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## **An Archaeological Investigation of the Origins of Cacao Drinking: The Ceramic Evidence from the Gulf Coast and Pacific Coast of México**



**Research Year:** 2006

**Culture:** Olmec, Maya

**Chronology:** Early Pre-Classic

**Location:** Gulf Coast and Pacific Coast, México

**Sites:** San Lorenzo, El Manatí, El Paraíso, El Merced, Cantón Corralito, Paso de la Amada

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### **Abstract**

Recent research has revealed that the Maya Lowlands may have been one of the first areas in which beverages made from cacao (chocolate) were prepared and consumed.

Powis and colleagues have identified traces of chocolate in spouted jars from the site of Colha, Belize, dating to ca. 600 B.C. The proposed project for the summer of 2006 had two main objectives: (1) to provide additional chemical evidence to support the early use of cacao by testing ceramic vessels from a number of Olmec sites, such as San Lorenzo, El Manatí, El Paraíso, El Merced, and Cantón Corralito; and (2) to test the hypothesis put forth by Clarke and Blake (1994) that the first ceramic vessels dating to the Early Preclassic Barra Phase (1600-1400 B.C.) from the site of Paso de la Amada were special containers used for serving ritual drinks made from chocolate.

## **Resumen**

La investigación reciente ha revelado que las Tierras Bajas Mayas pueden haber sido una de las primeras áreas en las cuales las bebidas hechas del cacao (chocolate) fueron preparadas y consumidas. Powis y sus colegas han identificado rastros del chocolate en jarras con pico del sitio de Colha, Belice, pasando de moda a ca. 600 a.C. El proyecto propuesto para el verano del 2006 tuvo dos objetivos principales: (1) para proporcionar pruebas químicas adicionales para comprobar el uso temprano de cacao probando vasijas de cerámica de varios sitios Olmec, como San Lorenzo, El Manatí, El Paraíso, El Merced, y Cantón Corralito; y (2) para comprobar la hipótesis hecha por Clarke y Blake (1994) que las primeras vasijas de cerámica que pasan de moda a la Fase de Preclásico Temprana Barra (1600-1400 a.C.) del sitio de Paso de la Amada eran contenedores especiales usados para servir bebidas rituales hechas del chocolate.

## **Introduction**

At the time of the Spanish Conquest, there were a number of written documents describing the importance of cacao, or chocolate, as a luxury drink, trade item, tribute item, and currency used by the Aztec and Maya (Coe and Coe 1996; Dakin and Wichmann 2000; Hall *et al.* 1990; Millon 1955; Reents-Budet 1994; Thompson 1956; Tozzer 1941; Weaver 1981). During this time, cacao was consumed with most meals and was always mixed with some other substance (e.g., water, maize, chili, fruit, and/or honey) and in different proportions to produce a variety of foods and beverages. In the Maya area, for example, there is considerable archaeological, botanical, iconographic, and epigraphic data demonstrating that cacao was being utilized during both the Classic (A.D. 250-900) and Postclassic (A.D. 900-1500) periods as evidenced by the discovery of whole beans and wood charcoal fragments, as well as by representations painted on ceramics and by depictions of cacao beans or pods modeled in clay as adornments (Coe 1990; Coe and Coe 1996:54; Gasco 1987; Hall *et al.* 1990:138; Hammond and Miksicek 1981:260-269; Houston and Taube 1987; Houston *et al.* 1989; MacLeod 1990, MacLeod and Reents-Budet 1994; McAnany *et al.* 2005; McAnany *et al.* 2001; Turner and Miksicek 1984:Table 1).

## Previous Research

Over a decade ago, chemical residue analysis was performed on a number of whole ceramic vessels recovered from an Early Classic (A.D. 460-480) tomb (Tomb 19) at the Maya site of Río Azul, located in northeastern Guatemala. Researchers at the site had strong indications that some of the vessels contained cacao because several of the hieroglyphs painted on the exterior surface of one vessel were translated to mean it contained cacao (Hall *et al.* 1990:141). Visual evidence of liquid marks preserved on the interior surface further indicated that it contained some type of liquid substance (Hall *et al.* 1990:141). A total of four vessels from Tomb 19 had revealed definite indications of cacao through a series of high-pressure liquid chromatography techniques (Hurst *et al.* 1989). The residue analysis from Río Azul at the time provided the earliest date of cacao consumption by any Mesoamerican culture group.

At present, very little data exists, chemical or otherwise, for the use of cacao during the earlier Preclassic or Formative (2000 B.C.–A.D. 250) period. However, one recent archaeological study by Powis, Valdez, and Hester of the University of Texas at Austin along with colleagues from the Hershey Foods Corporation in Pennsylvania revealed that the Maya had a much longer history of producing and consuming cacao than previously determined (Hurst *et al.* 2002; Powis *et al.* 2002). Our research focused on testing a number of Middle Preclassic (900-400 B.C.) and Late Preclassic (400 B.C.–A.D. 250) spouted vessels from the site of Colha, located in northern Belize, to determine what contents they contained. Specifically, our aim was to confirm the existence of cacao residues in these spouted vessels. We analyzed dry residue samples from 14 spouted vessels by using high-performance liquid chromatography coupled to atmospheric pressure chemical-ionization mass spectrometry (HPLC/APCI MS). The results indicated that three of the spouted vessels contained significant amounts of *theobromine*, a compound marker unique to cacao. The identification of chocolate in these vessels pushed back the earliest chemical evidence in the Maya lowlands, and indeed for all of Mesoamerica, to about 600 B.C.

The presence of residue, whole beans, and wood suggests that the Maya region, particularly Belize, may have been one of the first areas in which cacao cultivation as well as the custom of cacao drinking occurred. But what about the cultivation of cacao among earlier Mesoamerican culture groups like the Olmec and Mokaya, who also lived in coastal lowland areas like the Maya of Belize? Did the Gulf Coast Olmec and the Pacific Coast Mokaya also prepare and consume beverages made from cacao? Did the practice of cacao drinking originate with one of these earlier civilizations, or were the Middle Preclassic Lowland Maya the first to cultivate and use cacao in ritual and culinary practices? If so, what direct evidence exists for the cultivation and use of cacao by the Olmec and Mokaya?

## Current Research

At present, the data are scant in both regions where there is no strong archaeological, botanical, or iconographic evidence for the use of cacao (Michael Coe and David Lentz, personal communications, 2004). In the Gulf Coast area, it is only linguistic evidence that provides the strongest clue that the origins of cacao cultivation in Mesoamerica began with the Olmecs. According to Campbell and Kaufman (1976), the Olmec spoke ancestral Mixe-Zoquean as far back as 1500 B.C. and that the word **ka-ka-wa** or cacao was a Mixe-Zoquean word. However, in a recent article, Dakin and Wichmann (2000) contend that the origin of the word "cacao" is a Uto-Aztecan (Nahuatl) term dating to A.D. 400, not an Olmec one. Based on the current findings from the Colha spouted vessels, it does not seem plausible that the word **ka-ka-wa** was diffused to the lowland Maya from highland México, particularly since the Maya were consuming chocolate nearly a millennia before this diffusion supposedly occurred (Powis *et al.* 2002:100-101).

In the Mazatán region of the Pacific Coast of Chiapas, México, there is a complete lack of data on cacao use by the earliest Mokaya people. The first chiefdoms in lowland Mesoamerica were developed in this area, dating to the Barra Phase (1600-1400 B.C.). During this time, the period witnessed the adoption of maize agriculture, the founding of sedentary villages, and the adoption of ceramic technology. According to Clarke and Blake (1994:25), ceramic technology was adopted for personal advantage in displays of competitive feasting. Barra ceramics are considered to be copies of fancy gourd vessels. They are thin-walled, finely finished, and elaborately decorated (bichromes, trichromes, incised, grooved, carved, fluted, and gadrooned). All Barra pottery consists of flat-bottomed tecomates or deep incurved bowls; no plain, unslipped, or undecorated vessels have been recovered. Barra ceramics were not designed for cooking, but for holding liquids, presumably liquids with ritual significance and prestige for the giver, such as *chica* (corn beer) and/or *atole* (a drink of ground corn and chocolate) (Clark and Blake 1994:28; Clark and Gosser 1995:216). To date, there is no direct evidence to support their hypothesis. Therefore, this study attempts to address this lack of information regarding the origins of cacao use by chemically testing a number of ceramic vessels from sites located in both regions. This study is a collaborative effort with Dr. W. Jeffrey Hurst of the Hersheys Foods Corporation, the scientist who performed the original chemical testing on the Colha and Río Azul vessels.



Figure 1. Map of Cantón Corralito, located on the southern coast of Chiapas, México.

## Methodology

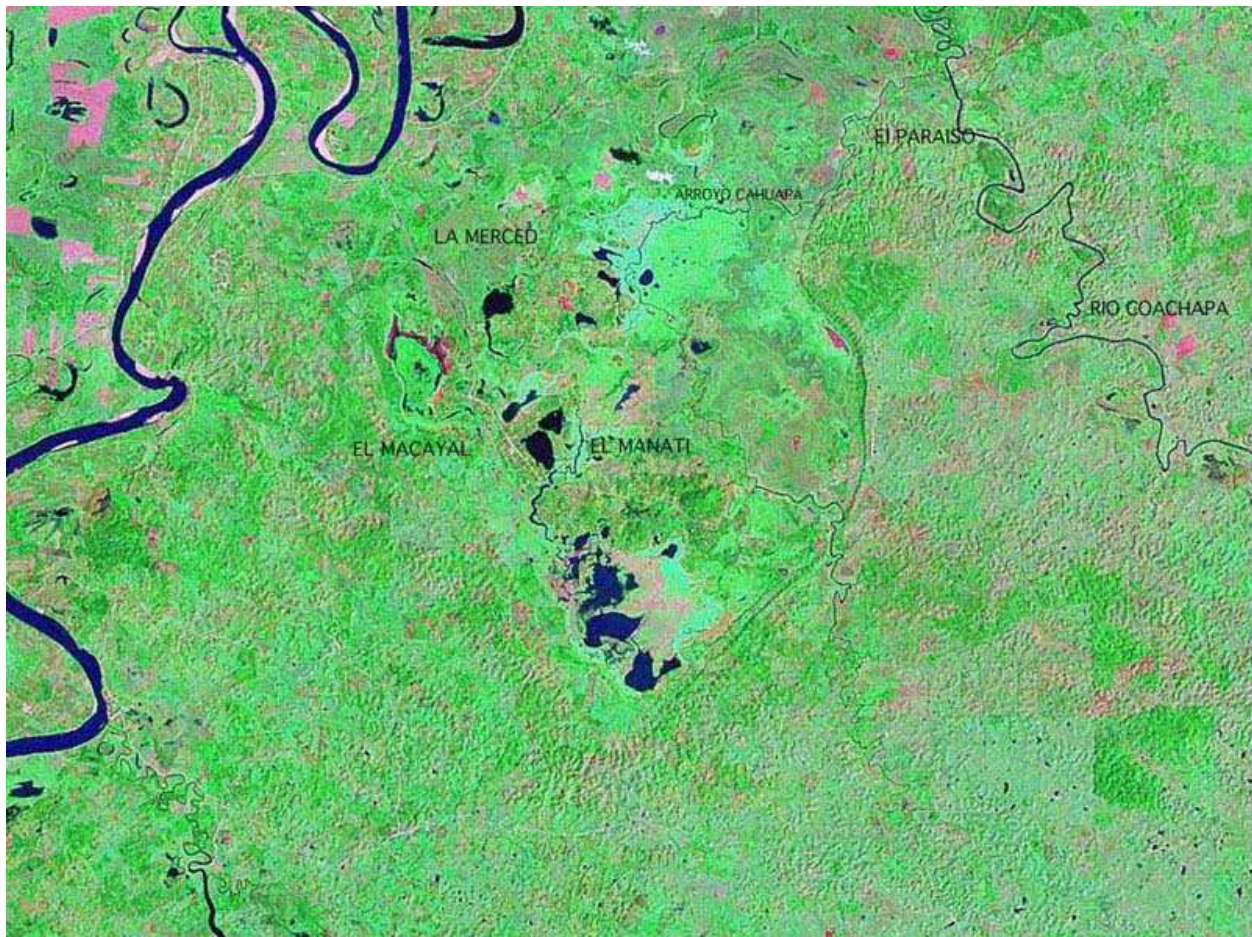
This study is part of the ongoing analysis of the artifactual material excavated from the sites of Cantón Corralito, Paso de la Amada, El Manatí, El Paraíso, La Merced, and San Lorenzo ([Figure 1](#), shown above; [Figure 2](#), [Figure 3](#), and [Figure 4](#), shown below). The ceramic material has already been excavated and is stored at various institutions in both the United States and México. Consequently, my study consisted entirely of laboratory analysis. The ceramic material from the site of San Lorenzo was excavated by Michael Coe and Richard Diehl (1980) and is currently being housed at the Museum of Anthropology at Yale University, New Haven, CT. The material from El Manatí, El Merced, and El Paraíso was excavated by Ponciano Ortiz and Carmen Rodríguez (1989, 1994, 1999), and is currently being housed at the regional offices of INAH in Veracruz, México. The pottery from Paso de la Amada was excavated by Michael Blake and John Clark (1994), and is currently housed at the New World Archaeological Foundation (NAAF) in San Cristóbal, Chiapas, México. The pottery from the site of Cantón Corralito was excavated by David Cheetham (2005; see also Cheetham *et al.* 2005), and is also being housed at NAAF in San Cristóbal.



Figure 2. Map of Paso de la Amada, located on the southern coast of Chiapas, México.

The ceramic material from each of the sites has already been subjected to a formal attribute analysis using the type:variety-mode approach. My strategy was to sample approximately 25 vessels from each of the six sites for the presence of cacao, totaling 150 vessels. The sampled vessels were to be either whole or complete (exhibiting a rim-to-base profile) in nature. Furthermore, only vessels derived from Early Preclassic sealed contexts (e.g., mound fill) were used. At the Olmec sites, only vessels dating to

the Ojochi (1350-1250 B.C.), Bajío (1250-1150 B.C.), Chicarras (1150-1050 B.C.) and San Lorenzo A and B (1050-900 B.C.) Phases were sampled. At the Mokaya site of Paso de la Amada, only Barra Phase (1900-1700 B.C.) vessels dating to pre-Olmec times will be tested. The full range of ceramic types (e.g., Bayo Brown, Calzadas Carved, Casnel Black-and-orange, Camano Coarse, El Tigre White, Lamina White, Limon Carved-Incised, Salta Orange, Tatagapa Red, Tilapa Red-and-white, Tusta Red) and forms (e.g., bowls, jars, basins, tecomates, cups, bottles, gravy boats, and spatulas) were included. Thus, the full range of vessels used in the preparation, presentation, storage, and consumption of cacao was sampled. This information also helped to determine the activity sets used in the process of making cacao drinks by both the Olmec and Mokaya peoples.



**Figure 3. Map of the Gulf Coast region, showing El Manatí, El Paraíso, and La Merced.**

In order to test whether or not any of the ceramic vessels contained cacao, I lightly scraped the interior surface of each vessel to remove any substance(s) that may have permeated the vessel wall. No damage was done to the fired clay surfaces. A small sample of clay material (ranging from 1-5 grams) was collected from each vessel and sent to Dr. W. Jeffrey Hurst of the Hershey Foods Technical Center at Hershey Foods



Corporation in Pennsylvania. The dry residue samples taken from all of the vessels will then be analyzed for cacao through a new analytic technique known as high-performance liquid chromatography coupled to atmospheric-pressure chemical-ionization mass spectrometry (HPLC/APCI MS). This technique has been successfully used in the determination of cacao for the spouted vessels from Colha (Hurst *et al.* 2002:289; Powis *et al.* 2002:97-98). Dr. Hurst took about 500 mg from each sample that I submitted to him and added three milliliters of hot distilled water at 80 degrees Centigrade in order to solubilize any materials. The HPLC/APCI MS was then used to detect peaks of *theobromine*, which is considered a unique marker for identifying cacao or *Theobroma cacao*. *T. cacao* is the only Mesoamerican plant that contains *theobromine* as the primary compound. Given the previous success with using this mass spectrometry technique, it was expected that the Olmec and pre-Olmec ceramic vessels would yield traces of the compounds for cacao.

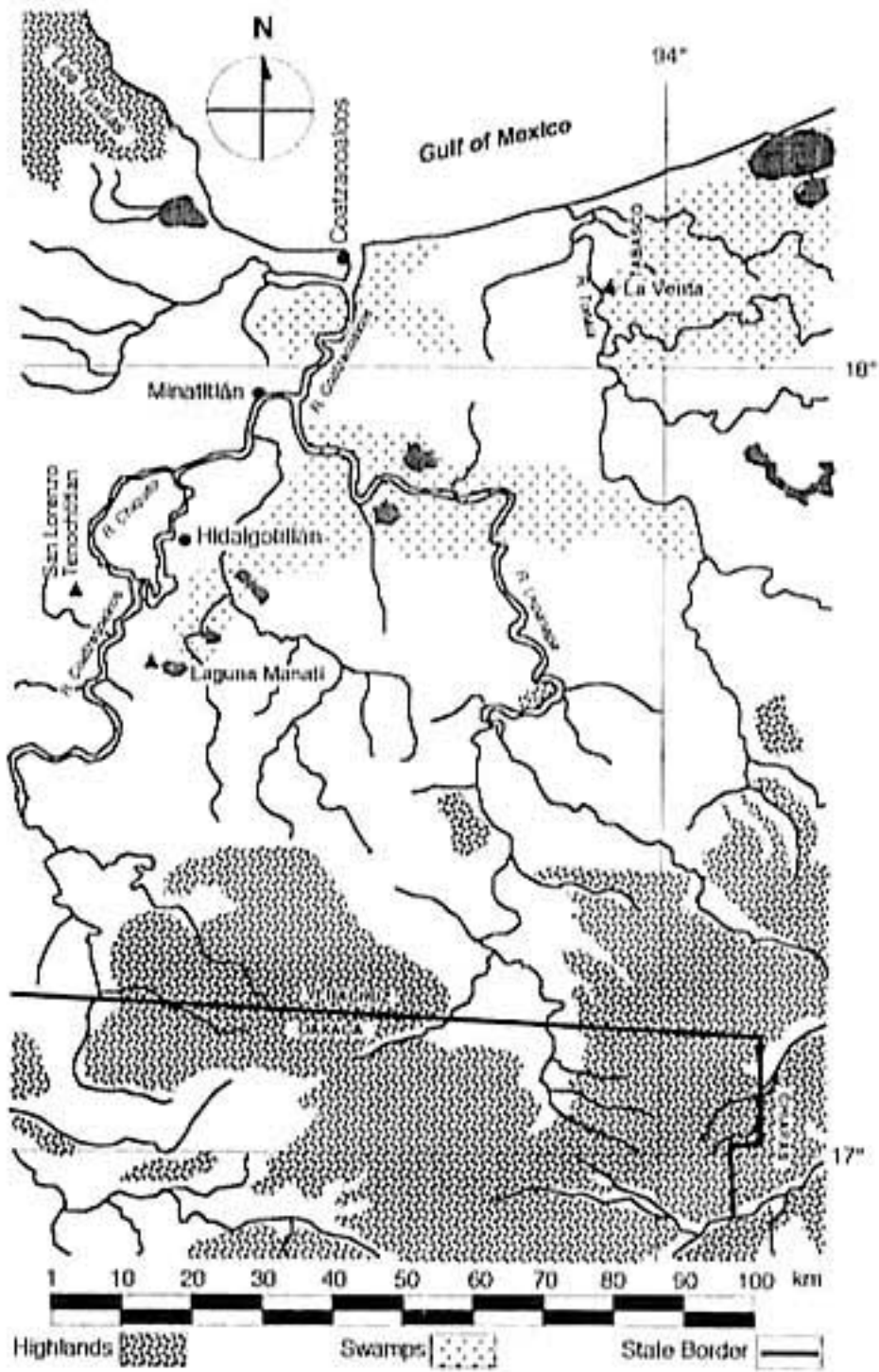


Figure 4. Map of the Gulf Coast region, showing San Lorenzo.



**Figure 5. Cuadros Phase Calzadas Carved bowl from a large midden in Trench 3 at Cantón Corralito.**

## **Results**

Before conducting this research, I wanted to sample 25 vessels from each of the six sites for the presence of cacao. However, once my study began, it became apparent that some of the sites exhibited more whole and/or complete vessels than others for analysis. Preservation was also a mitigating factor. Consequently, I was not able to analyze an equal number of vessels from each site. Although my sampling methodology was focused on analyzing only whole and/or complete vessels, there were instances where rim sherds were the only available ceramic material. The number of vessels sampled from each site is as follows: Cantón Corralito (41); San Lorenzo (28); El Paraíso (26); Paso de la Amada (16); El Manatí (6); La Merced (0). Overall, the total number of sampled for the presence of cacao was 117 vessels.



Figure 6. Cuadros Phase Calzadas Carved tecomate from a large midden in Trench 3 at Cantón Corralito.



Figure 7. Cuadros Phase Calzadas Carved dish from a large midden in Pit 10 at Cantón Corralito.



**Figure 8. Cuadros Phase Calzadas Carved bowl from a large midden in Pit 10 at Cantón Corralito.**

The majority of vessels tested come from the site of Cantón Corralito. Of the 41 vessels, there were 17 bowls, 11 tecomates, 5 cups, 5 ollas, and 3 spoons or ladles. Temporally, they date from Chicharras and San Lorenzo A times, with Calzadas Carved and Limon Incised being the most represented of the ceramic types ([Figure 5](#), [Figure 6](#), [Figure 7](#), [Figure 8](#), shown above; [Figure 9](#) and [Figure 10](#), shown below). The sampled vessels were derived from a variety of sealed contexts (e.g., middens and pits dug into living surfaces) excavated from both trenches and test pits.



Figure 9. Cuadros Phase white slipped gravy boat form from a large midden in Trench 3 at Cantón Corralito.



Figure 10. Cuadros Phase red slipped spatula from Trench 1 at Cantón Corralito.



**Figure 11. San Lorenzo Phase Yagua Orange basin found in the Remolino excavations at San Lorenzo (after Coe and Diehl 1980:Plate 4).**

The site with the second highest number of vessels tested for cacao was San Lorenzo. Of the 28 vessels, there were 12 large bowls, 4 small bowls, 3 tecomates, 2 cups, 2 ollas, 2 spatulas, 1 plate, 1 deep basin, and 1 gravy boat. Temporally, they date from Ojochi to San Lorenzo B times, with Calzadas Carved, El Tigre White, and Limon Incised being the most represented of the identified ceramic types ([Figure 11](#), shown above; [Figure 12](#), [Figure 13](#), and [Figure 14](#), shown below). The sampled vessels were derived from excavations in Group A, Monument 30, TE-ST. I, Stratigraphic Pit I, and the Main Aqueduct Line located to the southeast of Mound C3-1. One third of the collection was made up of Calzadas Carved and Limon Incised, with minor amounts of El Tigre White, Tular Black-and-white, and Encantado Coarse.



Figure 12. San Lorenzo Phase Calzadas Carved bowl found in Stratigraphic Pit II, located 8.8 meters due west of Cut 1 in the Mound C2-10 excavations at San Lorenzo (after Coe and Diehl 1980:78).



Figure 13. San Lorenzo Phase Limon Incised bowl found in Stratigraphic Pit II, located 8.8 meters due west of Cut 1 in the Mound C2-10 excavations at San Lorenzo (after Coe and Diehl 1980:78).



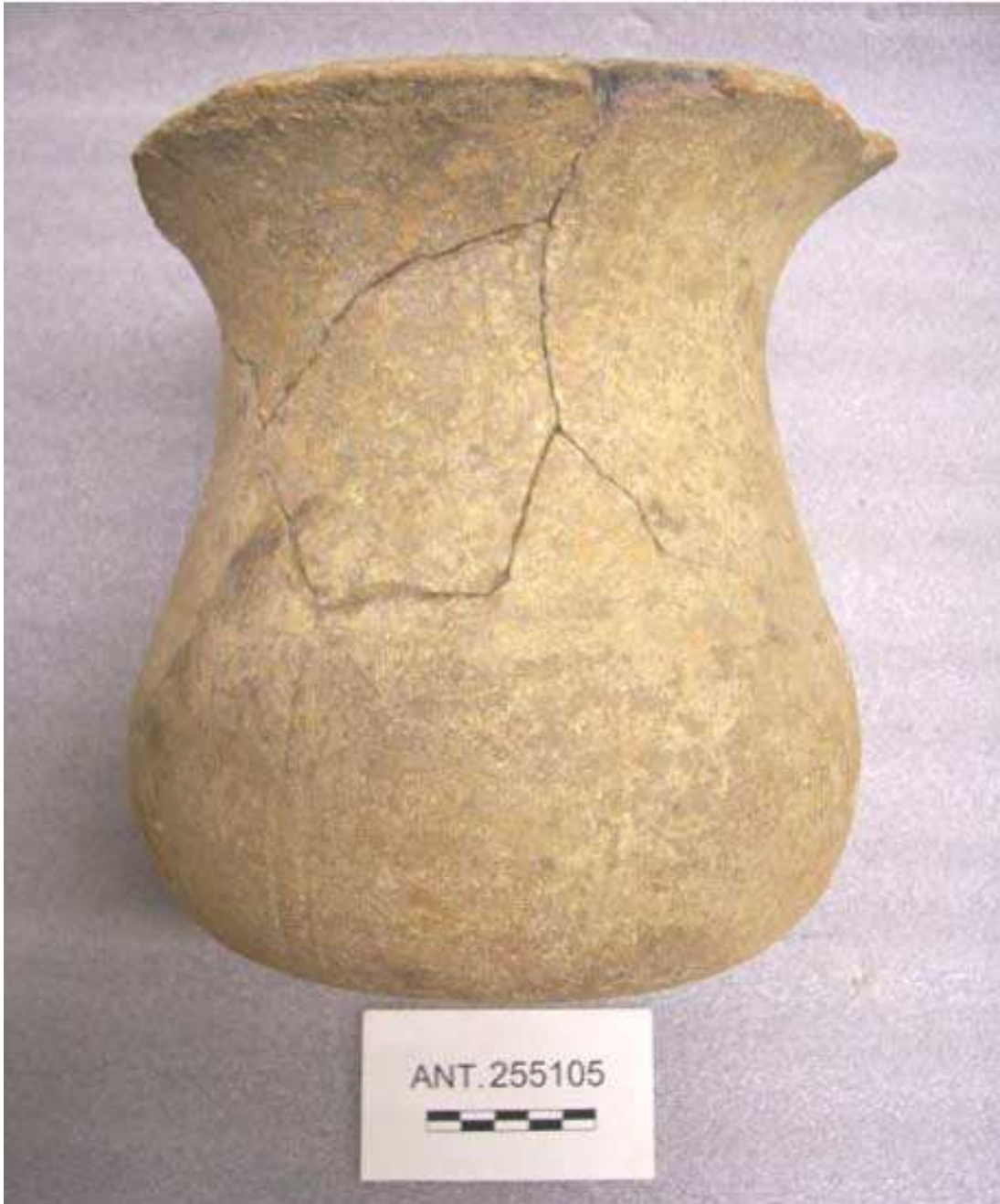


Figure 14. Bajio Phase jar from the Monument 30 excavations at San Lorenzo (after Coe and Diehl 1980:104).



**Figure 15. San Lorenzo Phase bowl at El Manatí. Photograph courtesy of David Cheetham.**

The total number of vessels analyzed from the closely-related sites of El Manatí and El Paraíso was 32. Of these, there were 11 bowls from El Paraíso and 3 from El Manatí, 4 tecomates from El Paraíso and 2 from El Manatí, 3 gravy boats from El Paraíso, 2 cups from El Paraíso, 2 ollas from El Paraíso, 1 spoon from El Paraíso, 1 large basin from El Paraíso, and 2 unknown forms from El Paraíso and 1 from El Manatí ([Figure 15](#), shown above; [Figure 16](#), [Figure 17](#), [Figure 18](#), [Figure 19](#), [Figure 20](#), [Figure 21](#), and [Figure 22](#), shown below). They date from both the Chicharras Phase and San Lorenzo B Phases. In many cases, the types sampled mirrored those tested at the other sites, with Calzadas Carved and Limon Incised being the most represented of the ceramic types. Many of the vessels were excavated from trenches and test pits that were placed into plazas and mounds at these two sites.



Figure 16. San Lorenzo Phase Limon Incised bowl at El Manatí. Photograph courtesy of David Cheetham.



Figure 17. San Lorenzo Phase Calzadas Carved bowl at El Paraíso. Photograph courtesy of David Cheetham.



Figure 18. San Lorenzo Phase Limon Incised bowl at El Paraíso. Photograph courtesy of David Cheetham.



Figure 19. Chicharras Phase tecomate at El Paraíso. Photograph courtesy of David Cheetham.



Figure 20. San Lorenzo Phase gravy boat form (interior view) at El Paraíso. Photograph courtesy of David Cheetham.



Figure 21. San Lorenzo Phase gravy boat form (exterior view) at El Paraíso. Photograph courtesy of David Cheetham.



**Figure 22. San Lorenzo Phase unslipped gray boat form at El Paraíso. Photograph courtesy of David Cheetham.**

At Paso de la Amada, 16 vessels were analyzed for traces of cacao. All of them were tecomates, both slipped and unslipped varieties ([Figure 23](#), [Figure 24](#), and [Figure 25](#), shown below). Each of them dates to the Barra Phase. The three main ceramic types were Bayo Brown, Salta Orange, and Tusta Red. The vessels are derived primarily from sealed fill in Mounds 5 and 6.



Figure 23. Barra Phase Tusta Red tecomate in Mound 5 at Paso de la Amada.



Figure 24. Barra Phase Tepa Red-and-white tecomate in Mound 5 at Paso de la Amada.



Figure 25. Barra Phase Tusta Red zoned punctated tecomate in Pit 8 at Paso de la Amada.

The results provide conclusive evidence that two vessels contained traces of *theobromine*. Both vessels date to the Early Preclassic period. One of the vessels that tested positive for cacao comes from Structure 4 in Mound 6 at Paso de la Amada. The vessel is a rim sherd and has been identified as a Bayo Brown type dating to the Barra Phase ([Figure 26](#), shown below). It is a brown slipped tecomate with vertical fluting on its exterior surface. Given that it is rim sherd, no height is discernible. The second vessel that tested positive for cacao comes from the site of El Manatí. It is a low bowl dating to Ojochi times. At present, there are some other vessels in the collection that may also contain *theobromine*, and we are currently performing additional extraction and isolation studies on them.





**Figure 26. Barra Phase Bayo Brown tecomate from Structure 4 in Mound 6 at Paso de la Amada. This vessel tested positive for the presence of cacao.**

### **Significance of Research**

The results of my residue analysis performed on the Olmec and pre-Olmec vessels are significant for three main reasons. First, it will be important because it continues to use a relatively new analytic technique (HPLC/APCI MS) to test dry residues from the interior surfaces of Mesoamerican pottery. Second, very little archaeological research has been conducted on the origins of cacao use by the Olmec and Mokaya in Early Preclassic times. The presence of cacao in vessels from both the Gulf Coast and Pacific Coast of México indicates that its usage predates evidence from the Maya lowlands, specifically from the site of Colha located in northern Belize, by more than a millennium. The results of the present study provide conclusive proof that the Mokaya people of the southern coast of Chiapas (Soconusco region) of México were involved in the production and consumption of liquid chocolate as early as 1900 B.C. In the Gulf Coast area, the presence of cacao in an Ojochi vessel indicates that pre-Olmec people were involved in the production and consumption of liquid chocolate by 1350 B.C., if not earlier. This is important to note because San Lorenzo does not start looking "classic" Olmec until the later Chicharras Phase. Third, and most importantly, the results confirm that Mesoamerica had a very long, continuous history of preparing and consuming liquid chocolate from the Early Preclassic through to historic and modern times. The data from our study pushes back the earliest reported use of cacao in Mesoamerica from 600 B.C. to 1900 B.C.

## Acknowledgements

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## Sources Cited

Campbell, Lyle, and Terrence Kaufman

1976 "A Linguistic Look at the Olmecs." In *American Antiquity* 41(1):80-89.

Cheetham, David

2005 "Recent Investigations at Cantón Corralito: A Possible Olmec Enclave on the Pacific Coast of Chiapas, México." Paper presented at the 70th annual meeting of the Society for American Archaeology, Salt Lake City.

Cheetham, David, John E. Clark, Gregory Luna, Terry G. Powis, Tomas Perez Suarez, and Artemio Villatoro Alvarado

2005 "Proyecto Arqueológica Cantón Corralito, Chiapas, México: Temporada 2004." Informe presentado al Instituto Nacional Antropología e Historia (INAH).

Clark, John E., and Michael Blake

1994 "The Power of Prestige: Competitive Generosity and the Emergence of Rank in Lowland Mesoamerica." In *Factional Competition and Political Development in the New World*, edited by Elizabeth M. Brumfiel and John W. Fox, pp. 17-30. Cambridge University Press, Cambridge.

Clark, John E., and Dennis Gosser

1995 "Reinventing Mesoamerica's First Pottery." In *The Emergence of Pottery: Technology and Innovation in Ancient Societies*, edited by William K. Barnett and John W. Hoopes, pp.209-222, Smithsonian Institution Press, Washington, D.C.

Coe, Michael D., and Richard A. Diehl

1980 *In the Land of the Olmec: The Archaeology of San Lorenzo Tenochtitlán, vol.1*. University of Texas Press, Austin.

Coe, Sophie D., and Michael D. Coe

1996 *The True History of Chocolate*. Thames and Hudson Ltd. London, England.

Dakin, Karen, and Soren Wichmann

2000 "Cacao and Chocolate: A Uto-Aztecan Perspective." In *Ancient Mesoamerica* 11:55-75.

Gasco, Janine L.

1987 *Cacao and the Economic Integration of Native Society in Colonial Soconusco, New Spain*. Ph.D. dissertation, Department of Latin American History, University of California, Santa Barbara. University Microfilms, Ann Arbor.

Hall, Grant D., Stanley M. Tarka, Jr., W. Jeffrey Hurst, David Stuart, and Richard E.W. Adams

1990 "Cacao Residues in Ancient Maya Vessels from Río Azul, Guatemala." In *American Antiquity* 55(1):138-143.

Hammond, Norman, and Charles H. Miksicek

1981 "Ecology and Economy of a Formative Maya Site at Cuello, Belize." In *Journal of Field Archaeology* 8:260-269.

Houston, Stephen D., David Stuart, and Karl Taube

1989 "Folk Classification of Classic Maya Pottery." In *American Anthropologist* 91:720-726.

Houston, Stephen D., and Karl Taube

1987 "'Name Tagging' in Classic Mayan Script: Implications for native Classifications of Ceramics and Jade." In *Mexicon* 9(2):38-41.

Hurst, W. Jeffrey, Robert A. Martin, Jr., Stanley M. Tarka, Jr., and Grant D. Hall

1989 "Authentication of Cocoa in Maya Vessels Using High-Performance Liquid Chromatographic Techniques." In *Journal of Chromatography* 466:279-289.

Hurst, W. Jeffrey, Stanley M. Tarka, Jr., Terry G. Powis, Fred Valdez, Jr., and Thomas R. Hester

2002 "Cacao Usage by the Earliest Maya Civilization." In *Nature* 418:289-290.

MacLeod, Barbara

1990 *Deciphering the Primary Standard Sequence*. Unpublished Ph.D. dissertation, Department of Art History. University of Texas at Austin.

MacLeod, Barbara, and Dorie Reents-Budet

1994 "The Art of Calligraphy: Image and Meaning." In *Painting the Maya Universe: Royal Ceramics of the Classic Period*, edited by Dorie Reents-Budet, pp. 106-164. Duke University Press, Durham.

McAnany, Patricia A., Eleanor Harrison-Buck, and Satoru Murata

2005 "Desire and Political Influence: The Archaeology of the Sibun River Valley." In *Research Reports in Belizean Archaeology* 2:313-327.

McAnany, Patricia A., Ben S. Thomas, Steven Morandi, Polly A. Peterson, and Eleanor Harrison

2001 "Praise the Ajaw and Pass the Kakaw: Xibun Maya and the Political Economy of Cacao." In *Ancient Maya Political Economies: Essays in Honor of William L. Rathje*, edited by Marilyn Masson and David Freidel. Altamira Press, Walnut Creek, CA.

Millon, Rene F.

1955 *When Money Grew on Trees: A Study of Cacao in Ancient Mesoamerica*. Ph.D. dissertation, Department of Anthropology, Columbia University, New York. University Microfilms, Ann Arbor.

Ortiz, Ponciano C., and Maria Del Carmen Rodríguez

1989 "Proyecto Manatí, 1989." In *Arqueología* 1 (2):23-52.

1994 "Los espacios sagrados olmecas: El Manatí, una caso especial." In *Los olmecas en Mesoamerica*, edited by John E. Clark, pp. 69-91. Citibank, México.

1999 "Olmec Ritual Behavior at El Manatí: A Sacred Space." In *Social Patterns in Pre-Classic Mesoamerica*, edited by David C. Grove and Rosemary A. Joyce, pp.225-254. Dumbarton Oaks Research Library and Collection, Washington, D.C.

Powis, Terry G., Fred Valdez, Jr., Thomas R. Hester, W. Jeffrey Hurst, and Stanley M. Tarka, Jr.

2002 "Spouted Vessels and Cacao Use Among the Preclassic Maya." In *Latin American Antiquity* 13(1):85-106.

Reents-Budet, Dorie

1994 *Painting the Maya Universe: Royal Ceramics of the Classic Period*. Duke University Press, Durham.

Thompson, John E.S.

1956 "Notes on the use of Cacao in Middle America." In *Notes on Middle American Archaeology and Ethnology* 128:95-116. Carnegie Institution of Washington, D.C.

Tozzer, Alfred M.

1941 *Landa's Relación de Las Cosas de Yucatán. Papers of the Peabody Museum of American Archaeology and Ethnology*, Harvard University, Vol. 1. Kraus Reprint Co., New York.

Turner, Bill L. II, and Charles H. Miksicek

1984 "Economic Plant Species Associated with Prehistoric Agriculture in the Maya Lowlands." In *Economic Botany* 38:179-193.

Weaver, Muriel Porter

1981 *The Aztecs, Maya, and Their Predecessors*. Academic Press, Inc., San Diego.