

Discovery of the first evidence for Pre-Columbian sources of Maya Blue

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Once again, science and anthropology have teamed up to solve questions concerning the fascinating, brilliantly hued pigment known as Maya Blue. Impervious to the effects of chemical or physical weathering, the pigment was applied to pottery, sculpture, and murals in Mesoamerica largely during the Classic and Postclassic periods (AD 250-1520), playing a central role in ancient Maya religious practice. This unusual blue paint was used to coat the victims of human sacrifice and the altars on which they were dispatched.

For some time, scientists have known that Maya Blue is formed through the chemical combination of indigo and the [clay mineral](#) palygorskite. Only now, however, have researchers established a link between contemporary indigenous knowledge and ancient sources of the mineral.

In a paper published online in the [Journal of Archaeological Science](#) on March 16, 2012, researchers from Wheaton College, The Field Museum of Natural History, the United States Geological Survey, California State University of Long Beach, and the Smithsonian Institution, demonstrated that the palygorskite component in some of the Maya Blue samples came from mines in two locations in Mexico's northern Yucatan Peninsula

Research on sources for palygorskite has been ongoing since the late 1960's. Through a combination of ethnographic research and mineralogical analyses, Dean E. Arnold, Professor of Anthropology at Wheaton College, and now Adjunct Curator of Anthropology at The Field Museum, discovered that palygorskite was well known among

indigenous potters of Ticul, Yucatán. These contemporary Maya used palygorskite as a key component of pottery and also prescribed the mineral for medicinal purposes. [Indigenous knowledge](#) further extends to sources of palygorskite: potters extracted the mineral from two mines in Yucatán – one in Sacalum and the other near the city of Ticul at a location called Yo' Sah Kab.

As part of his research, Arnold noted Terminal Classic (800-1000 AD) pottery and other signs of ancient site occupation at both of the modern sources. This suggested that the mines were used by the Maya as sources for the palygorskite used in Maya Blue. However, further tests were needed to convincingly link the present-day mines with the ancient Maya.

Between 1965 and 1997, Dean Arnold and Bruce E. Bohor of the United States Geological Survey collected 33 samples of the mineral from the Yucatán region. After mineralogical analysis, it was possible to differentiate between samples of palygorskite based on composition, which meant the palygorskite within specific samples of Maya Blue could be traced to specific locations.

With funding from the National Geographic Society, Arnold and Bohor collected additional 167 samples of palygorskite from five different sites in Yucatan in 2008. The analyses of these samples were then compared to analyses of the Maya Blue pigment found on pottery originally taken from Chichén Itzá and Palenque, Yucatán. The Chichén Itzá material was collected by E. H. Thompson and J. E. S. Thompson in the late 19th and early 20th century and is curated at The Field Museum. These objects were analyzed in the museum's Elemental Analysis Facility (EAF).

The analysis confirmed that all the samples of Maya Blue from the ancient Maya site of Chichén Itzá were created with palygorskite derived

from Sacalum, while the Maya Blue samples from Palenque could have been from Sacalum, Yo' Sah Kab, or another unknown source.

"Utilizing ground-breaking chemical sourcing techniques, we have unlocked data from collections held in The Field Museum for more than 100 years," reported The Field Museum's EAF Director and Curator and Chair of Anthropology, Ryan Williams.

"The data resulting from this study provides definitive evidence that Sacalum was the source for palygorskite used in Maya Blue from Chichén Itzá," Williams added.

Noting that the ancient Maya would have been limited by available technology and using this new data, senior author Arnold and his colleagues argue that sources of palygorskite for the ancient Maya were limited by available technology and the ancient landscape. Thus, Sacalum and Yo' Sah Kab, because of their accessibility and size, would have been prime sources of palygorskite used by the ancient Maya.

"Overall this study illustrates the key benefits of scientific teamwork to unravel the mysteries of a key [ancient](#) technology," said study participant and [Field Museum](#) curator, Gary Feinman.

More information: Arnold, D.E., et al., The first direct evidence of pre-columbian sources of palygorskite for Maya Blue, *Journal of Archaeological Science* (2012), [doi:10.1016/j.jas.2012.02.036](https://doi.org/10.1016/j.jas.2012.02.036)

Provided by Field Museum

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