Variability in Lithic Technological Strategies of Early Human Occupations from the Central Plateau, Santa Cruz, Argentina

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This report examines the production sequences of lithic artifacts associated with the initial peopling of the Central Plateau of Santa Cruz. These first human toolmakers used different lithic raw materials in diverse ways, based on their distribution, availability, and quality. These are reflected in the sequence of tool production, design of artifacts and their possible functions, and in the energy they invested in curating them. Lithic technological strategies are analyzed here in terms of risk management (Bousman 2005) and cost of procuring raw material (Andrefsky 1991). We consider such variables as the type of site and activities performed there, regional resource structure, mobility, and variety of occupations.

The evidence analyzed comes primarily from La María archaeological area, situated near other early sites like El Ceibo and Los Toldos (Cardich 1987), Cerro Tres Tetas (Paunero 2000) 5 and Piedra Museo (Miotti 1992). La María includes five early components that occur at Casa del Minero 1, Cueva Túnel and La Mesada; their radiocarbon dates range between 11,500 and 9000 RCYBP (Paunero 2009).

La María is situated in the Deseado Massif, in a rocky landscape (Ch•n Aike formation) that has a great variety of siliceous rocks of very good quality suitable for knapping. Flint and silicified tuff outcrops are broadly distributed, while chalcedonies and silicified woods are concentrated in limited areas. Non-local raw materials are also found in the sites, such as



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translucent opals, which possibly belong to the Ch•n Aike formation but have not yet been found in it; and obsidians, which probably came from Pampa del Asador (Skarbun 2009).

7 Lithic-Production Sequences

We examined 16 different kinds of lithic-production sequences in our techno-morphological analysis of debitage and tools. Seven of these sequences exploited quarries of immediately available flints and locally available chalcedonies to obtain unstandardized cores, which were

8 then taken to the sites to produce blanks, blades, and nodular supports (Figure 1). Different sequences are recognized for the final shaping of unstandardized blanks (flakes). In sequence 1, margins were retouched and edges were sightly regularized, but only on flints. In sequence 2, margins were also retouched, the edges were more regularized, and some tools were resharpened, operations that imply some degree of curation. In sequence 3 the final shaping was made by unifacial retouching, both extended and marginal; only flints were used in this



18 **Figure 1.** Lithic-production sequences of locally available raw materials and core transport for the early lithic assemblages from the La María archaeological area, Central Plateau, Santa Cruz, Argentina.

sequence. In sequence 4, final shaping was made by bifacial thinning. In sequence 5, some of bifacial-thinning flakes of flint were heat treated (Frank 2011). Although none of the finished tools from sequences 4 and 5 were recovered at the sites, the debitage evidence shows that both sequences produced curated and transportable tools. Flint blades were shaped by unifacial or bifacial marginal retouching (sequence 6). Finally, sequence 7 started with flint nodular blanks, which were shaped by unifacial extended and marginal retouching.

Seven other sequences were recognized on locally available flints, chalcedonies and silicified woods. In these sequences, however, unstandardized and blade blanks were transported to the sites (Figure 2). Final shaping involved three kinds of operations: (1) unifacial marginal

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retouching; (2) extended retouching with unifacial or bifacial marginal retouching of unstandardized blanks; and (3) bifacial thinning and bifacial marginal retouching of unstandardized and blade blanks. Three designs were identified with unifacial marginal retouching: one on silicified wood with poor edge regularizing (sequence 8); the other two on flints, sequence 9 with edge regularizing, and sequence 10 with notched edges. The tools finished by extended retouching or bifacial thinning were curated and transportable (sequences 11, 12, 13 and 14).

Finally, two sequences were performed on non-local translucent opals: unstandarized 10 blanks (sequence 15), and blade blanks (sequence 16). Sequence 15 started with blade cores,



Figure 2. Lithic-production sequences of locally available raw materials and blank transport for the 19 early lithic assemblages from the La María archaeological area, Central Plateau, Santa Cruz, Argentina.

and followed through with unifacial or alternate marginal retouching for final shaping, resulting in curated and transportable designs. Debitage analysis shows that bifacial thinning and edge resharpening were performed in both sequences.

Discussion

Two different organization modes were identified in the final-Pleistocene units analyzed. One corresponds to the lower units of Casa del Minero, defined as a multiple-activity site, possibly part of larger residential bases (Paunero 2009). Tasks were mainly related to the primary processing of prey, consumption, and secondary processing. Considering that a great variety of subsistence and mineral resources was readily available, it appears to have been 12 an efficient workshop where different technological strategies were applied to available local resources. Little energy was invested in acquiring local high-quality toolstone. Flint was the rock most often used; cores were prepared away from the site, probably in quarries with little energy invested in producing blanks. Other strategies were involved in the final shaping of tools, with more energy invested in manufacturing processes. These strategies were related

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to other factors, such as tool function and use life. Making bifacially thinned tools implies investing great energy and discarding away from the sites. Finally, other high-quality rocks were acquired from distant sources in lesser quantities. Importing exotic toolstone probably involved other strategies for transporting toolstone, economizing its use, and designing and curating versatile tools.

The lower unit of Cueva Túnel appears to have been organized in a different mode. Specific activities were performed in highly mobile circumstances while the area was being colonized (Paunero 2009). Under these conditions, the availability of raw material might have been an important concern. Consequently non-local translucent opal was the rock most commonly

13 used, and blade cores might have been transported. Analyzing debitage, however, reveals that tools were also manufactured from high-quality local flints, although tools of this material were not found at the site. In view of the desirability of this superior toolstone, tools made from it were probably made part of curated toolkits carried on long-distance travels. Other nearby early sites like La Gruta have yielded debris of siliceous raw material not immediately available, evidence that these toolstones circulated throughout the Deseado Massif since the late Pleistocene (Franco et al. 2011).

Subsequent occupations during the early Holocene, possessing a deeper knowledge of the landscape and whereabouts of resources, pursued more advanced strategies for procuring raw material. The need to acquire lithic resources influenced many of the decisions human groups had to make. Two strategies were involved. In the most common, cores or blanks of flint were transported to the sites. Producing blanks absorbed less energy than the final shaping and

- bifacial thinning of tools. This strategy was used to make tools designed for specific functions. The other procurement strategy involved obsidian, a non-local toolstone probably transported about 200 km. Other early Patagonian sites also appear to have used obsidian imported from a considerable distance. Studies of Cerro Tres Tetas reveal obsidian from Pampa del Asador (Paunero 2000; Stern 2004); it likewise appears in sites from the Deseado Massif (Miotti 2006; Hermo 2008) and Patagonia (Civalero 1999; Espinosa and Goñi 1999; Stern 2004). Its ubiquity further supports our interpretation that these groups practiced highly mobile strategies (Miotti 2006).
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