



Contents lists available at ScienceDirect

Journal of Anthropological Archaeology

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

How the Olmec used bitumen in ancient Mesoamerica

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ARTICLE INFO

Article history:

Received 11 May 2007

Revision received 18 February 2008

Available online 9 May 2008

Keywords:

Olmec

Bitumen

Chapopote

Asphaltum

Mesoamerica

Craft production

Material processing

Preclassic

Formative

ABSTRACT

Bitumen, found in abundance in Mesoamerica's southern Gulf Coast region in natural seeps and in many archeological contexts, is an important economic resource and exchange item that has received little consideration in Mesoamerica. Analyses of archeological, ethnoarcheological, and experimental data provide insights on the organization of bitumen processing activities, and the end product (archeological bitumen), which the Olmec (1200–400 BC) used in the production of many items. Archeological data are derived from investigations at El Remolino and Paso los Ortices—two Early Formative period levee sites in the San Lorenzo Olmec region. Our findings suggest that among the Olmec, bitumen processing was organized as a specialized activity, involving multiple production stages, but not necessarily elite involvement or control.

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When archeologists study production systems they usually consider the technology, agents, and organizing principles involved in the manufacture of craft items themselves (e.g., pottery, stone tools, textiles) (Costin, 2001, 2005). Our focus here differs in that while we are interested in production activities, we are not concerned with the manufacture of an actual craft item, but rather with the organization of bitumen processing and preparation, as well as the end product (archeological bitumen), which the Olmec (1200–400 BC¹) used in the manufacture of many items. In ancient Mesoamerica, processing also included smelting mineral ores (e.g., Hosler, 2003; Hosler and Macfarlane, 1996), processing latex (e.g., Hosler et al., 1997) and producing natural adhesives (e.g., Berdan, 2007). All of these raw materials had to be processed to be used effectively, and the final processed materials had many applications.

Since there is little reason to assume that indigenous populations and archeologists conceptualize processing and manufacturing activities in the same way, we argue that it is worthwhile to approach the study of ancient manufacturing from multiple angles in order to gain the most robust understanding of manufacturing systems in prehistory.

While the Olmec (Fig. 1) are one of the most written about early complex societies in Mesoamerica (Diehl, 2004), scholars know very little about the organization of their economy. Similar to

many world areas, most economic research on the Olmec has focused on craft manufacturing activities (e.g., Cyphers and Di Castro, 1996; Cyphers, 1996; Williams and Heizer, 1965; Coe and Diehl, 1980a; Curtis, 1959; Drucker et al., 1959; Gillespie, 1994; Di Castro, 1997; Rust, 1992; Rust and Sharer, 1988) at the expense of processing activities (but see Santley, 2004; Hosler et al., 1997). Because there are few Mesoamerican archeological and ethnohistoric analogies for bitumen extraction, processing, and preparation, we attempt to reconstruct aspects of Olmec processing and preparation from the bitumen recovered in excavations. Bitumen use among the Olmec is particularly interesting because it is rarely a craft item itself, but has real utility in primary and secondary activities (e.g., waterproofing wood, roofs, and watercraft, and attaching mica and shell to masks and ceramic figurines).

Very little evidence exists on how the Olmec processed materials. However, an analysis of rubber balls excavated from El Manatí suggests that the Olmec tapped latex from the *Castilla elastica* tree, combined it with liquid extracted from *Ipomoea alba* (a type of morning glory vine), and heated the mixture to achieve its 'rubber' quality (Hosler et al., 1997). It was then formed into balls (Hosler et al., 1997) and perhaps used as a waterproofing agent for such things as woven containers.

In the following sections, we present a discussion of the organization of manufacturing systems in antiquity. This is followed by an examination of bitumen collection and processing, and its use in Mesoamerica and other world areas, all of which provides useful insights on technological aspects of bitumen processing. Using archeological, ethnoarcheological, experimental, and chemical data

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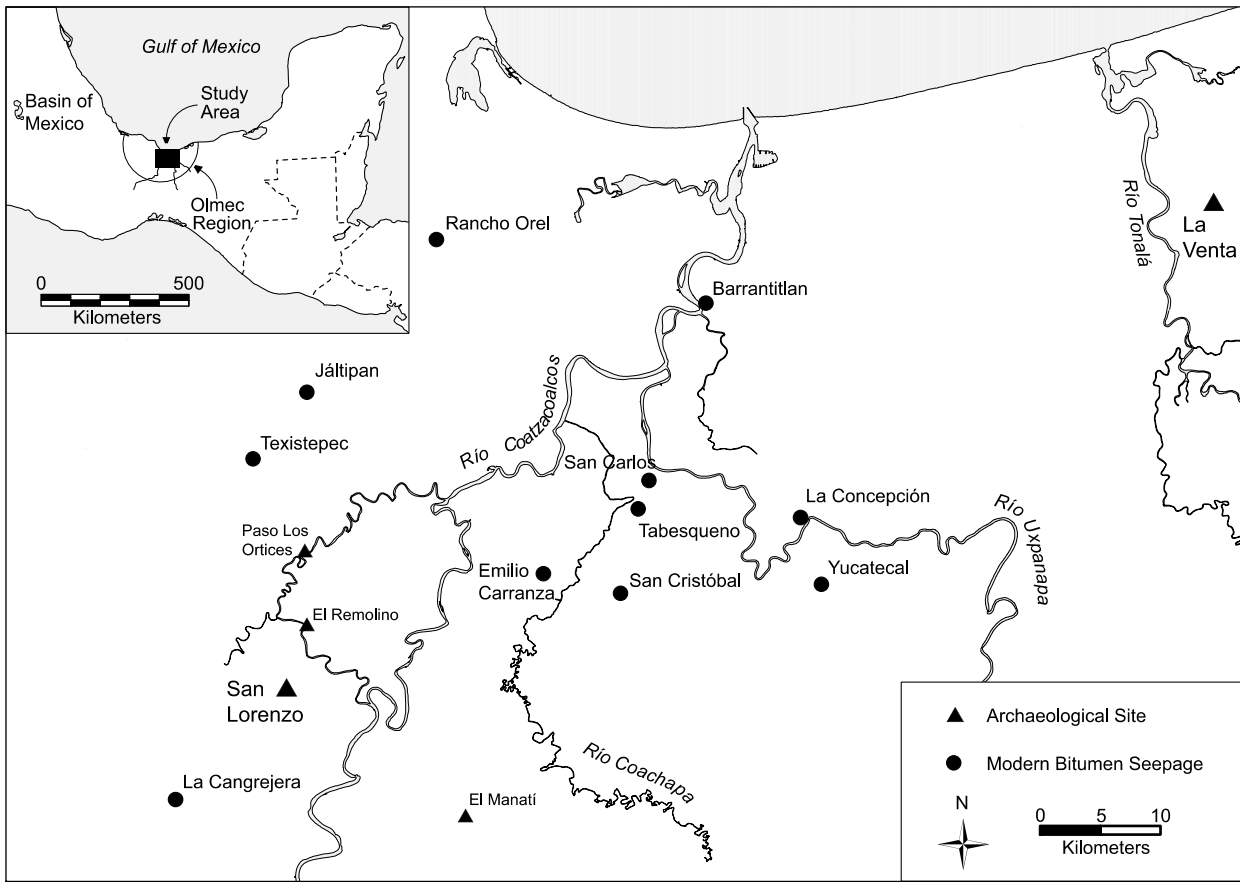


Fig. 1. Southern Gulf lowlands showing locations of major Olmec sites and modern bitumen seepages visited and sampled.

from our research in the Olmec region, we consider the steps, constraints, and variables involved in how the Olmec processed, prepared, and used bitumen. The archeological data on bitumen processing, storage, and preparation are from El Remolino and Paso los Ortices (Fig. 2)—two Early Formative (1500–900 BC) levee sites in the San Lorenzo region of Veracruz, Mexico (Symonds et al., 2002). Finally, we offer an interpretation of the bitumen processing sequence and the ways bitumen was prepared and used in Olmec times.

Production systems in prehistory

Since production systems are intimately linked to systems of distribution and consumption (Costin, 1991; Pool, 1992), we trace bitumen from procurement to consumption in order to gain a more complete understanding of the role the material played in Olmec society. An approach that takes into account all aspects of the production process of a particular item has the advantage of providing clues to the nature and organization of that society's social, economic, and political systems. In ranked and stratified societies the manufacture of some commodities are controlled by elites and play an important role in political economies, while the production of other commodities functions outside the political economy altogether (e.g., Rice, 1987; Demarest, 1992; Hirth, 2006).

How different commodities are treated depends largely on the nature of the society's political and ideological systems, and how and by whom the product was used. For instance, for the Olmec, utilitarian pots were used by all members of the society, but decorated greenstone celts were probably restricted to the elite, and it seems likely that production of these two items was organized differently.

In all types of societies, social, economic, and political factors influence the organization of production. For each particular artifact type, these factors affect the frequency, timing and locus of production, and the segment of society and the number of individuals involved in its production. For instance, scheduling (i.e., when an activity is performed, such as the time of the day or season) influences which social actors (e.g., their age/gender) perform the activity. Seasonal labor requirements, as in subsistence pursuits, often dictate the scheduling of production of other items during the 'off' season, which in turn influences which members of the society perform the activity (Hagstrum, 2001, p. 49). For most scholars (e.g., Gaimster and Freestone, 1997; Kramer, 1997; Childs, 1998) seasonal production generally implies a part-time activity unless, for example, specific climatic conditions determine the timing of production. This point is especially germane to the Olmec lowlands where a pronounced rainy season and seasonal flooding restrict the amount of time certain activities (e.g., ceramic manufacture) can be effectively undertaken, presumably resulting in an increasing intensity of processing/manufacturing activities of some items for a few months of the year.

The intensity and archeological context of manufacturing activities also reflect the social, economic, and political organization such as the degree of elite involvement in manufacturing for political purposes (Costin, 2001). Specifically, analyses of production loci can show (1) if the activity took place in domestic or non-domestic loci, (2) if the activity occurred in elite or non-elite loci, and (3) the location of the activity in relation to source material and consumption loci, which could reflect political boundaries, territoriality, or exchange networks. The intensity of manufacturing activities reflects the intensity of demand and often the nature and degree of elite involvement in the production process (Costin,

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