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Pottery analysis alters view of Olmec domination

BY THOMAS H. MAUGH II/Los Angeles Times
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Analysis of 3,000-year-old pottery fragments from the ancient Olmec capital of San Lorenzo contradicts the notion among some researchers that the Olmec civilization was the "mother culture" that laid the foundation for the Inca, Maya and other civilizations of Central and South America.



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Many researchers believe that the Olmec were the primary culture of the region, dominating, inspiring and ultimately raising the other chiefdoms to the level of civilization.

Researchers say a key role in this process was played by pottery which the Olmec made and gave away, incorporating many of their cultural beliefs into the decorations.

But a new chemical analysis by researchers from the University of Wisconsin indicates that pottery was produced throughout the region and it was exchanged in a two-way trade among sister states, the team reports in the Proceedings of the National Academy of Sciences published last week.

"The Olmec were big and numerous and made impressive stone monuments, but they were not the source of all known ideas," said archeologist Kent Flannery of the University of Michigan, one of the report's authors. "Civilization was a product of many different regions who were in contact and trading like mad. No region had a monopoly."

The Olmec people, who called themselves Xi (pronounced Shee), were among the earliest cultures in the Americas, emerging around 1200 B.C. Their capital was San Lorenzo, near what is now Veracruz on the Gulf Coast of Mexico. There they built massive pyramids and plazas with ceremonial buildings and elite residences.

Among their chief legacies are massive stone heads carved in the image of their rulers.

Impressed by these sculptures in the 1940s, artist Miguel Covarrubias argued that the Olmec must have been the progenitors of the other cultures in the area. In one form or another, this idea has been roiling the often contentious world of Mesoamerican archeology for at least 50 years.

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For archeologists, pottery is a key ingredient in reaching such conclusions. Where pottery was manufactured, who made it, the markings carried on it and how it traveled over trade routes provide critical clues to cultural influence.

In a paper published in the journal *Science* earlier this year, chemist Michael G. Glascock of the University of Missouri used a technique called neutron activation analysis to monitor the elemental composition of pottery fragments from San Lorenzo and other sites throughout the region.

In the new studies, geologist James B. Stoltman of the University of Wisconsin used a technique called petrography to study a similar set of fragments.

In petrography, you grind the fragment to such a thin section that when scientists look at it under a microscope (using polarized light) they can recognize the minerals contained in the clay and temper (materials used to make the clay stiffer or easier to manage) of the pottery enabling them to tie it to the geological bedrock of the place where it was made.

This is in contrast with neutron activation, the technique used in Glascock's study, where scientists irradiate the pottery fragments, and read the chemical elements in it (for example, calcium, iron, potassium, etc.) using spectral analysis.

Another author of the Stoltman study, Joyce Marcus of the University of Michigan pointed out two problems in neutron activation that their team believes produced false results. First, many different kinds of bedrock contain the same chemical elements though they they may form a variety of different mineral compositions. Second, it's impossible using neutron activation to determine whether the elements seen are coming from the clay or the temper of the pottery, the water used to moisten the clay, the material cooked or stored in the pot, or the soluble salts in the soil of the archaeological site.

"It is a much less reliable method than petrography," said Marcus. "This has been known for decades, but the people doing neutron activation do not want to listen to the problems."

Stoltman studied thin slices of the fragments to determine what minerals were used in the production. The minerals, usually crushed local rock, were added to the pottery clay to provide plasticity and to help pots survive shrinking and drying without cracking.

Stoltman concluded that the fragments were produced at a variety of sites. Some, for example, contained the sedimentary rock, such as limestone and sandstone, that underlies San Lorenzo. Others contained volcanic tuff such as that found in Oaxaca. Stoltman identified seven different types of materials in the fragments, suggesting a similar number of production sites.

Glascock, however, concluded that all of the fragments were produced at one location: San Lorenzo. He and his colleagues believe that the containers were then shipped out to other cities, spreading culture in the process.

Five of the samples dug up in the Olmec capital "were unambiguously from Oaxaca, demonstrating that some of the pottery in San Lorenzo was made elsewhere," Stoltman said. That "contradicts recent claims that the Gulf Coast was the sole source of pottery" for the region.

Stoltman's results show "that very clearly, every site was trading with every other site," Flannery said.

The behavior is very much like all other societies that have been studied, he said. "The Olmec just didn't give away thousands and thousands of pots and expect to get nothing in return. It just doesn't work that way."

The Herald's James Young contributed to this article.

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