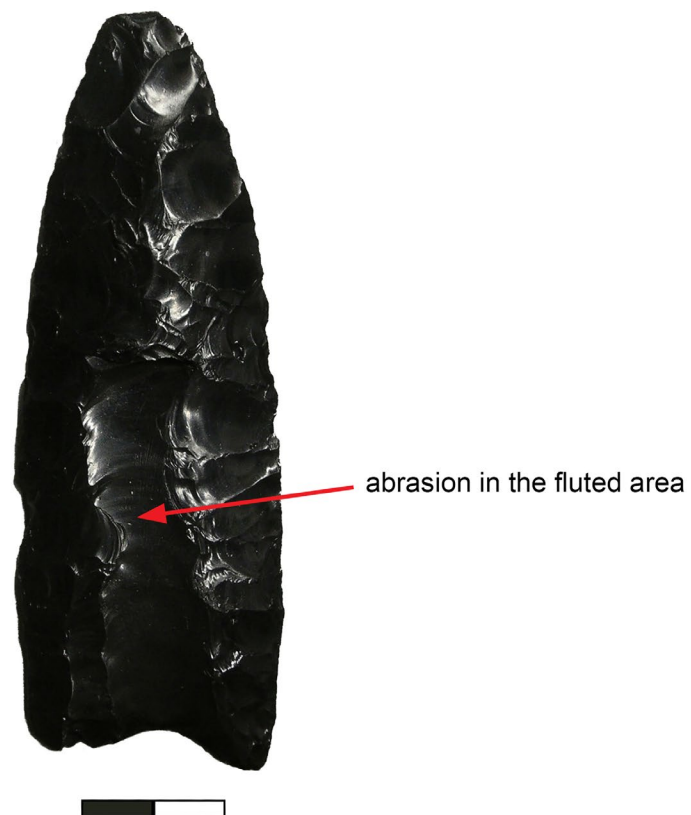


Figure 4. A Clovis fluted point from the Clovis type site at Blackwater Draw Locality No. 1, that displays the scratches in the fluted area which may facilitate hafting to a foreshaft (image after Slade 2016). The scale bar is 2cm wide (in 1 cm segments).

There are three lines of evidence supporting the Clovis point hafting model associated with flute scratches. First, the scratches on the fluted surface of the point form a rectangular pattern that is consistent with the patterns of the bevelled ends of the osseous rods in Clovis (Figure 1). Second, the width of the scratches on the fluted surface compare with the width of the bevelled ends of the rods. And thirdly, the direction of the scratches on the fluted surface of the points are at right angles to the marks on the rods, this is expected if two areas were bound together with an adhesive (Lahren & Bonnichsen 1974; Stanford 1996). Flute scratches have had surprisingly limited attention and the argument of them being associated with the facilitation of hafting remains largely speculative (Rondeau & Temple 2010). When the Borax Lake Clovis-like fluted points were first reported (Harrington 1948), the scratches were noticed, but not elaborated on further and were not associated with the hafting process at the time. It was a few years later that the first reference was made to the scratches on the Californian points (Figure 5) being possible hafting evidence (Wormington 1957: 61). Flute scratches and their purpose were not discussed again until the Dietz site in Oregon was reported (Fagan 1986: 4). Since then, there have several reported cases from further sites in Oregon, Utah, Idaho (Figure 6), California, and Nevada (Table 2). More research needs to be done on the nature and range of flute scratches, and to look at more Clovis and Clovis-like points that are made on obsidian in existing collections, and see if they display any evidence of flute scratches, and or traces of the adhesive pitch. It may also be possible to carry out a study on some non-obsidian Clovis fluted point assemblages to see if the scratches exist on more specimens other than the Shell Rock Butte, Oregon agate specimen (Rondeau 2009c; Rondeau & Temple 2010). It may be, however, that other materials used to produce Clovis points, such as chert and chalcedony produce roughened surfaces when knapped, and it was just not necessary to abrade the fluting areas of the point, as this provided sufficient friction for the hafting process (Tankersley 1994: 122).

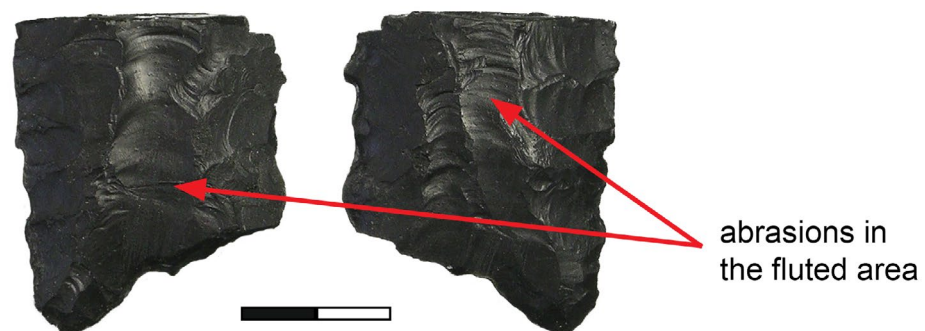


Figure 5. One of several Clovis-like fluted basal sections from the Borax Lake site, that displays the scratches in the fluted area on both faces (image after Slade 2016). The scale bar is 2cm wide (in 1 cm segments).

4. Discussion and concluding remarks

As we have seen since their discovery, the cylindrical osseous tools have been termed as foreshafts (*e.g.*, Cotter 1937; Dunbar 1991; Lahren & Bonnichsen 1974), points (Cotter 1954; Jenks & Simpson 1941), rods (Gramly 1993), pins (Dunbar *et al.* 1989) and wedges used for tightening up loose haft bindings (Lyman *et al.* 1998). The differences in the terminology reflects the issues that Paleoindian archaeologists have had in trying to interpret the functionality of these implements, and there is no reason to limit their function to just one of these possibilities. Although the true function of the bi-beveled rods remain a matter of some debate, researchers recognise the importance of these objects and that they are an important element of the Clovis toolkit (see Boldurian & Cotter 1999; Haynes 2002; Stanford 1991). Several of the osseous rods display evidence of criss-crossed grooves or cross-hatching, as roughening the surface would increase friction with the adjoining, opposing bevel that would

strengthen and make the tool more effective (Haynes 1982: 390). Other engravings found on some specimens are definite distinctive patterns, such as zigzag designs on both sides of an ivory rod from the Aucilla River, Florida (Haynes 1982: 390), and the zipper designs found on some of the East Wenatchee specimens (Gramly 1993).



Figure 6. The Seagull Bay Clovis fluted point that has pronounced scratches in the fluted area on one of its faces (image after Slade 2016). The scale bar is 2cm wide (in 1 cm segments).

Experimental analysis surrounding the feasibility of the hafting procedures has been carried out on Clovis fluted points and beveled rods through replication projects (*e.g.*, Lahren & Bonnichsen 1974). Casts of replica Clovis fluted points were used, along with scale replicas of shafts, wooden and ivory foreshafts, and splints. The wooden splint was made to fit onto the fluted surface of the point, and extended up the foreshaft. Both of the fluted point surfaces were coated with an adhesive, and the beveled ends of the foreshaft were set on the points surfaces (Lahren & Bonnichsen 1974: 149).

The osseous tools of the Upper Palaeolithic in Europe are recognised as projectile point technologies in the Aurignacian that change shape over time (Knecht 1993; Peyrony 1933). The earliest industries are split-based with distinctive haft widths and lengths (Peterkin 1993). Later examples are more simply lozenge-shaped and spindle-shaped, that do not have beveled ends. The earliest beveled-based hafts appear in the Gravettian assemblages (Knecht 1993; Pike-Tay & Bricker 1993). By the time of the Magdalenian in western Europe these implements were numerically very common in the archaeological record and the size ranges are remarkably consistent among the types with various bases (Peterkin 1993). The Clovis-aged specimens from North America although similar, do not include the split-based or lozenge-shaped bases. If the specimens from the Wizards Beach Clovis site in Nevada (Table 1) are made from mammoth ivory and bone, then the ranges of shape and size of the New World osseous tools are conspicuously similar to those from the Old World (see Haynes 2002). Amber or similar fossil resins have been found in eastern Upper Palaeolithic sites (*e.g.*, Soffer 1985), and it seems likely that the use an adhesive can be traced from Clovis sites in North America to the European Upper Palaeolithic, and in doing so, add another shared cultural trait between Clovis and the Old World. The bone shaft straightener, or wrench, from the Murray Springs site has obvious similarities with the “*bâton de commandement*”, or “*bâtons percés*” from the Upper Palaeolithic Gravettian and Magdalénian, such as the examples from the Czech Republic and the Ukraine (see Augusta & Burian 1960;

Boriskovsky 1958). Western European examples are similar in size but vary in shape, and often engraved. These European *bâtons* are generally thought of as shaft straighteners as well as having other uses too (Haynes 2002; Leroi-Gourhan 1957; Oakley 1982).

As yet there is no definite archaeological evidence of whether and how Clovis points were hafted. Perhaps with all the current work being carried out on the submerged sites in the southeast (e.g., Hemmings *et al.* 2004), and the work on the submerged landscapes on the eastern seaboard (e.g., Lowery *et al.* 2010) we might soon have direct evidence of hafting. Different hafting methods and techniques were perhaps employed on Clovis points of various shapes and sizes, and for varying functions (i.e., throwing spears, thrusting weapons, knives *etc.*). Indeed, this could go some way in explaining the variability within Clovis fluted points in North America (but see Buchanan *et al.* 2012).

Extensive evidence for the hafting of Clovis unifacial tools is present in the archaeological record, although it was originally thought that regular hafting by colonising hunter-gatherers and foragers would have decreased their toolkit portability (see Kuhn 1994; Morrow 1996). In the Great Lakes region of the Midcontinent of North America recent research supports the hypothesis of Clovis habitually hafting unifacial tools (Eren 2012). In this case, there is no reason to suggest that Clovis groups from elsewhere across North America, were not hafting Clovis fluted points as well.

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