



Fluted hafted bifaces in the Northeast and Clovis: A North America wide perspective using image analysis

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A B S T R A C T

The degree of variability present in fluted hafted biface morphology across North America is often debated. In this work I use a series of ratio scale linear measurements to examine variability in Early Paleoindian period fluted hafted bifaces from seven different Culture Areas across North America. Instead of analysing the actual artifacts, measurements are taken on high resolution images of the hafted bifaces. I find that the Early Paleoindian period fluted hafted bifaces from the Northeast are significantly different from those found elsewhere in terms of base depth and flute length. These differences have wide reaching implications for large scale studies of Early Paleoindian hafted bifaces.

1. Introduction and background

The style and morphological differences within the Pan-North America assemblage of Clovis and other fluted type hafted bifaces are popular subjects in recent archaeological literature. Archaeologists have debated the origin of the Clovis hafted biface technology (Beck and Jones, 2010; Buchanan and Collard, 2007; Buchanan and Hamilton, 2009; Morrow and Morrow, 1999), discussed the limits of Clovis morphological variation (Smith et al., 2015), debated the effect of the Younger Dryas on fluted hafted biface morphology (Ellis et al., 2011), and attempted to highlight and understand the uneven distribution of Clovis hafted biface technology (Anderson, 1990; Anderson and Faught, 1998; Mason, 1962; Prasciunas, 2011). Others have attempted to build a chronology of fluted hafted bifaces using cladistics (O'Brien et al., 2001, 2014) and debated how raw material affects the morphology of Clovis hafted biface technology (Eren et al., 2015). If we are to continue to undertake large scale studies of fluted type hafted bifaces, we need to better understand the changes in their morphology that occur across geographic space. Describing how the morphology of these hafted bifaces change across time and geographic space is essential if we hope to find the origin of the technology.

Specifically, this work focuses on the variability present among the Clovis and Clovis-like hafted bifaces in the Northeast. But before moving forward, however, a review of Paleoindian hafted biface chronology in general is necessary. Many major sub-groups and types have been proposed in the literature for the Paleoindian hafted bifaces found in the Northeastern part of the United States. Deller and Ellis propose that there are three non-Clovis types in the eastern Great Lakes

regions including in chronological order, Gainey, Barnes and, Crowfield type hafted bifaces (Deller and Ellis, 1992; Ellis and Deller, 1997). Bradley et al. (2008) provide definitions of eight Paleoindian Period hafted biface types from the New England Maritimes region including: Kings Road Whipple, Vail-Debert, Bull-Brook West Athens, Michaud Neponset, Crowfield-related, Cormier-Nicholas, Agate-Basin, and Ste-Anne Varney type hafted bifaces. Further, Bradley et al. (2008) suggest that the term 'Clovis' not be applied to hafted bifaces in the New England/Maritime region. White (2006) proposes a chronology of Paleoindian hafted bifaces for Northeastern Indiana which includes Gainey, Barnes/Cumberland (Early and Middle Paleoindian periods) and Holcombe, Hi-Lo and Agate Basin type hafted bifaces in the Late Paleoindian Period. It should be noted that none of these hafted biface chronologies include the Clovis type.

This paper focuses on fluted hafted bifaces from the Early Paleoindian Period in the Northeastern United States. This region includes portions of Bradley et al.'s (2008) Great Lakes region and New England Maritime region. I include hafted bifaces from the Clovis, Gainey type, the Vail, and Bull Brook/West Athens-Hill types. I compare these four types of hafted bifaces found in the Northeast to Clovis type hafted bifaces found elsewhere in North America. To clarify some of these issues, I compare a sample of 256 fluted hafted bifaces from the Northeast to a sample of 439 Clovis type hafted bifaces from the rest of North America. In this comparison, I use various linear measurements to characterize the morphological variability in Clovis hafted biface size and shape between the differing regions in North America. I undertake this analysis to answer the following research question: are the Early Paleoindian Period fluted type hafted bifaces from the Northeast

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morphologically different from Clovis type hafted bifaces found throughout the rest of North America, and if so, how? The type of site at which a Clovis hafted biface is found may have effects on its morphology (Buchanan and Collard, 2007; Ellis, 2004; Williams, 2016). Therefore, site type will be controlled for in this analysis. The hafted bifaces found at each type of site will be removed from the analysis one at a time, to better understand what effect site type has on hafted biface morphology.

Gainey type hafted bifaces were first reported at the Gainey site, from which they take their name (Simmons et al., 1984). Morphologically, archaeologists have suggested that Gainey hafted bifaces differ from Clovis hafted bifaces in several ways. Sandstrom and Ray (2004) state that Gainey hafted bifaces are fluted in the middle of the production sequence, unlike Clovis that are fluted throughout the production sequence as basal thinning (Callahan, 1979). Additionally, Sandstrom and Ray (2004) point out that Gainey hafted bifaces often feature short guiding flutes on either side of the primary flute. Morrow (1995), Morrow (1996), and Sandstrom and Ray (2004) have all noted that Gainey hafted bifaces are shorter and thinner than Clovis hafted bifaces from other parts of North America. Gainey hafted bifaces are found throughout the Great Lakes Region (Deller and Ellis, 1992; Loebel, 2000; Morrow, 1996).

Morrow (2015) suggests that Gainey type hafted bifaces are coeval with Folsom type hafted bifaces found in the Great Plains. She further argues that Gainey is the oldest point type in the New England/Maritime region. Eren and Desjardine (2015) question how we define Gainey type hafted bifaces, arguing that archaeologists are truly making the Clovis/Gainey distinction largely based on geography. They argue that if Clovis is defined by the presence of overshot flaking, prismatic blades, and presence of fluted points, then the Gainey in the Great Lakes is, in fact, Clovis.

The relationship between the Bull Brook/West Athens Hill types and the Clovis and Gainey hafted biface types also remains unclear. Robinson et al. (2009) attribute the hafted bifaces at Bull Brook in what they call the Bull Brook/Gainey type. Bradley labels this type as Bull Brook/West Athens Hill and argues that, “Most Bull-Brook West Athens Hill have only moderately deep bases.” (Bradley et al., 2008: 138).

Vail type hafted bifaces are argued to be similar to those at Debert (Ellis, 2004). Ellis (2004) argues that hafted bifaces from Vail, Debert and Lamb are different from those found at Bull Brook, Shoop, Hiscock, and isolated Gainey hafted bifaces that were included in his sample. Ellis (2004) argues that hafted bifaces from Debert and Vail have wider bases and greater basal depth.

This review has revealed that a great deal of variability is present in the hafted biface types found in the Early Paleoindian Period and that there is disagreement about the relationship between Gainey, Clovis, Bull Brook-West Athens Hill, and Vail type hafted bifaces in the Northeast. Furthermore, some researchers include hafted bifaces from the Northeast in their Clovis research (Buchanan and Collard, 2007; Hamilton and Buchanan, 2009), while others believe that Gainey type hafted bifaces are the basal (oldest style Paleoindian hafted biface) type for many areas of the Northeast (Bradley et al., 2008; Deller and Ellis, 1992). In this study I will examine variability in Early Paleoindian hafted bifaces to better define the relationship.

2. The sample and methods

The sample includes 695 fluted hafted bifaces from across the country. Images of these hafted bifaces were analysed using a piece of software called Canvas, version 17. Fig. 1 provides details on where these fluted hafted bifaces in this sample were found. Fig. 1 provides a map of each Culture Area and all the major fluted hafted biface sites included in the data set. This sample was built in an opportunistic manner. I contacted over 100 museums and other artifact curation facilities and procured images of as many fluted hafted bifaces as possible. At minimum, I required that each hafted biface have at least

county level provenience, but did not require any contextual information beyond that. The Culture Areas were mapped onto a county map of the United States using the original Culture Areas proposed by Kroeber (1939). If a county was split by the Culture Area dividing lines, all the hafted bifaces from that county were part of whichever Culture Area the majority of the county was in.

The Culture Areas outlined by Kroeber (1939) are based on cultural and environmental differences. Many museum collections are organized into these Culture Areas, and for that reason, they proved a useful method in stratifying the sample. In other publications, other schemes have been used to divide fluted hafted bifaces into regions, such as that of Buchanan and Hamilton (2009). The regions used by Buchanan and Hamilton (2009) are not appropriate for this study as their geographic range does not include much of the Southeast, California, Minnesota, or Wisconsin. The classic Culture Areas defined by Kroeber do include the entire fluted hafted biface sample in this study. Additionally, the classic geographic divisions of Kroeber (1939) do not differ greatly from divisions shown in paleo environmental estimates of the early Paleoindian period, such as that of Adams (2002), and thus represent differences in environmental conditions very well.

A hafted biface was included in this sample if the following criteria were met. First the biface must be fluted. Second the flute should not extend more than half of the total length of the biface, unless the hafted biface shows significant signs of usewear and retouch (i.e. triangular blade shape and/or small retouch flake scars). Most often hafted bifaces with extensive usewear were only taken from sites known to date to the Early Paleoindian period. Third, the hafted biface was required to have a concave base. This definition was largely created from the Clovis type definition comparison work done by Boulanger (2015). The initial goal of this data collection was to acquire Clovis type hafted bifaces. However, in doing so, it was quickly realized that in the Northeast, this definition included both Gainey and other non-Clovis type hafted bifaces as well.

Each hafted biface was assigned to one of three site types. Here, I utilized the three Clovis hafted biface site types defined elsewhere by Buchanan and Collard (2007). This site typology includes caches, kill sites, and camp sites. All hafted bifaces with insufficient context information were assigned to Undetermined site type. Undetermined sites dominate the overall sample. Of the 695 total hafted bifaces in the sample, 536 are from undetermined sites, 66 are from kill sites, seventeen are from cache sites, and the final and 68 are from campsites.

All the measurements were taken on scanned images or photographs. Digital images are commonly used to analyse Paleoindian Period hafted bifaces. Several archaeologists have made use of images to make measurements on fluted hafted bifaces from Florida (Thulman, 2012) and Clovis type hafted bifaces from across North America (Buchanan and Collard, 2007; Buchanan et al., 2012; Buchanan et al., 2014; Hamilton and Buchanan, 2009). The reason for using images is threefold. First, this greatly increased the sample size, as 604 of the total 695 Clovis type hafted bifaces were never personally handled by the author. Second, many curation facilities were willing to provide scaled, top-down photographs of the Clovis hafted bifaces which prevented the expense of funds for travel. Finally, making measurements on images allowed me to make accurate measurements at specific intervals along the length of the haft and blade elements. Some issues, such as edge deformation, image quality and re-scaling have been suggested to affect the accuracy of measurements made on images, but previous research suggests that accurate measurements can be made using 2-D images of hafted bifaces (Williams and Andrefsky, 2013). This kind of accuracy in measurement placement would have been difficult using calipers and the actual artifact. A detriment in using images to take measurements, however, is that the two-dimensional nature of these images means that thickness measurements are not possible. The measurements were taken digitally by using a piece of graphics software called Canvas. Any image with a scale could be used. To re-scale an image, the scale was measured, and the actual length of

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