

Introduction

1.1 Clovis: an investigation into an early Paleoindian culture

Clovis is widely regarded as the oldest archaeologically visible, reasonably well-defined, and relatively homogenous early archaeological culture in North America. Clovis also has the most geographically extensive signal in the archaeological record of North America at any time (Miller *et al.* 2014). It has been reported as being present in all forty-eight states in inland U.S.A., as well as in some areas of sub-glaciated Canada, Mexico and South America (*e.g.* Haynes 1964; Haynes 2002; Meltzer 2009; Anderson *et al.* 2010). Our understanding of the first humans in North America has greatly improved over the last couple of decades (see Meltzer 2003a, 2009; Erlandson and Braje 2011; Pitblado 2011; Davidson 2013; Shott 2013; Kornfeld and Politis 2014; Smallwood and Jennings 2014; Lothrop *et al.* 2016; Amick 2017; Sutton 2017), and understanding Clovis origins and variability is critical in this understanding (*e.g.* Wright 1989; Bonnicksen 1991; Meltzer 1993, 2003a, 2003b, 2009, 2013; Haynes 2002, 2015; Tankersley 2004; Stanford *et al.* 2006; Miller *et al.* 2014; Buchanan *et al.* 2017; O'Brien and Buchanan 2017).

Several definitions of Clovis have previously been offered. To some, Clovis is a time period (*e.g.* Haynes 2002). To others, Clovis is a culture (*e.g.* Haynes 2005). And for others still, Clovis is a techno-complex (*e.g.* Bradley *et al.* 2010). For the purpose of this study, it was defined as a time period and the terms Clovis-era and Clovis-age will be used for consistency in this body of work (Slade 2018b). It has been suggested that Clovis represents a major culture change, spreading out among existing pre-Clovis populations (Bradley and Collins 2013; Collins *et al.* 2013), whilst others suggest these models are weakened by the limited quality of secure pre-Clovis evidence (Adovasio and Pedler 2004; Shott 2013; Haynes 2015). It is my opinion that while I do believe in an older than Clovis presence, Clovis is considered to be the first universal lithic technology (Bradley 1992) to evolve in North America, occurring between 11,500 and 10,900 radiocarbon years before present (^{14}C yr BP) 13,300 to 12,700 calibrated calendar years (Cal yr BP)¹ (Hamilton and Buchanan 2007). A re-evaluation of the available date

record, and more accurate and precise ^{14}C yr dates taken from Clovis sites with technologically diagnostic artefacts place the Clovis time range from around 11,050 to 10,800 ^{14}C yr BP. Although there are additional sites with Clovis artefacts with dates outside these ranges, they have large standard deviations. This re-evaluation of the existing Clovis date record places the time range to as little as 200 years (Waters and Stafford 2007, 2013).

These early hunter-gatherers left behind a sparse material record of their occupation that consists primarily of stone tools and the manufacturing debris associated with their production. The trademark tool of this earliest lithic technology to evolve in North America is a fluted point named after its type site discovery in a quarry at Blackwater Draw Locality No. 1 (LA3324), near Clovis, a town in New Mexico (Hester 1972). These artefacts were made by widely separated groups at almost the same time throughout North America. The fluted points from Nova Scotia are much the same as those from New Mexico, not identical, but the similarities outweigh the differences. Not only are the fluted points similar across North America, but other technological aspects of the Clovis culture, *i.e.* blades, unifacial tools, and osseous tools, appear to be equally similar and widespread (Haynes 1964). The differences that are present are in the styles and shape of the Clovis points. In my study I identified a number of Clovis and Clovis variants from seven environmentally very different regions across North America (Figure. 1.1), which I will discuss in more detail in 'chapter 2'. The regions I incorporated are based on modern political boundaries and follow current U.S State borders, they do however correspond to previous continental overviews of Clovis distribution (*e.g.* Haynes 2002:36).

Clovis fluted points have been found in all lower forty-eight states in the U.S. (Anderson 1990a, 2013a; Haynes 2002; Anderson *et al.* 2005). It is uncertain whether they are in Alaska as the earliest archaeological evidence there is not Clovis (but see Humphrey 1966; Goebel *et al.* 2013). There is a blade and unfluted thick-bodied point technology present that has been dated to as early as 11,800 ^{14}C yr BP in the Tanana river valley, Alaska (Hamilton and Goebel 1999) known as the Nenana Culture (West 1996). Clovis points are present in some southern unglaciated regions of Canada (Kehoe 1966; Deller and Ellis 1988), and Clovis can also be found in Mexico (Robiles and Taylor 1972; Sánchez 2001), Central America and northern South America (Cooke 1998; Ranere and López 2007). These regions will not be discussed further here in the main body of the work as this particular study is concerned with Clovis points in North America, but it will be briefly discussed in the appendices (Appendix. A).

¹ For the purpose of this study I will, where possible, use ^{14}C yr BP dates, and when appropriate I will provide the Cal yr version as well. If the ^{14}C yr date is not available, the Cal yr date will be provided (see Table. E.1 in appendices). The distinction between radiocarbon years and calendar years is important. A report in 2000 (Johnson *et al.* 2000) described a 13,000 year old human skeleton found in California and compared it to a 12,500 year-old from Monte Verde, without mentioning that the former was calendar years (Dillehay 1989, 1997. But see Dillehay 2002)

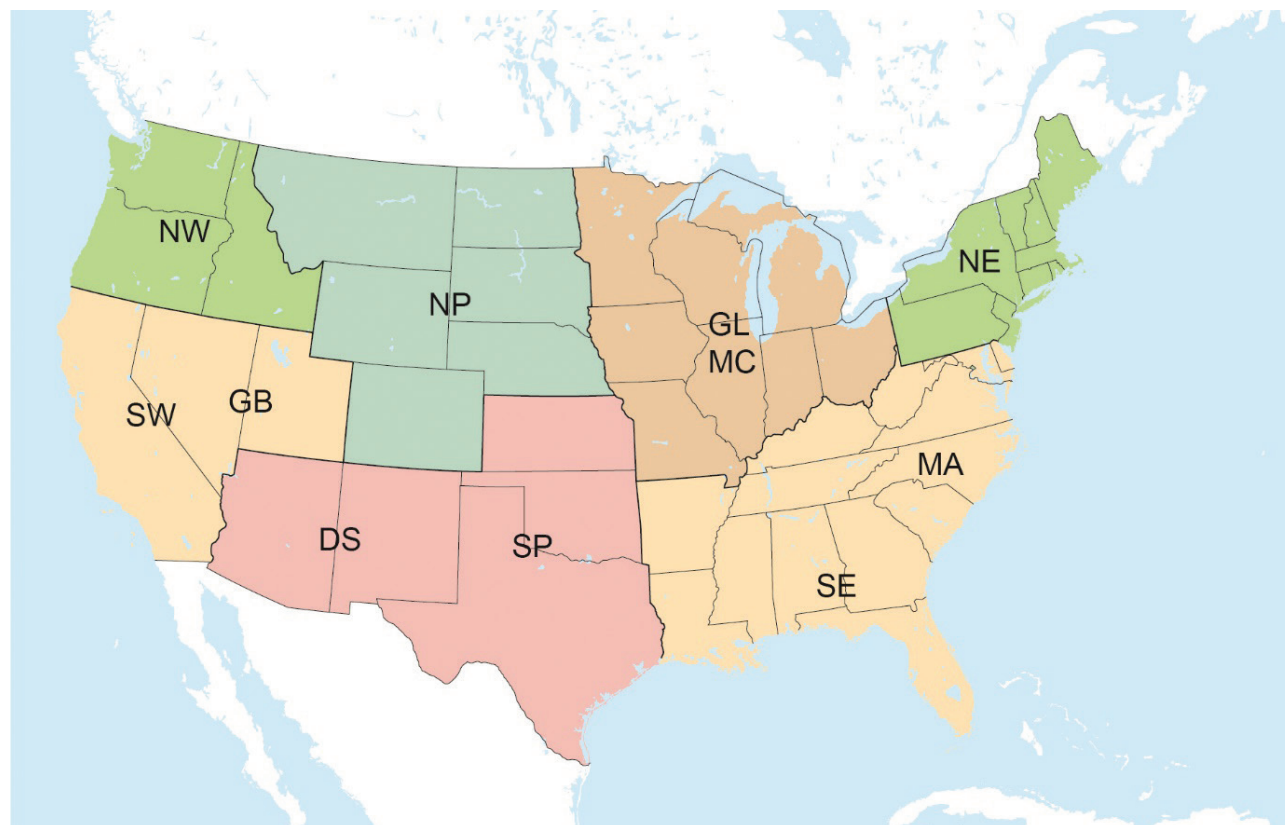


Figure 1.1. Map of North America highlighting the seven regions including their subregions that I identify in chapter 2. (NE = Northeast; MA = Middle-Atlantic; SE = Southeast; GL = Great Lakes; MC = Midcontinent; NP = Northern Plains; SP = Southern Plains; NW = Northwest; SW = Southwest and Great Basin.

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 (Figure. 1.2), and it is these points that will be the main focus of this work. 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.

Previous studies of Clovis fluted points have regularly revealed morphological variation (see Collins and Hemmings 2005), including my own previous research (Slade 2010, 2018b). Raw material has been considered to play a role within other early Paleoindian fluted point types (Tankersley 1994a), such as Folsom (Hofman 1991) and Gainey (Morrow and Morrow 2002a) and in individual Clovis site assemblages, but it has seldom been looked at comprehensively on a continental perspective and in particular just on Clovis or Clovis-aged point assemblages (Spaulding 1960; Buchanan *et al.* 2014; Miller *et al.* 2014).

At the Plains Anthropological Conference (PAC) in October 2011 in Tucson, Arizona, a session on Clovis made it clear that there was a need for Clovis, and in particular Clovis fluted point variability, to be properly defined. D. Meltzer summed this up at the conference who said that . . .

“Until we as archaeologists and analysts agree on what is and what is not Clovis, there will always be this problem in definition.”
(D. Meltzer pers. comm. Tucson, AZ. 2011).

The issue is that some researchers define some assemblages of fluted points as Clovis, while others assign them to a different culture, despite being chronologically contemporaneous and technologically similar. Meltzer concluded that he . . .

“Would like to see Clovis fluted points defined by style”
(D. Meltzer pers. comm. Tucson, AZ. 2011).

Much of the shape variation in Clovis fluted points is displayed in the basal sections of the points, and it is the basal variability of the Clovis points that I partly based my analysis around (Slade 2018b). Bases are rarely re-sharpened (Ahler and Geib 2000) and therefore re-sharpening is an unlikely cause for regional and subregional variation in Clovis point variability (see Buchanan *et al.* 2015; Eren *et al.* 2015b). However, raw material variability is a possible explanation for point shape variation (Tankersley 1994a; but also see Eren *et al.* 2014b), high-quality toolstone being easier to knap than lower-quality materials. As part of that study, I also looked at whether raw material variability and quality are influencing Clovis point variability.

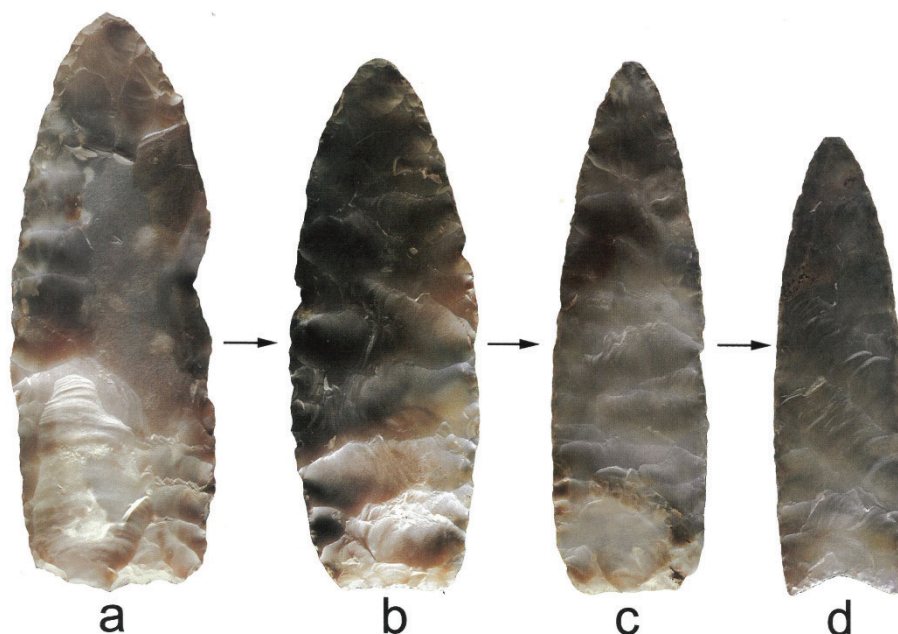


Figure 1.2. Clovis point production phases. a) early, b) middle, c) late, d) finished point. After Bradley *et al* (2010).

1.2 Aims and objectives

This work was an investigation on the morphological variability within an early North American Paleoindian fluted point technology, to explore whether different regions of North America have a distinct variation in shape on Clovis fluted points, and to see whether raw material selection can be a possible explanation for the variability. The aims and objectives for this study are threefold:-

- identify and characterise the range of morphological variation in Clovis fluted points
- determine whether there is a relationship between lithic raw material and the morphological variation
- investigate just how homogenous Clovis really is

Through these objectives I hope to give explanation to how this work will contribute to wider questions, such as the potential implications for regional settlement, landscape-use practices, and technological decision making.

From the visual and metric analysis, I carried out for a previous study (Slade 2010), I observed that there is certainly a distinctive variation within assemblages of Clovis points from sites in different regions across North America. The variation seems to be more pronounced when there is significant variation of raw material present in the assemblage, such as at a campsite that has been frequented by different groups coming from different directions and regions. Site types across North America differ by region and an examination of the point variability, raw material present, and how these relate to the Clovis sites will be discussed in later chapters and will also be made available as supporting information (Appendix. A). For determinations of the identification and quality of the raw materials that were used to produce the Clovis points

in my analysis, I used published accounts (*e.g.* Buchanan *et al.* 2014) that gave a comprehensive overview of the toolstone types for the points discussed. I also used the individual raw material analyses that were present in the published archaeological record of certain individual assemblages.

1.3 Outline of research

This chapter has outlined the importance of research into the early Paleoindian Clovis culture of North America, how studying the variability of Clovis and Clovis-aged fluted points is of central importance to exploring and understanding early human behaviour in North America, and the key aims and objectives of this work. Subsequent chapters will address these objectives in more detail.

Chapter 2 starts with a discussion of the archaeology of Clovis fluted points across the continent and will highlight the variation in these points. This will be followed by a literature review of the history of the research of the topic and offer an appraisal of the current state of knowledge of Clovis and the peopling of North America. Since the first discoveries in the early 1900s, fluted points have been classified as Clovis simply because they were fluted and were associated with mammoth remains or other extinct megafauna of Clovis age (but see Henrikson *et al.* 2017). I will provide the most recent and reliable radiocarbon dates, where possible, for the sites and assemblages that I used in my overview of Clovis fluted points and their distribution that made up my sample. ‘Chapter 2’ also deals with the regional distribution of Clovis based on my regional boundaries (Figure. 1.1), and in a comprehensive overview, I provide a regional analysis of the well-known Clovis fluted point record and offer a brief description of the site or collection history, the assemblage itself, and the

most recent research of that particular material. I finish off ‘chapter 2’ with a brief description of Clovis site types that occur across North America.

In ‘chapter 3’ I discuss my methodology and approaches to the analysis of the bases of the fluted points that made up my complete sample and present the datasets that contributed to my analysis (Slade 2018b). My data collection strategies and analysis of the Clovis fluted points used during previous research were employed for this work (Slade 2010). This will be built upon by carrying out a metric analysis on complete points and photographic imagery, but with more emphasis on the morphological characteristics of the basal concavity and raw material types. Since my original study, I have continued to research the collections of Clovis fluted points in museums in North America, London, Oxford and Paris, as well as accessing private collections in North America. A full record of the collections and locations that made up my complete sample will be also be provided in the appendices (Appendix. B).

Chapter 4 will be based on an overview, previous research and current understanding of the raw material availability and variability that was accessible as potential toolstone for Clovis fluted point production across the North America during the Clovis times. The prehistoric knappers who produced Clovis fluted points used a wide range of raw material available to them, and in some cases this revealed extreme long distance transport of toolstone between the find spot of the point and the geological source of the material (see Gramly 1988a; Holen 2004; Boulanger *et al.* 2015). Either Clovis hunter-gatherers had access to toolstone sources, for example a favoured outcrop of raw material or source-area close to their camps, or they would have traded raw material with other groups, either with other raw material or trade goods. I will compose a distribution map for each region of raw material types and their sources which when compared to fluted point locations would reveal how far the raw material or fluted point travelled (Figures. 4.1 to 4.7). Analysis of the raw material was made from the points themselves where possible, site reports and published accounts, and regional topographical records which were available from the United States Geological Survey (USGS) for each respective state (Table. 4.2).

Chapter 5 will be a review of my caliper measurement-based shape analysis and the geometric morphometric analysis of the complete sample of Clovis points that make up my datasets for my study. As with previous chapters, this chapter will be broken up into regional sections, and the three samples that make up my complete sample will be presented regionally. The assemblages of points will be compared on a regional and on an intraregional basis. The results of the analysis will then be collated and the variability of Clovis points on a continent-wide perspective using the basal-concavity results and the raw material analysis presented.

In ‘chapter 6’, in accordance with my original research questions, I will present the conclusions which can be

drawn from the analyses for understanding the variability of Clovis points both within a regional and continental context. Specific issues were discussed and defined through the evidence for basal concavity variability and toolstone selection. How all these results can be implemented into our understanding of Clovis as an early Paleoindian North American culture². Finally, I discuss how future research, and results from this work, can be advanced and refined further through future projects.

² The term Paleoindian has recently come under criticism and should be dropped from the literature for a more consistent universal term, the Upper Paleolithic of North America (Williams and Madsen 2020)