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Obsidian artifacts from the southeastern structure of the Lagartero Acropolis, Chiapas, Mexico

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ABSTRACT

Obsidian artifacts recovered from a structure located in the southeastern area of the Lagartero archeological site (Early Classic to Early Postclassic Periods), Chiapas, Mexico, were studied. Most artifacts were blades (proximal, medial, and distal fragments) in addition to flakes and core fragments. Groups of objects were differentiated according to their manufacturing technique and sequencing. Neutron activation analysis was applied to a collection of these artifacts, which were subsequently determined to come from one Mexican source (Sierra de Pachuca, Hidalgo, Mexico) and three additional sources in the Guatemalan Highlands (Ixtepeque, El Chayal, and San Martin Jilotepeque, the majority from the last). These results indicate contact between Lagartero and other Mayan and Mesoamerican populations. Due to its proximity, San Martin Jilotepeque was an important obsidian supplier for Lagartero. Two possible trade routes to Lagartero for the Sierra de Pachuca obsidian are proposed.

1. Introduction

The Lagertero archeological site (located in La Trinitaria municipality, Chiapas, Mexico; latitude: 14.8375; longitude: −92.25), is situated on the current border between Mexico and Guatemala (Fig. 1). This archeological site is the largest in the Upper Grijalva Basin, with a characteristic architectural style that has been well preserved until the present day. The site is composed of eight islands and seven peninsulas of different sizes. It is unique, having a distinct ecological environment, presumably because it is surrounded by 8.6 km^2 of swamps with fast flowing streams and lakes (Lagos de Colón) fed by springs and the backed-up water from the Lagartero and San Lucas Rivers, diverted by natural travertine barriers. A description of the site can be found elsewhere (Rivero Torres, 2007).

The relative chronology of Lagartero from the Early Classic (CE 300) to the Early Postclassic Period (CE 1200), is based on archeological data, ceramic typology, and C14 analyses. Thus, it's an ideal place to study the process of cultural change occurring over a long period. The inhabitants of Lagartero settled on small islands where they built housing and ceremonial structures. They had both terrestrial and lacustrine ecosystems, and because the area was so rich in food, it certainly influenced their cultural development. Lagartero was an important civic/religious site during the Late Classic Period (CE 700–900). The ceremonial center is located at El Limonal, one of the largest islands in the southern sector of the Cienega where there are pyramids, ball game courts, various altars, and housing foundations. The ceramics demonstrates the degree of artisan specialization. Codex style polychrome vases, decorated with personages richly dressed and we can see also a man represented on it is talking, as well as a variety of anthropomorphic and zoomorphic figurines. These ceramics seem to be related to or influenced by the Guatemalan Highlands, especially the regions of Quiché and Alta Verapaz (Rivero Torres, 2007), other sites in the Upper Grijalva Basin region, and Central Chiapas Highlands. (Tenorio et al., 2010). According to Kaufman (1976), a language preceding Mam and K'iche' developed in the high plateau of Huehuetenango and in Cuchumatanes (Guatemala). This language was the Mayan language spoken in Lagartero.

During the 15th field season in 2012 (Rivero Torres, 2013), a structure composed of limestone blocks was found in the southeastern sector (see Figs. 2 and 3). The main wall, on the southeast side of the structure, formed part of a high rectangular platform made with 9 to 12 blocks (50 × 10-cm) and supported low basements with benches that were also made of blocks. On the western side, an 18-m long platform was made with blocks that were bigger at the bottom. The wall at the southern side was made of similar blocks.

Twelve units, each 2 × 2-m and 20-cm deep, were excavated in the Southeastern Structure. From the surface to level 11–12 (2.20-m deep), a total of 923 obsidian artifacts were found. Lagartero lacked local obsidian sources, making it necessary for its inhabitants to participate in long distance trade networks to acquire these resources.

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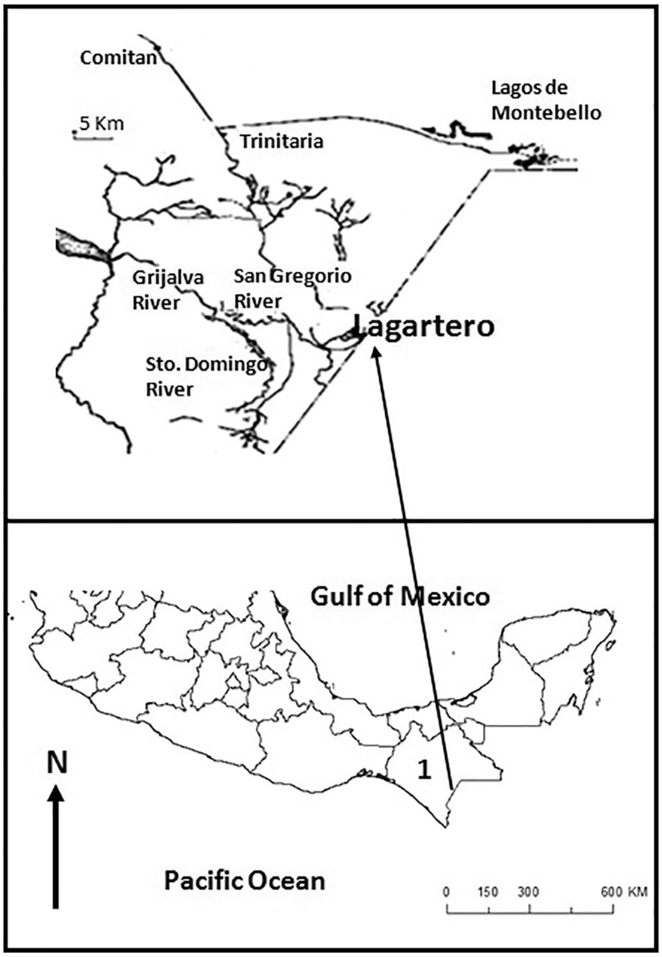

Fig. 1. Localization of Lagartero.1. Chiapas State, Mexico. 2: Guatemala.

According to Clark and Nelson (1988), the type of technology can be determined by differentiating groups of objects according to their manufacturing technique and sequencing. These considerations include:

A) Artifacts of the same type have approximately the same size and shape, similar platform and bulb, and comparable characteristic features on their dorsal surface.

B) Blade production from a core raw material requires two to three steps.

C) The flat surface of the stone could be used as a platform or be formed either by splitting the node into two halves or by removing one large blade. After the cortex is eliminated from the preformed core, it becomes a macro core.

D) Macro and small blades could be subsequently obtained through percussion upon the macro core until it was sufficiently small and regular; a core at this stage is called a long polyhedral core.

E) Prismatic blades could be produced from that core using a pressure technique. The blades obtained from the first ring (first series) are relatively short and still have percussion scars. The blades of the second series are longer, and some scars were removed from them by means of percussion, but a few remains at the distal portion.

At Mound 5, the entire production process of the obsidian blades was uncovered, including large cores worked with direct percussion to obtain prepared platform chips, macro-chips and micro-blades. In addition, blades manufactured using both a percussion and a pressure techniques were found, and exhausted polyhedral cores were found as well. Gray obsidian was widely worked to manufacture artifacts according to specific needs. We did not find the entire manufacturing process for the green obsidian (Rivero Torres and Tenorio, 2005).

The classification of the obsidians artifacts presented is based on the proposal of the reduction sequence for lithic artifacts (Clark and Nelson, 1988). Each group of products, differentiated by manufacturing technique and removal sequence from the original core, constitutes what Clark and Nelson define as a technological type. Blades from the first and second series were differentiated. However, due to the difficulty of distinguishing between the third, fourth, and later series, we decided that those with less than 5–7% of percussion scars on their dorsal surface would be categorized as "third series blades".

The aim of this study is: 1) to identify the types and series of artifacts recovered at the Southeastern Structure in the Lagartero archeological site, and 2) to identify the original source of a chosen collection of these obsidian artifacts, which were representative of the entire collection considering the types and colors of the artifacts.

2. Experimental processes

The 923 obsidian artifacts recovered at the Southeastern Structure during the 15th field season (Rivero Torres, 2013) were macroscopically classified according to type and color. The quantity of distal, medial, and proximal portions of the blades was evaluated. Manufacturing series were identified by the characteristics previously described. Blades from the first series are relatively short and still have percussion scars; the second series blades are longer with few scars at the distal portion. Those of the other series have very few scars on their dorsal surface.

Fifty-two obsidian objects were chosen for analysis by neutron activation (NAA). This selection included several types of artifacts, different colors, and artifacts from excavated and surface contexts (Table 1). Neutron irradiations were performed in the TRIGA MARK III nuclear reactor of the Mexican Nuclear Center (Instituto Nacional de Investigaciones Nucleares) at a thermal neutron flux of $1 \times 10^{13}\,cm^{-2}\,s^{-1}$. Samples of 200 mg of obsidian and of the reference material (SRM 278-Obsidian Rock) were irradiated for 2 h, and were allowed to decay for 12–14 days. The γ-ray spectra were then recorded for 2 h. All radioactivity values were corrected to account for half-lives and decay times. Nuclear data of the isotopes identified on the γ spectra are provided elsewhere (Jiménez-Reyes et al., 2001). Certificated SRM 278-Obsidian Rock from the National Institute of Standards and Technology (NIST) was the reference material for the calculation of elemental concentrations (NIST, 2017).

Statistical analyses were performed, taking into consideration elemental concentration data and using MURR procedures for statistical analysis of multivariate archaeometric data, written in GAUSS language (Neff, 2008). These multivariate statistical techniques were used to identify obsidian groups, which can be clearly differentiated from each other. All the different statistical strategies for the identification of groups by means of compositional data suggest that groups should be formed by statistically meaningful datasets, containing a suitable number of objects. The principal components analysis calculates orthogonal linear combinations of the auto-scaled variables the correlation matrix based on the maximum variance criterion. The plot of the projection of objects onto the first two or three principal components axes is a linear projection of the objects onto a two- or three-dimensional subspace that conserves most of the total variance.

3. Results and discussion

3.1. Typological analyses

The results of typological observations are provided in Table 2. The majority was blades, but flakes, cores and fragments of cores were found as well. They were gray (light, dark, veined), black and dark green.

The prismatic blades recovered in excavated levels were incomplete. The quantity of blade portions (proximal, medial, and distal) and their