



Patrick McGovern and his colleagues in the Biomolecular Archaeology Laboratory, Gretchen Hall and Ted Davidson, have embarked on a one-of-a-kind program in anti-cancer drug discovery with researchers at Penn's Abramson Cancer Center, principally Melpo Christofidou-Solomidou. The project yielded its first fruits this summer in the *International Journal of Oncology* (37.1:5-21). Patrick McGovern and colleagues describe how herbs which had been added to ancient fermented beverages from ancient Egypt and China have very promising in vitro activity against lung and colon cancers. The most exciting discovery was a wormwood additive (*Artemisia annua*) to a rice wine found inside an exquisitely made bronze vessel of the late Shang Dynasty (ca. 1050 BCE) recovered in 1998 from the Changzikou Tomb in Luyi Country, eastern Henan Province in China. The lid of the jar had been so tightly fitted to its neck, subsequently forming a hermetic seal by corrosion, that the wine was still present as a liquid after 3,000 years. The active wormwood compound, artemisinin—especially as its semi-synthetic analogue artesunate—proved to be a more potent anti-cancer agent than Adriamycin, a standard chemotherapy drug.

Plans for the future include testing jars containing what is thus far the earliest fermented beverage in the world (also from China, ca. 7000 BCE), drinking-cups for *chicha* (corn beer) from Peru, and amphorae from southern France (ca. 600 BCE) related to the introduction of Near Eastern "wine culture." Our human and hominid ancestors had a huge incentive to explore the world around them for possible remedies against diseases and physical ailments. Lacking modern synthetic medicines and suffering from maladies of all kinds that resulted in infant death and short life spans of 30 years or less, their only recourse was to "experiment" with botanicals in their environments, which readily dissolved in and could be administered by alcoholic beverages. Photos by Z. Zhang and Institute of Cultural Relics and Archaeology of Henan Province.





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In 1895–1896, archaeologist Max Uhle obtained one of the Penn Museum's largest collections from the site of Pachacamac, Peru. This diverse collection contains over 12,000 objects, including many artifacts of fragile organic materials such as gourds, wood, feathers, fibers, skin, remains of food offerings and ritual feasting, and the textile-wrapped mummified bodies of humans and animals preserved in the dry environment of coastal Peru. Pachacamac was the location of the most important sacred center in the Andean region. For more than 1,000 years in late prehistory, native peoples worshipped a central deity here whose presence is still vibrant in myth, oral history, and Peruvian identity. The temples, pyramids, palaces, plazas, and oracle of Pachacamac were the destinations for hundreds of thousands of pilgrims from different societies throughout the Andes. Eventually, the center fell under the control of the Inca Empire who built a large Sun Temple that now dominates the site.

During the past year, Clark Erickson has worked with a number of graduate students, student interns (Michelle Molchan, Jeanette Nicewinter, and Josh Henkin), and visiting scholars to research this vast collection for publication and preparation for a large exhibition on Pachacamac. Anne Tiballi of Binghamton University wrote her dissertation on the objects and human remains from the Sun Temple in collaboration with Janet Monge and Brittney Tatchell. Clark Erickson and Patrick McGovern are collecting samples of residues from pottery and gourd vessels for analysis of beverages, in particular, those that may have medicinal or hallucinogenic properties. In collaboration with Penn's Digital Media Design program, virtual reality and 3D modeling of the site are being explored as exhibition technology for peopling and visualizing the past at Pachacamac. Photo by Clark L. Erickson.