

See also AGRICULTURE, ORIGINS OF; CEREALS; CULTIVATION; PLANT DOMESTICATION; PLANT HUSBANDRY; PLANTS

### Further Reading

- Fuller, Dorian Q. 2006. Agricultural Origins and Frontiers in South Asia: A Working Synthesis. *Journal of World Prehistory* 20(1):1–86.
- Harlan, Jack R. 1992. *Crops and Ancient Man*. 2nd edition. Madison, WI: American Society for Agronomy and Crop Science Society of America.
- Hymowitz, T. 1972. The Trans-Domestication Concept as Applied to Guar. *Economic Botany* 26(1):49–60.
- Piperno, Dolores R., and Deborah M. Pearsall. 1998. *The Origins of Agriculture in the Lowland Neotropics*. San Diego, CA: Academic Press.
- Smartt, J., and N. W. Simmonds, eds. 1995. *Evolution of Crop Plants*. 2nd edition. Harrow, UK: Longman.
- Zeven, A. C., and J. M. J. De Wet. 1982. *Dictionary of Cultivated Plants and Their Regions of Diversity*. Wageningen, the Netherlands: Centre for Agricultural Publishing and Documentation.
- Zohary, Daniel, Maria Hopf, and Ehud Weiss. 2012. *Domestication of Plants in the Old World*. 4th edition. Oxford: Oxford University Press.

■ DORIAN Q FULLER

### WINE

Wine is part of religious and cultural traditions from prehistory and has played a major role in the lives of the ancient Mediterranean people. It is a naturally fermented beverage produced from grapes and other fruits (e.g., dates, figs) and grains by the action of yeasts that transform sugar into alcohol. Archaeological evidence for the production of wine includes iconography, texts, artifacts (wine jars, strainers, cups), wine presses, and organic material (grape berries, wood, wine residues).

The cultivation and domestication of the grape vine appears to have occurred between 7000 and 4000 BC. Archaeological and historical evidence suggests that grape primo-domestication occurred in the Near East. Domesticated vines gradually spread to adjacent regions such as Egypt and Lower Mesopotamia, with subsequent dispersal around the Mediterranean region. The ancestral cultivars and diversification process of grape varieties through time are not well known, and it is uncertain whether secondary independent domestications also may have occurred. Recent advances in studies of morphological diversity of seeds and ancient DNA (aDNA) analysis of grapes might reveal the extent and origin of genetic diversity.

Although it is still unclear exactly where wine was first made, the earliest archaeological evidence for wine comes from Haji Firuz Tepe in the Zagros Mountains (Iran) ca. 5400 BC and from a winery in Areni (Armenia) ca. 4000 BC. Wine-making facilities, wineries, and storerooms are frequently found in the archaeological record of the ancient Mediterranean. In addition, amphorae have been recovered from shipwrecks in the Mediterranean Sea—for instance, those of two Phoenician boats (ca. 750 BC) whose cargo of wine was still intact—and from graves, such as the intact wine cellar in Tutankhamun's tomb (ca. 1323 BC) (figure 70). Residue analysis of archaeological samples using liquid chromatography–mass spectrometry (LC-MS/MS) identified tartaric acid, a grape marker, and syringic acid, a red grape marker that is derived from malvidin 3–glucoside, the main anthocyanin that gives the red color to grapes and wine.



**Figure 70.** Top: Grape harvest and wine making depicted in the tomb of Nakht at Thebes, 18th Dynasty (1539–1292 BC). On the right, workers pick the grapes by hand and put them in baskets. On the left, four men press the grapes with their bare feet. A red juice flows from the vat. Above, center, are sealed amphorae. Photograph © Irep en Kemet Project ([www.wineofancientegypt.com](http://www.wineofancientegypt.com)). Bottom: Tutankhamun's amphora JE 62303, Carter No. 486. The inscription reads: "Year 4, wine of the Estate of Aten, l.p.h., of the Western River, chief vintner Nen." The abbreviation "l.p.h." means "life, prosperity, and health," and it is always found after the name of the god. Photograph © Maria Rosa Guasch Jané, with permission of the Egyptian Museum in Cairo.

Wine making also has a considerably history in other regions. Archaeological residues of pottery jars from China, at the site of Jiahu (between 7000 and 6000 BC), using Fourier transform infrared spectroscopy (FTIR) and high performance liquid chromatography (HPLC), show a mixed fermented beverage made from rice, honey, and possibly a fruit. The earliest known archaeological example of grape wine dates to the Han Dynasty (206 BC–AD 220). The earliest grape seeds and skins in the Aegean have been found at the Late Neolithic site (ca. 4500 BC) of Dikili Tash in Greece. In ancient Greece and Rome, resins and plants were added to wines for preservation and to give flavor. Phoenician and Greek trade networks distributed wines throughout the Mediterranean region. Wine was a drink of the gods in ancient Egypt (Osiris), Greece

(Dionysus), and Rome (Bacchus) and was enjoyed in banquets. Athenaeus of Naucratis (a Greek city in the Nile Delta) discussed the essence of drinking wine in *Deipnosophistae* (Philosophers at Dinner) in the third century BC. The world's oldest textual sources describing of the role of wine in medicine are ancient Egyptian papyri and Sumerian tablets dating back to 2200 BC. The Greek Hippocrates (ca. 460–370 BC) recommended wine as part of a healthy diet.

One of the world's oldest and most extensive records for wine production comes from ancient Egypt. In Egypt, wine was a prestigious drink consumed mainly by royalty and the elite, offered to gods in daily temple rituals, and used in medical treatments and the pharaoh's resurrection ritual for the afterlife. From the Predynastic period (ca. 3800 BC) onward, wine jars were placed in graves as funerary offerings. Inscriptions on pottery jars dating to the Early Dynastic period (ca. 3300 BC) indicate the wine's geographic origin. From the Old Kingdom period (2680–2160 BC) through to the Greco-Roman period (332 BC–AD 395), wall paintings depict viticulture and wine-making scenes in private tombs, such as the mastaba of Iymery at Giza and the tomb of Nakht at Thebes (figure 70). During the New Kingdom period (1550–1069 BC), wine jars (amphorae) were inscribed in hieratic writing to indicate harvest year, product, quality and sweetness, provenance, ownership, and the wine maker's name and title. Egyptian mythology from the Old Kingdom accorded significance to the red color of wine; no textual references to white or red wine have been found from the Dynastic period (3100–343 BC). For many years, the only known evidence for wine from the New Kingdom was the representation of red grapes in tombs and the myths that connected red wine with the blood of Osiris, the god of the underworld. Recent chemical analysis through the identification of wine markers has now revealed three kinds of wine in the New Kingdom period: red, white, and a third wine named *Shedeh*. The *Shedeh*, a distinct type of red wine, was mentioned in the Salt papyrus 825 (BM 10051) of the Late Dynastic period (715–332 BC); this text described filtering and heating, but because the papyrus was damaged, a list of its raw ingredients did not survive. Chemical analysis of a unique sample identified the presence of the two markers for red wine, however.

*See also* ARCHAEOBOTANY; ARENI; BIOMOLECULAR ANALYSIS; CARVINGS/CARVED REPRESENTATIONS OF FOOD; DNA ANALYSIS; DOCUMENTARY ANALYSIS; FERMENTATION; FOOD AND RITUAL; FOODWAYS AND RELIGIOUS PRACTICES; HIGH PERFORMANCE LIQUID CHROMATOGRAPHY; INFRARED SPECTROSCOPY/FOURIER TRANSFORM INFRARED SPECTROSCOPY; MORTUARY COMPLEXES; OFFERINGS AND GRAVE GOODS; REPRESENTATIONAL MODELS OF FOOD AND FOOD PRODUCTION; RESIDUE ANALYSIS, TARTARIC ACID; SHIPWRECKS; TRADE ROUTES; WALL PAINTINGS/MURALS; WINERIES; YEAST

### Further Reading

- Guasch-Jané, Maria Rosa. 2008. *Wine in Ancient Egypt: A Cultural and Analytical Study*. BAR International Series 1851. Oxford: Archaeopress.
- . 2011. The Meaning of Wine in Egyptian Tombs: The Three Amphorae from Tutankhamun's Burial Chamber. *Antiquity* 85(329):851–58.

- Guasch-Jané, Maria Rosa, Cristina Andrés-Lacueva, Olga Jáuregui, and Rosa M. Lamuela-Raventós. 2006a. First Evidence of White Wine in Ancient Egypt from Tutankhamun's Tomb. *Journal of Archaeological Science* 33(8):1075–80.
- . 2006b. The Origin of the Ancient Egyptian Drink *Shedeh* Revealed Using LC/MS/MS. *Journal of Archaeological Science* 33(1):98–101.
- Guasch-Jané, Maria Rosa, Sofia Fonseca, and Mahmoud Ibrahim. 2013. “Irep en Kemet” Wine of Ancient Egypt: Documenting the Viticulture and Winemaking Scenes in the Egyptian Tombs. In *ISPRS Annals of the Photogrammetry, Remote Sensing and Spatial Information Sciences, Volume II-5/W1, 2013 XXIV International CIPA Symposium, 2–6 September 2013, Strasbourg (France)*:157–61.
- McGovern, Patrick E. 2003. *Ancient Wine: The Search for the Origins of Viniculture*. Princeton, NJ: Princeton University Press.
- This, Patrice, Thierry Lacombe, and Mark R. Thomas. 2006. Historical Origins and Genetic Diversity of Wine Grapes. *Trends in Genetics* 22(9):511–19.

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## WINERIES

Wineries are facilities specifically constructed for the production of wine from grapes (*Vitis vinifera*). The vinification process appears to have developed at the beginning of the Neolithic in the Fertile Crescent, from which location it spread through Southeast Asia, North Africa, and Europe. In colonial times the technique was imported into the Americas, South Africa, and Australia. In an archaeological context, wineries are primarily identified by the presence of the seeds or stalks and stems of grapes in combination with the remains of an installation to press grapes, installations to collect and process the resulting juice, or fermenting vessels. The inference of wine production can be corroborated through chemical analysis by showing the presence of malvidin, the anthocyanin that gives grapes and wines their red color and preserves because of its tendency to polymerize over time; tartaric acid (C<sub>4</sub>H<sub>6</sub>O<sub>6</sub>), an organic acid especially common in grapes that can be preserved in the form of potassium and calcium salts; or compounds that are likely from tree resins that were used to make ceramic vessels less porous or were added to wine to enhance its flavor or act as preservative. Fermentation can sometimes be supported by showing the presence of yeast, either microscopically or by finding the DNA of yeast microbes. The earliest winery (4223–3790 cal BC) that has been identified to date is in the Areni cave complex in modern Armenia. As this is fully developed, it must have been the result of a much longer tradition, also indicated by isolated evidence of wine in, for instance, Dikili Tash (Greece), Gadachrili Gora (Georgia), and Godin Tepe (Iran).

*See also* ARENI; BIOMOLECULAR ANALYSIS; DNA ANALYSIS; FERMENTATION; MACROREMAINS; RESIDUE ANALYSIS, TARTARIC ACID; WINE; YEAST

## Further Reading

- Barnard, Hans, Alek N. Dooley, Gregory Areshian, et al. 2011. Chemical Evidence for Wine Production around 4000 BCE in the Late Chalcolithic Near Eastern Highlands. *Journal of Archaeological Science* 38(5):977–84.