China’s Fermented Past

Pottery yields signs of oldest known wine

Here’s a discovery worth toasting: Chemical analyses of pottery fragments from a prehistoric village in northern China indicated that people living there between 8,000 and 9,000 years ago concocted a fermented, winelike drink from rice, honey, and fruit.

That’s the oldest known evidence of an intoxicating beverage, says archaeological chemist Patrick E. McGovern of the University of Pennsylvania Museum of Archaeology and Anthropology in Philadelphia. He led the international team that scrutinized the ancient pottery.

Until now, the earliest chemical evidence of wine came from Iranian jars from about 7,400 years ago. Middle Eastern beer-brewing sites date to roughly 5,000 years ago (SN: 10/2/04, p. 216).

The new results are the latest hints that modern civilizations developed in parallel in eastern Asia and the Middle East, starting around 10,000 years ago, according to McGovern. “The domestication of plants, construction of complex villages, and production of fermented drinks began at the same time in both regions,” he says.


McGovern and his coworkers used chemical solvents to extract traces of substances from fragments of 16 vessels unearthed at the ancient Chinese village of Jiahu. The team applied five analytical methods to identify chemical constituents of the material, which had been absorbed into the pottery.

The scientists isolated the chemical fingerprints of rice, beeswax that would have been associated with honey, and either Hawthorn fruit or wild grape. The chemical structures of these extracts closely match those of modern rice and grape wines, the researchers say.

Further analyses indicated that the fermented drinks in the Chinese vessels set the stage for more-advanced wine-making techniques that appeared around 3,000 years ago. Dozens of bronze jars found at Chinese settlements from that time still contain liquid. Corroded lids sealed these vessels and prevented their contents from evaporating.

Liquid from two such vessels, both found in tombs of high-ranking individuals, exhibits chemical signs associated with fermented, filtered rice or millet wine, the researchers report.

The still-liquid beverages were probably made in a process that the Chinese continue to employ today, McGovern says. First, winemakers add various molds to break down rice or millet into fermentable sugars. The vintners often store lumps of these sugars in barns, where yeasts thrive. Yeast cells infiltrate the sugars, and the winemakers add to their brews a variety of herbs that increase the yeast’s fermentation activity.

Researchers have long suspected that the Chinese made alcoholic beverages several thousand years ago, notes biochemist Hsing-Tsung Huang of the Needham Research Institute in Cambridge, England, who studies ancient Chinese food and drink. However, the evidence from Jiahu “is earlier than what most scholars had in mind,” he says. —B. BOWER

Cloning Milestone

Monkey embryos urged to stem cell stage

Researchers have coaxed cloned rhesus macaque embryos to grow to the blastocyst stage, a developmental benchmark in which cells form a hollow, fluid-filled ball. The accomplishment marks the furthest point that scientists have yet reached in cloning a nonhuman primate.

Scientists have long been interested in human cloning as a therapeutic tool. Unlike reproductive cloning, which is meant to create genetically identical organisms, therapeutic cloning aims to grow embryonic stem cells into tissue that matches a patient’s genetic signature.

Scientists have proposed stem cells as a means to treatments for a wide range of diseases, including Parkinson’s and diabetes.

Last February, a group of South Korean researchers grew cloned human embryos through the blastocyst stage using a set of new techniques (SN: 2/14/04, p. 99). To see whether a similar technique would work on nonhuman primates, thereby opening up medical-research possibilities, Gerald Schatten and his colleagues at the University of Pittsburgh teamed up with the South Korean group to clone macaques.

Following the South Korean team’s procedure, Schatten’s group started with immature eggs, although most researchers begin with mature eggs. Next, the researchers removed the eggs’ nuclei by using the “squish” method pioneered by the South Koreans. As the name implies, the researchers gently squeezed the nucleus out of each cell instead of drawing it out using a vacuum needle, as most other researchers do.

Schatten’s group then inserted into each egg a donor nucleus isolated from another macaque. The source of those nuclei was either cumulus cells, which surround eggs in the ovaries, or fibroblast cells, which make up connective tissue throughout the body. An electric shock or chemical stimulation encouraged the reconstituted eggs to start dividing into multicell embryos.

A significant percentage of the cloned embryos survived about 8 days, an age at which embryonic stem cells are present. However, the researchers say that the embryos provide little possibility for reproductive cloning. None of 135 cloned macaque embryos transplanted into 25 surrogate mothers produced a successful pregnancy.

Schatten and his team presented the results Dec. 6 at the American Society for Cell Biology meeting in Washington, D.C., and in the Dec. 11 Developmental Biology.