



Contents lists available at ScienceDirect

Quaternary International

journal homepage: www.elsevier.com/locate/quaint

Evolving views on the Pleistocene colonization of North America

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ARTICLE INFO

Article history:
Available online xxx

Keywords:
Clovis
Cultural transmission
Human behavioral ecology
Costly signaling
Colonization

ABSTRACT

Current understanding of the processes involved in the Late Pleistocene human settlement of North America has benefited from the application of theoretical perspectives derived from evolutionary ecology, human behavioral ecology, and evolutionary paradigms. These perspectives have increased and expanded our grasp of critical issues including demography and migration strategies; foraging, settlement mobility, and technological strategies; processes of social learning and cultural transmission; mobility and interaction networks; and the involvement of symbolism and prestige in social cohesion. The rapid spread of the Clovis cultural phenomenon across the entire continent has long fascinated archaeologists because of its speed, geographic extent, association with big-game hunting, and impressive degree of technological knowledge and skill. Renewed investigation of this phenomenon points toward the critical role of certain social factors behind its success. In particular, prestige-seeking and symbolic representation of inter-group relationships are increasingly viewed as driving forces in explaining this unique colonization event.

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1. Introduction

Knowledge about early human settlement of North America continues to expand through discoveries and purposeful studies of empirical data, which form the archaeological and paleoenvironmental records of the Late Pleistocene. Approaches from perspectives of evolutionary theory (dual-inheritance theory [DIT] and costly signaling theory, in particular) and human behavioral ecology (HBE) are especially useful for explaining how this event may have unfolded. Goals of this paper are to synthesize these studies and propose a few new ideas about processes and mechanisms involved in Late Pleistocene human settlement of North America. First, this paper reviews foundations, key features, and interrelationships of the most influential paradigms. One thing these perspectives provide is demonstration of the critical roles of symbolic and ritual displays as mechanisms facilitating adaptations to environmental and reproductive success. Next is a review to frame what we currently think we know about the earliest Americans including chronology, origins, migration, diversity, settlement strategies, subsistence and their role in megafauna exploitation and

extinctions. Finally, this analysis considers social behaviors that seem to be underwriting the process of Clovis colonization of the continent. These issues include reproductive and social networks; group aggregation; exchange; symbolic aspects of lithic assemblages including projectile point fluting, artifact caches, and quartz crystal utilization; and evidence of art, ritual, and prestige-seeking behavior. This paper concludes with discussion of the transformation of Clovis through regional cultural adaptations such as Folsom and Dalton during the Terminal Pleistocene.

Demographic modeling and simulations imply that these early foragers had substantial capacity for rapid demic colonization of the continent within a few millennia (Wobst, 1974; Steele et al., 1996, 1998; Surovell, 2003; Lanata et al., 2008). This remarkable population expansion was likely facilitated primarily by socio-political mechanisms largely underappreciated in most Paleoindian literature; in particular, symbolism and information exchange may have played critical roles in this process. Most geologic evidence indicates the ice-free corridor (IFC) may have opened too late to account for the main pulse of Pleistocene colonization, which most likely occurred along the Pacific coastal route (Dixon, 1999, 2001, 2013; cf. C.V. Haynes, 2005a; Lanata et al., 2008; Madsen, 2015). Consequently, Clovis people do not appear to have been the first inhabitants of the continent and when Clovis culture eventually does appear, it is similar but not the same everywhere. Nonetheless, Clovis hunters seem to have delivered the *coup de grâce* in the Late Pleistocene megafauna extinctions of

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North America (Stuart, 1991; Haynes, 1999; Alroy, 1999; Faith and Surovell, 2009; Grund et al., 2012; Johnson et al., 2013; Boulanger and Lyman, 2014; Surovell et al., 2015). The Clovis cultural phenomenon deserves the bulk of attention in understanding the early occupation of North America, because of the enormous scale and speed of its success (Haynes, 2002a; Meltzer, 2009, 2013, p. 65). Explanatory perspectives suggest this accomplishment was mainly driven by their investment in extensive information exchange and rich ideological and symbolic displays possibly associated with prestige-seeking pursuits.

2. Theoretical foundations

Evolutionary approaches in modeling and understanding variation in the archaeological record maintain a focus on cultural transmission as the primary mechanism affecting human behavior (Shennan, 2012). Under this paradigm, researchers attempt to explain the archaeological record in terms of Darwinian evolutionary processes in which change and variation are viewed as the differential persistence of cultural traits and the differential reproductive success of individuals resulting from the cultural traits they possess. Variation is the source material upon which selection and drift operate while traits are transmitted and inherited through social learning (Bentley et al., 2004; Hewlett et al., 2011). Variation in artifact form is viewed as undirected with respect to selection, playing a role analogous to mutation in genetic evolution. Under this paradigm, functional traits influencing energetic costs and benefits or performance characteristics of artifacts are considered to be most affected by selection. There has been considerable application of these evolutionary approaches to understanding the variation in early Paleoindian projectile points using cladistics methods of phylogenetic reconstruction to determine its possible meaning in terms of cultural transmission theory (e.g., O'Brien et al., 2001, 2012, 2015).

Understanding about human settlement of North America has also benefitted from researchers adopting the perspective of human behavioral ecology (HBE) in which natural selection theory is applied to studies of adaptation and biological strategies in an ecological setting. Under this paradigm, an emphasis is placed on understanding the interaction between evolutionary forces and ecological variables in the development of specific adaptations. Formal optimality models are often used to address specific questions about behavior under this approach and they require establishing hypotheses about fitness-related goals for the behavior under study, the alternate strategies to achieve those goals (including constraints limiting the range of possible strategies), the costs and benefits associated with each strategy, and currencies for measuring those costs and benefits (Broughton and O'Connell, 1999). An important goal of HBE is to understand how ecological and social factors influence and shape behavioral variation within and between human populations. Sources of such variation are considered to be adaptive responses to the competing life-history demands of sustenance, growth, development, reproduction, parental care, mate acquisition, and social interactions. Consideration of these critical aspects of human populations can be argued to be at the core of understanding how humans colonized Late Pleistocene North America.

2.1. Cultural transmission theory

The central principle of CT is that similarities in behavior and artifact forms can be produced through information exchange via non-genetic mechanisms. Social learning serves as a critical mechanism for humans to acquire and pass on behavioral patterns. Cultural information may consist of a single trait from a single

individual, the average of a trait in a group of individuals, the most frequent trait in a population, or any combination from these modes. Furthermore, it is possible to gain cultural information as traits, sets of traits, or merely as models on how to obtain traits or rules. The observation that historical traditions of artifact manufacture are often preserved for long periods of time implies that cultural information can be preserved and consistently passed down among individuals in populations over multiple generations (Jordan, 2015). In such cases, classification methods such as cladistics, which are constructed to work when vertical transmission is the norm, can be effectively applied (Mace and Holden, 2005). Information transmitted from individuals regarded to have high social prestige, is generally remembered and retransmitted with greater fidelity than similar information obtained from peers or subordinates (Henrich, 2001; Henrich and Gil-White, 2001). In other words, transmission rates can be biased by the perceived social status of the transmitter. Furthermore, the information transmitted in formal settings where it is often repeated and the content is highly valued – sometimes in ritual contexts, but not always – tends to have much lower rates of transmission error.

2.2. Lithic technology as a socially learned, dynamic system

Because chipped-stone tool technology is a reductive process, it is often possible to determine operational processes and decisions represented from these remains through careful analysis of artifact flake scar sequences. It is precisely this sequential patterning in technological operations and its variation that defines the cultural tradition behind these remains. In other words, chipped-stone artifacts are able to preserve evidence of cultural norms and recipes as well as providing clues about the utilitarian activities associated with their manufacture, use, and discard. Not only does cultural transmission refer to the acquisition, modification, and retransmission of information displayed in artifacts, it also involves the rules and instructions for making things, such as stone tools (Eerkens and Lipo, 2005, 2007; Shennan, 2011; Eerkens et al., 2014; Jordan, 2015). Schillinger et al. (2014) point out how transmission copying errors are more common in reductive technologies versus additive technologies, which makes lithic technology a good subject for the study of cultural drift. In addition, social learning and apprenticeship and play important roles in the acquisition of technological skills and habits (Pigeot, 1990; Stout, 2002; Tostevin, 2007, 2012; Bamforth and Finlay, 2008; Tehrani and Riede, 2008; Hewlett et al., 2011; Lohse, 2011; Hiscock, 2014; Jordan, 2015; Eren et al., 2015).

The production of stone tools also involves acquiring skills, which vary between individuals (Bamforth, 1991; Bamforth and Finlay, 2008; Bamforth and Hicks, 2008; Bleed, 2008; Ferguson, 2008; Lohse, 2011). Eren et al. (2015) suggest that such differences in skill levels may underlie the biased transmission of the processes and desired models of Paleoindian projectile point productions with highly skilled flintknappers and hunters possessing special social prestige in Paleoindian societies. In addition, stone tools and their production can also serve as important media for the communication of cultural signs and symbols (Taçon, 1991; Sinclair, 1995; Hiscock, 2014; Kuhn, 2014). Balme et al. (2009) have argued that symbolic communication is especially important in the colonization process, thus, we should be seeking out such evidence in the Paleoindian record.

Following Andrefsky and Goodale (2015), this paper advocates an inclusive approach to applying evolutionary theory in lithic analysis (also see Shennan, 2002, 2008, 2011, 2012; cf. Bird and O'Connell, 2006, 2012). However, not all variation in material culture can be attributed to evolutionary forces; understanding the context of variation is the key to assessing its potential causes

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