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A behavioral landscape perspective on silcrete use in hunter-gatherer lithic technologies along the Southern High Plains Eastern Escarpment of Northwestern Texas (USA)

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ABSTRACT

Ogallala Formation layers and clasts of silcrete, locally known as Macy silcrete, are documented throughout an 83,000-acre research area located along the Southern High Plains eastern escarpment in northwestern Texas (USA). A behavioral landscape perspective has been used to determine how silcrete was incorporated into hunter-gatherer lithic technologies. Results demonstrate that 80% of the silcrete was flaked for making unifacial tools for on-site use. The remaining 20% of the silcrete, however, is transported for continued manufacture and use at other places on the landscape. The behavioral landscape perspective and lithic *catena* methodology used in this study are important for delineating multiple patterns of lithic use strategies.

1. Introduction

Silcrete is a material that was used in the manufacture of stone tools in many parts of the world (Cotterell and Williams, 2010:96). Most published lithic studies of silcrete, however, are geographically concentrated in Australia (e.g., Douglass et al., 2015; Webb and Domanski, 2008) and South Africa (Brown et al., 2009; Nash et al., 2013) where silcrete predominates in lithic assemblages (e.g., Nash et al., 2013; Webb et al., 2013). Researchers in these regions have published important insights into heat-treatment (e.g., Brown et al., 2009; Mercieca, 2000; Mercieca and Hiscock, 2008; Rowney and White, 1997; Schmidt et al., 2013), origins of human behavior (e.g., Brown et al., 2009), sourcing strategies (e.g., Nash et al., 2013), and the transportation and use of silcrete (e.g., Douglass et al., 2015; Pargeter, 2013; Webb and Domanski, 2008; Webb et al., 2013).

Studies of silcrete use in lithic technology has received little attention in the United States, and an infrequently used term by U.S. lithic analysts. Some lithic materials classified as quartzite, orthoquartzite, or silicified sandstone (e.g., Church, 1996:149; McCoy, 2011:3; Wyckoff, 2005:95–96) most likely would be classified as silcrete by Australian or South African lithic experts. The low frequencies of silcrete identified in U.S. lithic assemblages (e.g., Hurst et al., 2010) also is due to finer-grained materials such as chert and obsidian, prevalent in many regions, being preferred for flintknapping (e.g., Andrefsky, 2005:53; Odell, 2004:275).

On the Southern High Plains, silcrete layers formed in the Ogallala Formation near the surface. Outcrops of silcrete layers were identified and studied (McCoy, 2011) in the ~83,000 acre Post research area located along the Southern High Plains eastern escarpment (Figs. 1 and 2). These outcrops along with their eroded clasts found in stream deposits below the escarpment were a potential lithic material source for making stone tools (e.g., Backhouse et al., 2009; Hurst et al., 2010; Hurst et al., 2015).

The Southern High Plains region was formed from the aggradation of the Ogallala Formation throughout the Miocene (~23–5.3 mya) and Pliocene (~5.3–2.6 mya). Gravel derived from mountains in New Mexico to the west filled paleo-valleys (ancestral Red, Brazos, and Colorado river systems) and eventually were buried by aeolian sediments (Gustavson and Winkler, 1988). Deposition ceased with the formation of the Pecos River Valley in late Pliocene time (Reeves and Reeves, 1996). This event resulted in long-term stability of the landscape and development of the Ogallala caprock caliche. This resistant pedogenic calcrete, up to 2 m thick, is the main geomorphic cause for the current shape, size, and topographic flatness of the Southern High Plains (Hurst et al., 2010:98).

Large lake basins were cut into the Ogallala Formation during the Pliocene and Pleistocene (~2.6 mya–11,000 radiocarbon years BP) periods (Holliday, 1997:10). These basins were filled with lacustrine dolomite and clastic sediments (Evans and Meade, 1945; Harbour, 1975). The largest of these, the Blanco Formation, also included a calcrete at the

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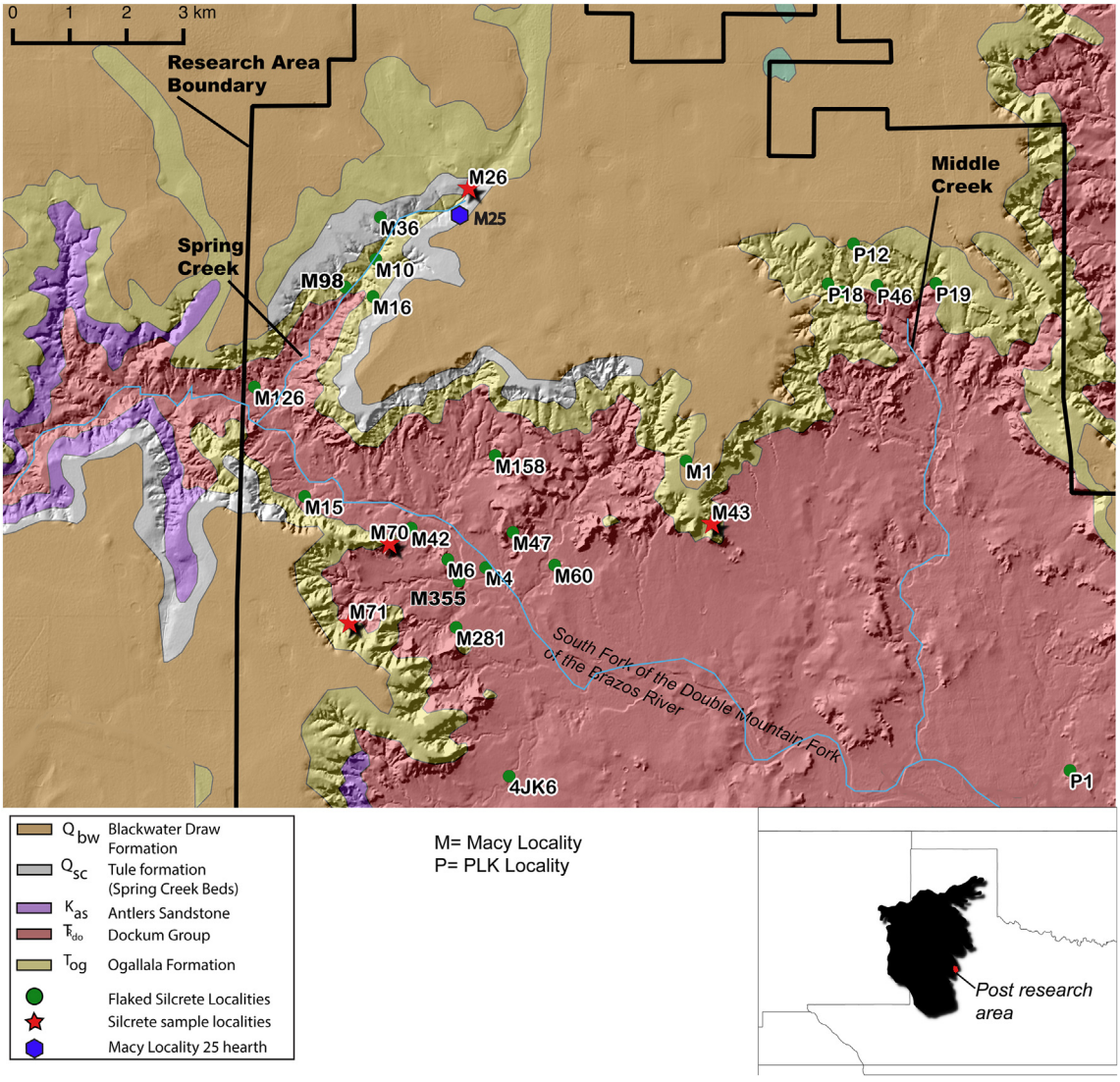

Fig. 1. Silcrete sample localities and archaeological localities with silcrete at the Post research area.

top of the formation (Holliday, 1997:10). Smaller and more localized lacustrine deposits included the informal Tule, Double Lakes, and Tahoka formations (Harbour, 1975; Reeves, 1976). One of these local Pleistocene lacustrine deposits was identified as the Spring Creek beds (Figs. 1, 2; Martin, 1950; Reeves, 1963, 1966) in the Post research area.

The Blackwater Draw Formation (~1.8 mya–50,000 radiocarbon years BP) is a surficial deposit in most places on the Southern High Plains consisting of aeolian sediment derived from the Pecos River Valley (Holliday, 1989). Modern geomorphic features that include draws, playas, and salinas, cut through, are inset into, or rest upon this formation (Holliday, 1989).

In contrast to silcrete research in Australia and South Africa (e.g., Douglass et al., 2015), this study is situated in a diverse lithic landscape. Clasts that comprise the basal section of the Ogallala Formation are

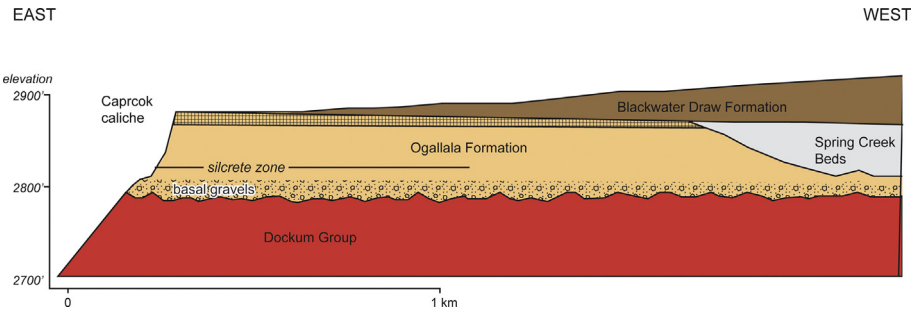

Fig. 2. Geologic cross-section of the eastern escarpment of the Southern High Plains near Post, Texas. (Modified from McCoy (2011:10).).

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