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Staten Island students brew *chicha* beer to learn about ancient Peruvian migration

by KRISTINA KILLGROVE

The beer of choice for anthropology students at Wagner College is not Budweiser or PBR – it's *chicha de maíz,* a corn beer made from an ancient Peruvian recipe. Simmering in a chemistry lab on campus, what looks like pea soup crossed with oatmeal may hold the key to understanding migration patterns among the ancient Moche of Peru. Bioarchaeologist Celeste Gagnon and her students stirred, strained, decanted, and fermented the concoction then compared it to local Peruvian water sources to figure out if excessive chicha drinking would affect a person's body chemistry.

Chicha was an important element of the ancient Moche diet, but as with most alcoholic consumption through time, it also helped cement social alliances. "People drank prodigious amounts of chicha at social events," Gagnon and colleagues write in a new article in the Journal of Archaeological Science: Reports. By one estimate, the average ancient Moche person drank 2 liters of chicha daily, and even more during feast times. "The production of chicha was a site of power negotiations at the local level," they explain, and chicha production is often identified by archaeologists based on their finding of special vessels for fermentation of the drink.

Brewing a drink like chicha is relatively simple: take water and sprouted corn, boil for hours, cool, strain, add yeast, and let ferment for a few days. But what excessive drinking of chicha does to the human skeleton is much more complex. Our bodies contain a lot of oxygen in several different forms or isotopes. The relative abundance of oxygen isotopes in our skeletons is mostly due to what we drink. So a person who lives in one place during childhood, when their teeth and bones are forming, will have an oxygen isotope ratio related to the groundwater in the geographical area. Testing skeletal tissue for oxygen isotopes is one way that bioarchaeologists can discover whether a person was local or a migrant to an area. Brewing water results in evaporation, so the oxygen isotope value of the brewed beverage is different from the water that went into it. Since the ancient Moche were drinking more chicha than groundwater, though, this almost certainly changed their oxygen isotope ratio.

Seeking to investigate how different the oxygen isotope values were between local water and chicha, Gagnon collected water from the Moche valley watershed, the area in Peru where she studies the skeletal remains of the ancient Moche. Using this water and local Peruvian corn, which Gagnon brought back to the U.S., she and her students experimentally brewed chicha the way the Moche did. Their corn beer batches contained between 3-4% alcohol.

Gagnon and colleagues at the University of Alabama and the University of Colorado Boulder then tested both pre-boil and post-boil chicha samples for oxygen isotopes. They discovered that the post-boil samples were significantly enriched — meaning the oxygen isotope ratio was a lot higher in the brewed chicha samples compared to the pre-processed corn-and-water concoction. If ancient Peruvians were drinking 2 liters of chicha every day, their oxygen isotope ratios were almost certainly much higher than would be expected compared to the local water sources.

Bioarchaeologists often use oxygen isotope ratios to identify the skeletons of people who were immigrants to a geographic region. Gagnon and colleagues have shown that, in the Peruvian Andes, these studies may be thrown off if consumption of chicha is not properly considered. “We cannot assume that the identification of different oxygen isotope values in the remains of Andean groups necessarily indicates the presence of migrants,” they write. Instead, Gagnon and colleagues suggest researchers use multiple lines of evidence — oxygen, carbon, and strontium isotopes, ancient botanical remains, and dental disease — “to better trace consumption patterns of chicha de maíz and thus better reconstruct its ritual, economic, and sociopolitical importance in the Andes.”

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Read the article by Jennifer Ida, Anthropology ’12, chemistry professor Nick Richardson and anthropology professor Celeste Gagnon in the Journal of Archaeological Science: Reports