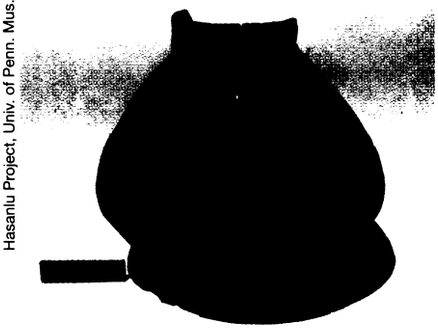
Wine making's roots age in stained jar

Last year, archaeological chemists at the University of Pennsylvania Museum in Philadelphia noticed a yellowish white blotch on the inner surface of a pottery fragment housed in their facility. Ancient wine residues usually cast a reddish hue, but on closer inspection of the substance, the scientists hit pay dirt—the oldest known evidence of wine making, dating to between 7,000 and 7,400 years ago.

"Analysis of this jar shows that wine containing a tree resin additive, used for preservation or to cover up unwanted flavors, was produced in the northern Zagros mountains of Iran 2 millennia earlier than previous evidence from the Near East [had indicated]," asserts study director Patrick E. McGovern. Prior findings had dated wine making to about 5,500 years ago (SN: 5/4/91, p. 279).

Excavations more than a decade ago at Hajji Firuz Tepe, an ancient village where residents grew barley and raised cattle, yielded the pottery shard studied by McGovern's group as well as five similar vessels, all from the cooking room of a mud brick structure. Mary M. Voigt, an archaeologist at the College of William and Mary in Williamsburg, Va., led that dig. The site's age derives from a series of radiocarbon dates.



Hasanlu Project, Univ. of Penn. Mus.

Ancient wine jar of the same type and from the same room as the newly analyzed pottery fragment, and the Iranian site where both vessels were found.

Chemical analyses of the telltale stain identified its principal component as the calcium salt of tartaric acid. Grapes are the only food known to contain large amounts of tartaric acid, McGovern says. The yellowish resin of the terebinth tree was also present. These trees grow throughout the Near East, and their resin was added to medicine and wine by many early societies, according to McGovern.

Tartaric acid and terebinth resin occur together in a large number of Near Eastern jars, including wine-bearing jugs from ancient Egypt, he adds.

The 2.5-gallon Iranian container had a long, narrow neck, thick walls, and a stopper, all signs that it contained a liquid, argue McGovern and coworkers Donald L. Glusker and Lawrence J. Exner in the June 6 NATURE. The addition of terebinth resin served in part to inhibit the growth of bacteria that convert wine to vinegar, the researchers assert. Terebinth, which can be distilled into turpentine, may also have masked any offensive flavors in the wine, they suggest.

McGovern regards the use of terebinth as a preservative as a "profound development" that made possible shipping and trading of wine. — *B. Bower*

A shrimpy find: Communal crustaceans

What lives in a cooperative colony, has a queen that bears all of the young, and workers that defend the home nest from intruders? Oh, and is related to a popular dinner delicacy?

A snapping shrimp (*Synalpheus regalis*), of course!

S. regalis and probably other members of the *Synalpheus* genus have the same community spirit that characterizes the lives of other so-called eusocial creatures—bees, ants, termites, and naked mole rats, J. Emmett Duffy of the College of William and Mary's Virginia Institute of Marine Science in Gloucester Point reports in the June 6 NATURE.

The shrimp is the first marine animal known to be eusocial.

Duffy's study shows that "in all important respects, the social organization of *S. regalis* resembles that of many eusocial terrestrial animals," Jon Seger of the University of Utah in Salt Lake City and Nancy A. Moran of the University of Arizona in Tucson assert in an accompanying commentary.

Researchers know little about the 100 or so other species in the genus, Duffy says, but divers who explore Caribbean coral reefs are familiar with the loud crackling sound—similar to that of frying bacon—produced by snapping shrimp.

Duffy/ NATURE

A queen shrimp surrounded by her colony members.

He analyzed more than 30 shrimp colonies inhabiting sponges in the coral reefs of Carrie Bow Cay, Belize. Of these colonies, 17 had an intact female whose eggs he could count. The sponges ranged in size from a tennis ball to a football, and each held one shrimp colony.

A sponge's resident shrimp have strong genetic similarities, according to Duffy's analysis of soluble proteins found in the creatures. Indeed, the data suggest "that most colony members (there may be more than 300) are offspring of the queen, and possibly of a single male."

In addition to the genetic data, other evidence suggests that a single female produces all of the young. For example, the colonies of larger, older queens have more members than those of smaller, younger queens. If females besides the queen were contributing offspring, the numbers in the nests might be closer, he says.

Like other eusocial species, *S. regalis* faces considerable competition for housing and will fiercely defend its nests, he reports. Duffy set up eight small colonies in the laboratory and provided each with a female, eight of her large male offspring, and eight of her juveniles. The next morning, he introduced at separate times into each new colony a member of its original group and a member of a different species of snapping shrimp.

Within a few hours, colony members had killed the foreign intruder. In contrast, they welcomed their former colony mate into the new nest.

Because of their close genetic relationship to the colony's breeders, eusocial animals need only care for and defend the colony in order to ensure that their own genes get passed along, researchers believe.

The snapping shrimp now joins the mole rat and termite on the short list of eusocial creatures that are diploids, which inherit one set of chromosomes from each parent. Diploids are less closely related to each other than ants and bees, whose males inherit only one set, from the female. — *T. Adler*