Tarascan Copper Metallurgy at the Site of Itziparátzico, Michoacán, México

Research Year: 2003
Culture: Tarascan
Chronology: Late Post Classic
Location: Michoacán, México
Site: Itziparátzico

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Abstract

Mesoamerican copper metallurgy emerged in West México sometime between A.D. 600-800. Over a period of approximately 900 years, a wide variety of artifacts, typically decorations and other valuable non-utilitarian goods were produced. By 1450 A.D., the Tarascan kingdom in the state of Michoacán had become the most important center of Prehispanic metalworking. Metallurgy played a significant role in the structure of political and economic power in the Tarascan Empire. Metal adornments used as an insignia of social status and public ritual became even more associated with political power. While metal was used for an array of goods, virtually nothing is known about the manufacture and the organization of production of this craft. This report summarizes the results of the FAMSI-funded *Proyecto Santa Clara 2004*, which involved surface survey and excavations at the archaeological site of Itziparátzico, near the modern Tarascan community of Santa Clara del Cobre, where potential copper production areas were located and concentrations of manufacturing slag were recorded.

Resumen

El Reino Tarasco de Michoacán representa sin lugar a dudas el centro más importante de producción metalúrgica de cobre durante el período Posclásico Tardío en Mesoamérica. Éste y otros metales, así como diversas aleaciones, eran usados para la elaboración de una gran variedad de bienes, en su mayoría no utilitarios. Pese a su importancia, se desconoce por completo el proceso de manufactura y la organización de la producción de esta artesanía. El presente reporte ofrece una breve sinopsis de los resultados del *Proyecto Santa Clara 2004*, financiado por FAMSI, el cual incluyó recorridos de superficie y excavaciones de sondeo en el sitio arqueológico de Itziparátzico, localizado en las inmediaciones de la moderna comunidad de Santa Clara del Cobre, Michoacán, en el Occidente de México. Santa Clara es el hogar de la última industria artesanal de cobre forjado a mano aún activa en México. La información provista por fuentes etnohistóricas y la presencia inequívoca de desechos de fundición en la superficie de la zona arqueológica, sirvieron como indicadores de que la producción contemporánea de objetos de metal (particularmente cobre) tuvo su origen en tradiciones prehispánicas. En base a esta información, los objetivos principales de esta investigación fueron, pues, establecer el contexto, la etapa, la escala y la cronología de la producción de cobre en esta región.

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Introduction

During the Late Postclassic, the most important center of Prehispanic metalworking in Mesoamerica was without doubt the Tarascan kingdom in the state of Michoacán. While metal was used to produce a wide variety of artifacts, typically valuable non-utilitarian goods, virtually nothing is known about the manufacture and the organization of production of this important craft. The following report offers a brief summary of the results of the FAMSI-funded *Proyecto Santa Clara 2004*, which involved surface survey and excavations at the archaeological site of Itziparátzico, located on the outskirts of the modern Tarascan community of Santa Clara del Cobre, Michoacán, in West México (Figure 1). Santa Clara is the home of the last, but still thriving, hand-worked copper craft industry in México. Information provided by written sources, along with the factual presence of smelting waste on the surface of archaeological areas, suggested that the ongoing production of metal crafts (particularly copper) in this community has its roots in Prehispanic traditions. Based on this information, the main objectives of this investigation were to establish the context, the stage, and the scale of copper production in this region, as well as its chronology.

Figure 1. Map of West México (Based on Solís 1999, modified by Maldonado, 2004).

Project Background and Goals

The archaeological site of Itziparátzico is located between the communities of Santa Clara del Cobre and Opopeo, about 10 km south of the Pátzcuaro Basin, in the state of Michoacán (Figure 2). Although previous archaeological investigations in the region had concentrated in the vicinity of Lake Pátzcuaro, particularly in the Tarascan capital of Tzintzuntzan, it is well known among the older coppersmiths of Santa Clara that many mounds or *mogotes*, lie buried in this area. Presumably, Itziparátzico, as well as several other Tarascan village communities in the Pátzcuaro Basin, specialized in metallurgical craft production during the Late Postclassic period (Horcasitas de Barros 1981; Pellicer 1996).

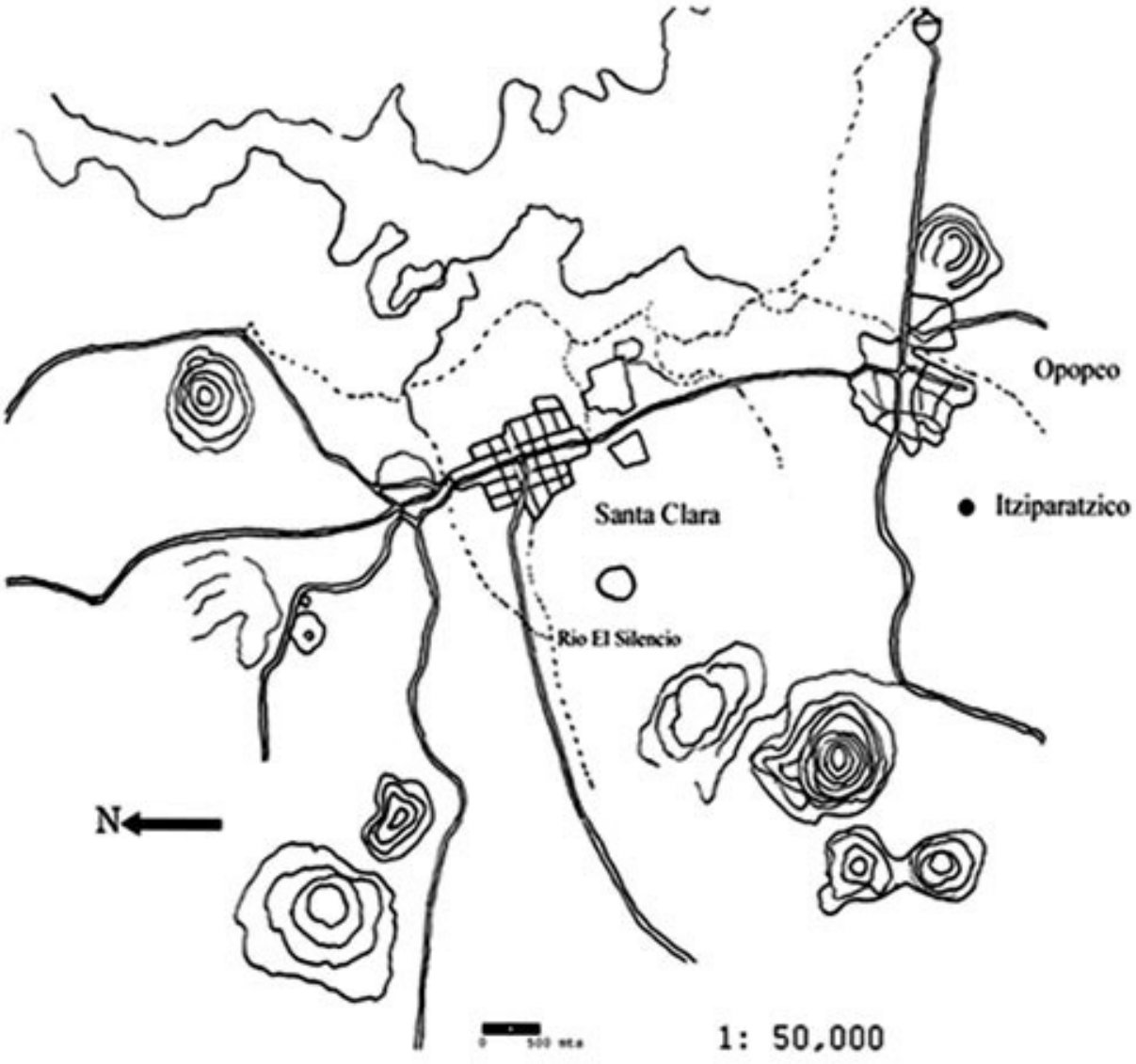

Figure 2. Map showing Santa Clara and its surroundings (Maldonado 2002).

According to colonial sources (e.g. Quiroga 1533, in Warren 1968), the indigenous populations of this region were skilled and knowledgeable in working copper. Itziparátzico and several other Tarascan village communities in the vicinity are mentioned in Colonial sources as communities specialized in metallurgical craft production (e.g. Horcasitas de Barros 1981; Pellicer 1996). The Spanish, eager to exploit the mineral wealth of the area, founded the village of Santa Clara De Los Cobres (modern Santa Clara del Cobre) to foster the processing of metal ore. In 1540, a large forge was built to smelt copper ore, which incidentally is not found locally, but has to be imported from copper mines around La Huacana, 80-100 km to the southwest in the Tierra Caliente (see Figure 3). Quiroga (1533, in Warren 1968) points out that since the smelting of ore took three times as much charcoal as ore; it probably resulted more

economical to transport the ore from the mines to the source of charcoal than the other way around.

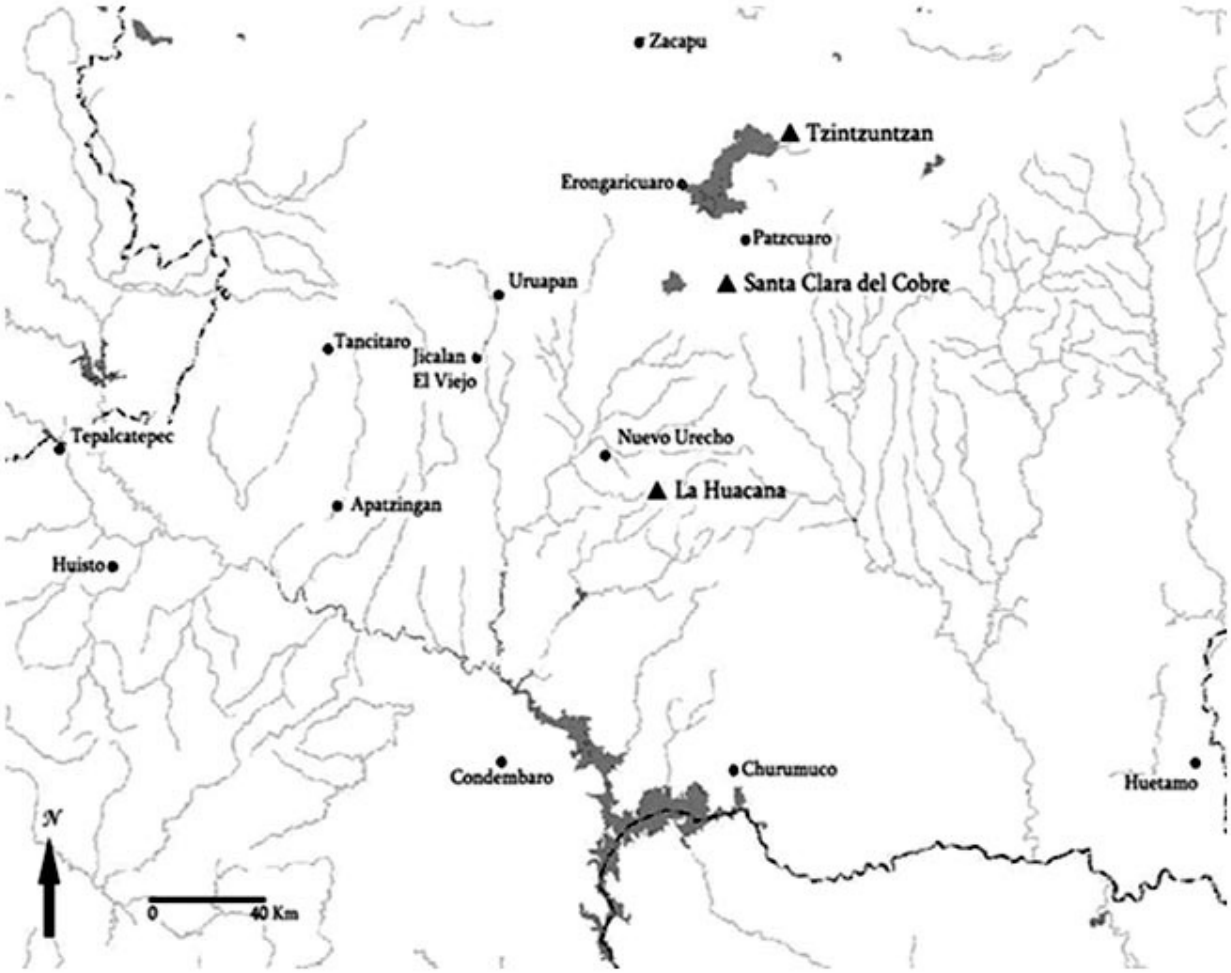

Figure 3. Regional map showing Santa Clara, Tzintzuntzan, and La Huacana. Drawn by H. Roskamp, 2004, 1 modified by Maldonado, 2004.

Preliminary surface survey at Itziparátzico during the summer of 2002 confirmed the presence of Prehispanic mounds, domestic terraces, and evidence for metalworking at the site (Figure 1). Evidence for metalworking consisted mostly of slag (locally known as *querenda*) located in discrete concentrations across the site. The local inhabitants have also described forged and hammered copper objects, such as axes, masks, and tweezers, that have been recovered from agricultural fields that now cover the site. Previously, Efrain Cárdenas (1986) had reported the existence of three archaeological sites at Itziparátzico, which he named separately as Potrero La Cornejalera, Puente del Rebocero, and Opopeo.

The research design of the Santa Clara 2004 project was a multi-method approach to identifying and examining traits, or clusters of traits, associated with different stages of metallurgy. The aim was to establish the basis for comparing archaeological evidence for metallurgical production with descriptions of Prehispanic metallurgy found in ethnohistoric sources, involving both the technology and organization of production. These results would also provide an opportunity to compare Prehispanic, as opposed to Contact metal production. The first stage of field research produced a comprehensive map of Itziparátzico, within which all evidence of craft metallurgy on surface has been located. Production areas have been identified mostly from concentrations of slag. Data recovered from excavation are currently being used to determine: (a) the production activities carried out at the locale (smelting, artifact casting, percussion shaping, finishing, etc.); (b) the technology employed in metallurgical production; (c) the context of production (domestic, non-domestic, etc.); (d) the size and layout of the production area; and (e) the relative chronology of the unit.

Fieldwork

Surface Survey

With the support of FAMSI and the Pennsylvania State University, I initiated systematic archaeological investigations at Itziparátzico during the summer of 2003. The surveyed area covered the zones explored by Cárdenas, and their surroundings and beyond. Intensive surface survey was used to locate production areas represented by concentrations of manufacturing by-products (i.e. slag). GIS equipment was employed to map an area of approximately 15 sq km and record archaeological materials and features. Three major sectors of the site were identified and mapped during this survey (Figure 4). Archaeological materials are present at varying densities throughout the whole site. A total of 79 surface collections were made during the survey that included ceramics, lithics (mainly obsidian), and slag. These materials were sorted and quantified, and still remain to be further analyzed.

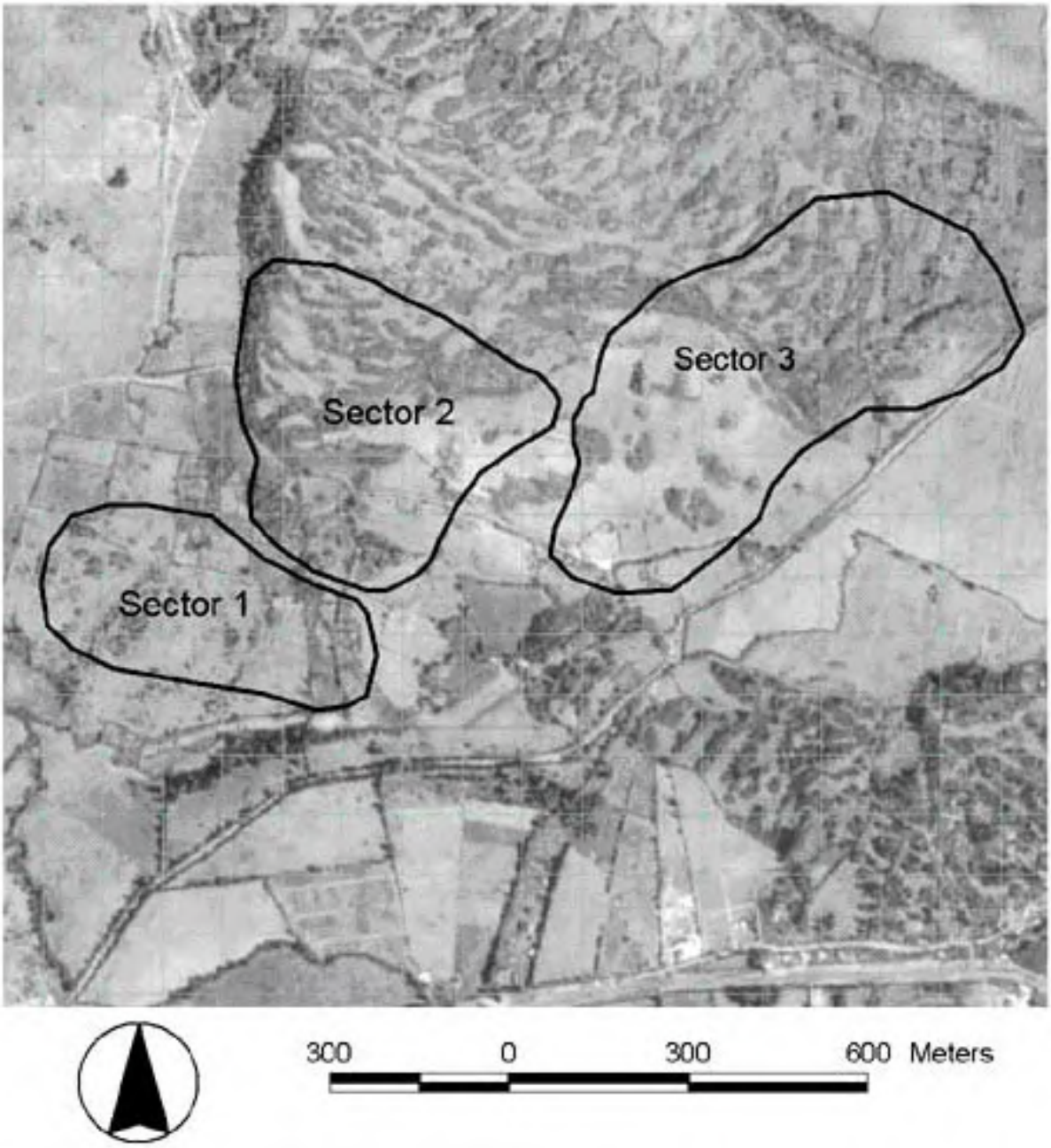

Figure 4. Site Layout (Maldonado 2004).

Slag concentrations were located almost exclusively around three freshwater springs, all of them situated toward the center of the surveyed area (Sector 1, Figure 4). Both the presence of smelting by-products and the proximity to water (indispensable for metalworking processes) indicate that smelting activities may have taken place at this sector of the site. Other materials collected from this sector include moderate amounts of potsherds and lithics (mainly obsidian prismatic blades). Among the most remarkable

materials recollected during the survey is a set of stylistically diverse Tarascan pipes, which were also collected from Sector 1. Helen Pollard has positively identified these pipes and several polychrome ceramic fragments as Late Postclassic (for examples, see Figure 11, Figure 12, Figure 13, Figure 14, Figure 15, Figure 16, Figure 19, and Figure 20; thumbnail images shown in Table 1 below). The combination of ceramic pipe fragments, Tarascan polychrome ceramics, and prismatic blade fragments (probably from Ucareo) at the site, indicates an elite occupation (Pollard 2003; Pollard *et al*. 2001).

The second sector of the site (Sector 2, Figure 4) consists basically of terraces, both occupational and agricultural. A total of twenty-seven terraces, most of them domestic in nature, were identified in this sector of the site. Although some slag is scattered on surface, the amounts are significantly smaller than those at Sector 1. Sector 2 presents, on the other hand, the highest densities of potsherds and lithics on surface. Some of these potsherds present painted decoration. Lithics include obsidian blades and a few grinding stone fragments. Two anthropomorphic figurine fragments were also collected from one of the terraces. The third sector of the site (Sector 3, Figure 4) contains numerous mounds, as well as presence of lithic and ceramic materials on surface. A total of thirty-one earthen mounds were recorded throughout the survey area; about a third of them are in Sector 3. The patchiness of the materials on surface suggests a scattered settlement pattern and a relatively short-lived Prehispanic occupation, presumably, affiliated with the Late Postclassic Period. The results of this surface survey have set the parameters for the selection of excavation areas.

Excavations

Sample collection from stratigraphic context was the next critical step of my research. I conducted nine weeks of intensive fieldwork beginning in mid January and ending in late March 2004. This fieldwork involved the preliminary archaeological test excavations in the three major sectors of the mapped area of the site: the sector of the water springs, which presumably represents the production zone of the site; the sector of the domestic terraces; the sector of the large mounds (see Figure 4). Seven test-pits were excavated through deposits of silt and clay in different parts of the area. The overall aim was to assess the quality and significance of the archaeological information obtained during the surface survey. Three of these test pits were located in Sector 1, two in Sector 2, and two more in Sector 3. All metallurgical remains, pottery, lithics, soil samples, and soil and radiocarbon samples were collected. The results of these excavations were consistent with the observations on surface. No consistent evidence for occupation before the Late Postclassic Period was found.

Table 1. Samples of Ceramic and Lithic Artifacts from Itziparátzico

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Although their actual processing is still in progress, all of the ceramic and lithic artifacts from excavation seem consistent with a Late Postclassic Tarascan occupation. The lithics include obsidian blades, arrow heads, modified flakes, and cores (Figure 5, Figure 6). Basalt blades, axes and hammers were also recovered, as well as grinding stones (Figure 7, Figure 8). Discreet amounts of potsherds were recovered including both undecorated and decorated samples. The most abundant fragments correspond to a domestic, well-polished, red-slipped ware (Figure 9). Although the general condition of the pottery is highly fragmentary, in this case, we have been able to identify pieces of jars and bowls, as well as two fragments of stirrup-spouts (see Figure 10). The most common type among the decorated specimens is a red-and-white-on-orange ware, which seem to have included forms such as bowls and plates (Figure 11, Figure 12). Other polychrome examples in our collection are shown in Figure 13, Figure 14, Figure 15, and Figure 16. Incised and appliqué decoration is also represented in the sample (Figure 17 and Figure 18). The ceramic assemblage also includes a number of Tarascan pipe fragments (Figure 19, Figure 20).

Regrettably, no identifiable metalworking structures (furnaces, hearths, and pits) were found at Itziparátzico during the test-pitting. Slag samples recovered from excavation, therefore, represent the most relevant material for the purposes of this project. While these smelting waste-products were recovered in large amounts, only a representative sample of 2.1 kg was selected and exported for metallographic analysis. Part of this material is currently being analyzed at the Institute of Archaeology, University College London (see Figure 21 and Figure 22 for examples of slag specimens). The absence of metallurgical materials other than slag (i.e. fuel, hearth structures, crucible fragments, mould fragments, stock metal, metal prills, failed castings, part-manufactured objects and spillages, etc.) around Itziparátzico is remarkable, although it may indicate that only primary copper production was being carried out at the site. Primary production involves the actual smelting or extraction of metal from its ore by heating. Conversely, secondary production or smithing implies the working or forging of metals into artifacts (Bachmann 1982).

Laboratory Analysis

The main goal of the slag analysis is to examine the technology and social context of copper metallurgy at Itziparátzico, by determining the type of ore, smelting temperature, manufacturing processes and the level of mastery that the smelters exercised over their craft. Optical microscopic examination of microstructures has been carried out to determine the mineralogical structure of the slag. Scanning electron microscopy with energy-dispersive X-ray spectroscopy (SEM/EDS) is being used to perform phase and elemental analysis of the samples, as well as for confirmation of the minerals detected by optical microscopy. The samples are also being examined by X-ray fluorescence spectroscopy (XRF) to determine the bulk chemical composition of the slags and assist the microscopic examination of mineral phases within samples.

Preliminary results indicate the use of chalcopyrite ($CuFeS_2$), a sulfidic ore, for copper extraction at the site. In addition, the partial mixing of iron with copper observed in metal prills, indicates the production of a high smelting temperature, and points towards a very efficient, highly-reductive environment. A high reduction environment requires a well-developed and sophisticated smelting method. This rules out the possibility of the use of crucibles and lung-powered blow pipes, and suggests instead, the use of a formal furnace operated by bellows. Alternatively, this high-oxygen environment could have been the result of the use of some type of wind-powered furnace.

Comments

Although small in scale, the *Proyecto Santa Clara 2004* proved successful in wholly or partially resolving some of the most outstanding archaeological issues of the archaeological site of Itziparátzico. The results have allowed us to determine that the production activities carried out at the site involved mainly primary smelting. Possibly, copper ingots were being produced at Itziparátzico and then transported elsewhere for their final processing into objects. The technology employed in the smelting process, as mentioned before, involved an efficient, highly-reductive environment. These results, while enlightening, raise a major issue regarding the chronological and cultural context for this primary production. If Late Postclassic, the smelting activities that took place around the site may have been carried out in Prehispanic wind-powered furnaces. However, if such activities involved the use of bellows, we may well be dealing with a relatively early post-Contact production area, this considering their association with unquestionably Tarascan cultural assemblages. Only further research in the area can provide sufficient data to address this question and those related to issues about the domestic versus non-domestic nature of the production and the size and layout of the production areas. Regardless the specific technological affiliation, this information will be crucial to the study of Tarascan and Mesoamerican metallurgy.

The results of this project have provided the basis for comparing archaeological evidence for metallurgical production with descriptions of Prehispanic metallurgy and metallurgical production found in ethnohistoric sources. It also provided us with a firm foundation of experience on which to base any future research in the region. Due to the small size of the site, it is believed that there would have been other similar smelting workshops in the area. This idea seems consistent with what is mentioned in Spanish accounts, however, a search for ethnohistorical data on the region is also critical. Only close scrutiny of the original sources will help us to positively identify Itziparátzico and the surrounding villages within their physical and political context. Additionally, this archival research can be used for establishing the status of these communities within the Tarascan domain at the time of Contact and determining their role as metal producers in the economic organization of the state. Experimental archaeology represents another potential source of information. For instance, Quiroga's assertion that the reason for the location of this smelting area was fundamentally economic, could be evaluated in the future through archaeological experimentation, by replicating the technology and smelting methods used by the Prehispanic smelters.

In summary, the project described above represents a valuable initial step in approaching issues of copper production in the region. Nevertheless, further archaeological, ethnohistorical, and experimental work is essential to our understanding of metallurgy at the site and at region level, as well as at the matter of its association with the Tarascan culture of ancient Michoacán. The combination of these data will also give us clues about why this technology developed as it did in Western México.

Acknowledgements

This research project was accomplished thanks to the research grant received from the Foundation for the Advancement of Mesoamerican Studies, Inc., (FAMSI); the support of the Instituto Nacional de Antropología e Historia (INAH), México; and the Pennsylvania State University was also vital, and I wish to express my sincere thanks to the three institutions. My advisor, Ken Hirth, provided me with invaluable advice in designing and carrying out this research. Various types of support offered by David Webster have been decisive for a successful accomplishment of the research. Special appreciation must also be extended to William Sanders, Susan Evans, Helen Pollard, Dorothy Hosler, Hans Roskamp, and Miguel Medina, who have provided valuable assistance with various aspects of the research. I am particularly indebted to Gerardo Gutierrez, Alfredo Vera, Jay Silverstein, Josué Gómez, and Alondra Godínez, who assisted me throughout different stages of the fieldwork. Important aid was received from James Metcalf and Ana Pellicer, as well as from the authorities of Municipio of Santa Clara del Cobre, Michoacán. I owe my gratitude to all of them, as well as to my local workers and informants, who made possible our fieldwork.

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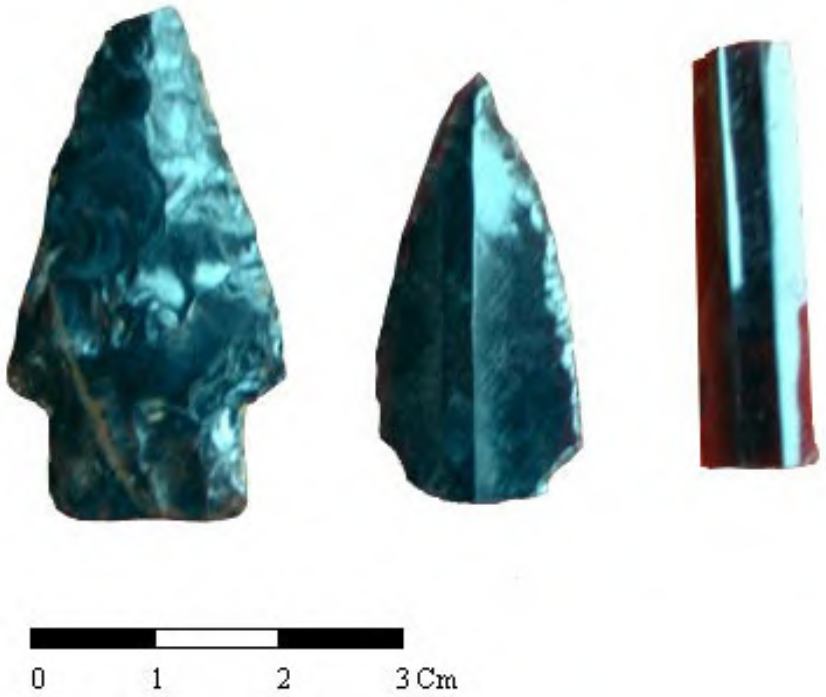

Figure 5. Obsidian arrow heads and prismatic blade.

Figure 6. Obsidian core.

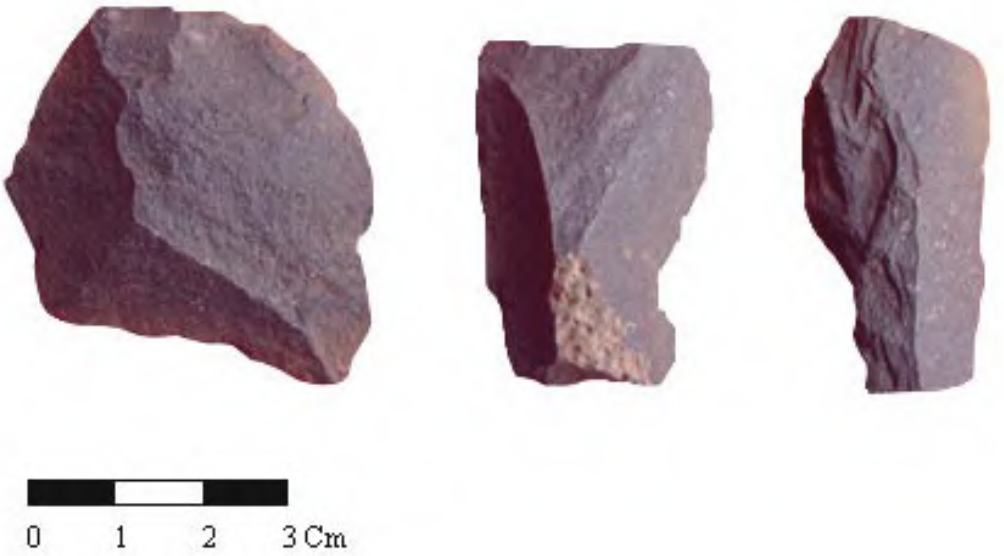

Figure 7. Basalt flakes and blade.

Figure 8. Basalt axe.

Figure 9. Red slip ware.

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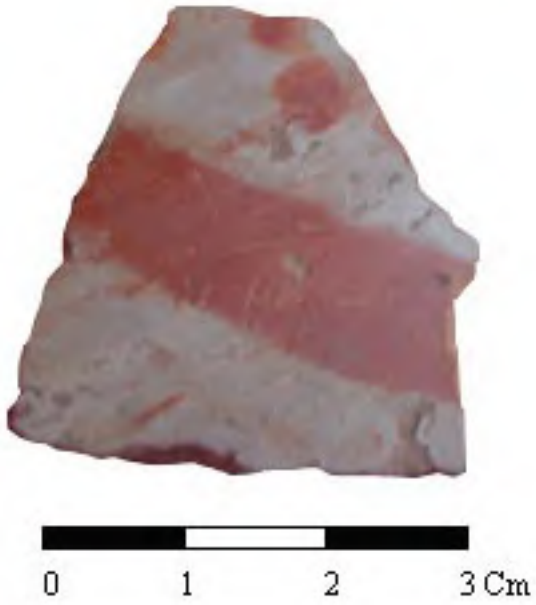

Figure 11. Red and White on Orange body fragment.

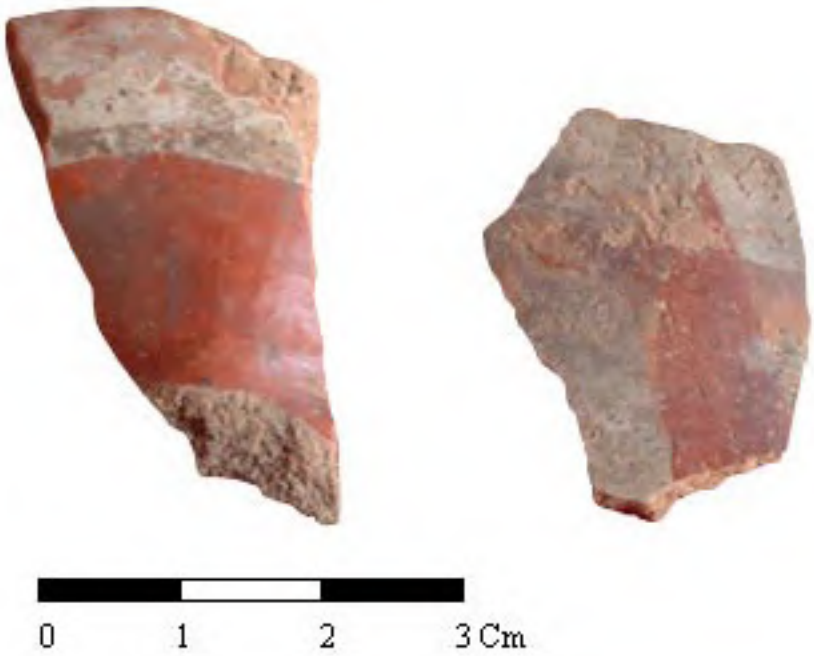

Figure 12. Red and White on Orange rim and body fragment.

Figure 13. Decorated black on red pottery.

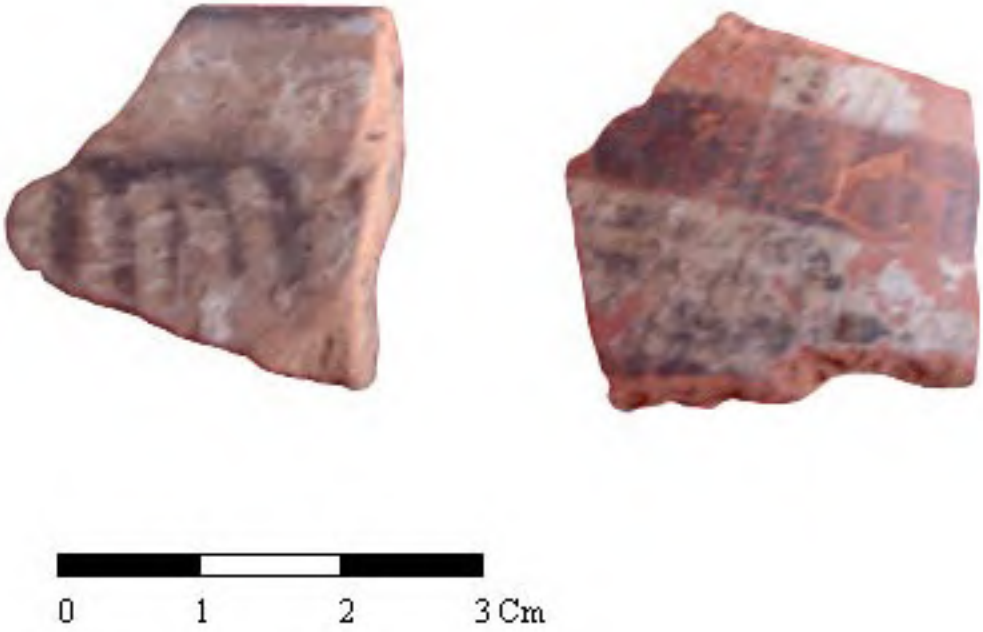

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Figure 22. Platy slag fragment from Itziparátzico.

Figure 23. Drawing from Códice Florentino, ©1550. Department of Library Services, American Museum of Natural History (image provided by Hans Roskamp).