

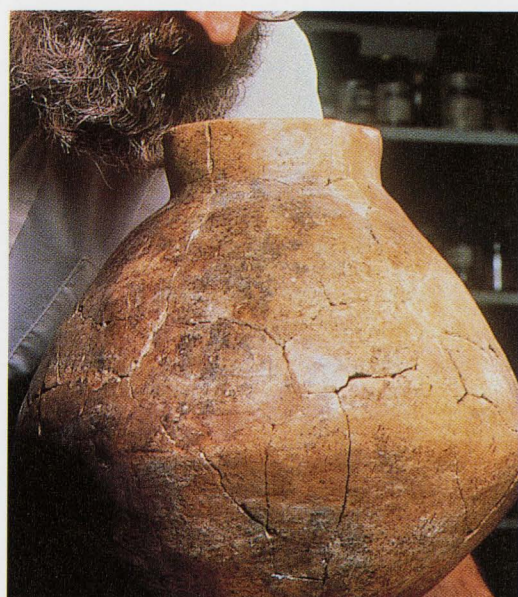
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Fermented Beverages

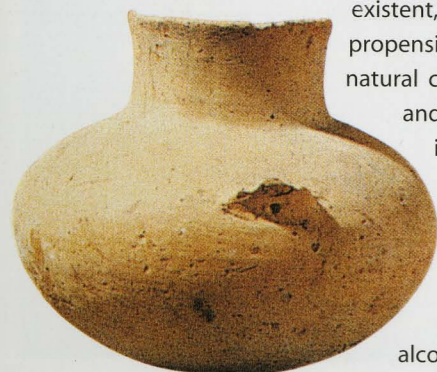
There is no department of man's life on which more labour is spent, as if nature had not given us the most healthy of beverages to drink, water ...

PLINY THE ELDER, 1ST CENTURY AD

Right The oldest wine jar in the world: a 7400-year-old 'vintage' from Hajji Firuz Tepe, Iran, which contained an organic residue.



Below A jar that contained a Neolithic mixed fermented beverage of honey, rice and fruit (probably grape or hawthorn tree fruit), according to molecular investigation; from Jiahu in Henan province, China, 7th millennium BC.



right conditions. Many fruits, including grape, fig, apple and berries, harbour the 'wine-beer-bread yeast', *Saccharomyces cerevisiae*, on their skins. Once a sugar-rich juice has been exuded from the fruit, these micro-organisms naturally begin multiplying by feeding on the monosaccharides of the juice – within a day or two in warmer climates. Yeast of the same species also exist in honey, by far the richest natural source of simple sugars (60–80 per cent by weight); when diluted to one-fifth honey and four-fifths water, the yeast begin fermenting the honey to mead.

A natural propensity

A propensity for sugar and alcohol is found throughout the animal world, from flies to birds to elephants, which readily gravitate to ripe, fermenting fruit and honey. It is not difficult to imagine Palaeolithic humans being drawn to sweet, brightly coloured fruit, and gathering it up in containers made of wood, stone, leather or fibres. Under the accumulated weight of the fruit above, fermenting juices would collect at the bottom of the vessel. This 'wine' would have been quickly appreciated and created again if possible. Lacking the knowledge or the means to preserve the beverage, however, it could only be made at harvest-time, and had to be drunk quickly.

Intentional fermentation

As an intentional human activity, the Neolithic period was the first time that all the necessary pieces fell into place for the momentous innovation of fermented beverage-making. Permanent settlements led to specialized production, increasing demand and trade. The invention of pottery

meant that the beverages could be stored in stoppered, durable jars.

Based on an expanding knowledge of their antimicrobial properties, herbs and tree resins were added to the beverages to prevent them from turning to vinegar or, minimally, to cover up bad odours and tastes. Chemical analyses of ancient Mediterranean and Middle Eastern wines in particular have shown that tree resins were used for thousands of years, a practice that persisted only in Greece in the form of retsina.

Most importantly, Neolithic humans began domesticating plants, especially cereals, fruit trees and vines, thus guaranteeing larger, more predictable yields and products with other desirable characteristics (e.g. higher sugar). Bee-keeping might well have begun in this period as well, although definitive evidence is lacking.

In trial and error fashion, the ancient beverage-maker must have realized that by adding grapes or another fruit high in natural yeast to whatever sweet substances were locally available, fermentation was easier and quicker. On opposite ends of the Asian landmass – in Neolithic villages of upland Mesopotamia, the Caucasus and Turkey in the West and in communities in the Yellow and Yangzi river basins in the East – archaeological, botanical and chemical data have shown that a fermented beverage was first made by combining honey, fruit and cereal. Whether the innovations occurred independently is not known, but the advantages of adding a fermenting fruit juice or diluted honey was apparently appreciated in both areas.

The problem in fermenting cereal sugars is that they are not associated with naturally occurring yeast and thus cannot be directly fermented. Moreover, grains are largely comprised of starches (polysaccharides) that are not digested by the yeast. Ancient humans eventually learned how to break down the complex sugars of cereals into simpler ones by malting barley in the Near East and by saccharifying rice and other grains using moulds in China. To start the fermentation process, the beverage-makers had two choices: either wait for some air-borne, adventitious yeast to colonize the brew (as is still the case with Belgian lambic beers and Chinese rice wines), or, more pre-



dictably, to introduce *S. cerevisiae* directly by adding fermenting fruit or honey.

By using a yeast 'starter', as is implied in the earliest beer recipe dedicated to the ancient Mesopotamian beer-goddess Ninkasi, a more predictable end-product was assured. Having established a colony of *S. cerevisiae*, it could be collected and transferred from one batch to the next. By 'automatic selection' (humans isolating yeast strains based on their observations), the wine yeast evolved into the beer and bread yeasts.

Another advantage of *S. cerevisiae* is that once an alcoholic content of 5 per cent by volume is reached, detrimental micro-organisms, which can cause undesirable flavours and aromas and even disease, are killed off, while the yeast survives and continues fermenting available sugars to produce a drink with more than twice this amount of alcohol.

Gradually, in the non-hygienic, experimental settings of Neolithic beverage-making, this yeast came to predominate.

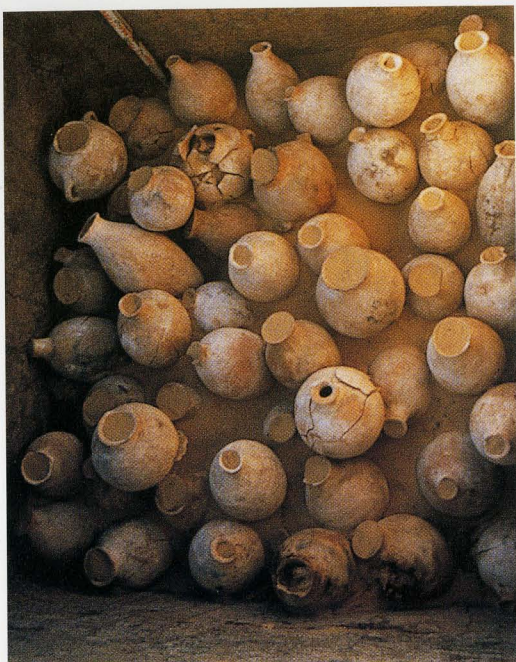
Fermented beverages became increasingly more specialized. Single-product drinks, such as grape wine, barley beer, rice wine and honey mead, eventually displaced mixed beverages. Although the more specialized beverages were sometimes held up as marks of civilization – or barbarity, depending on one's vantage point – the knowledge and expertise

Above A Mesopotamian banquet scene, the forerunner of the ancient Greek symposium, as depicted on an impression of a lapis lazuli cylinder seal from Queen Pu-abī's tomb in the Royal Cemetery at Ur, c. 2600–2400 BC. A male and female imbibe barley beer through drinking tubes from a wide-mouthed jar, as dignitaries below raise their cups, probably containing wine, which is served from a spouted jar.



Above 'Phrygian grog', a mixed fermented beverage of grape wine, barley beer and honey mead, was served with this bronze lion-headed situla, or bucket, recovered from the 'Midus Tumulus' at Gordion, and dated to c. 700 BC, Turkey.

Chamber 10 of Tomb U-j at Abydos, Egypt, filled with wine jars. The tomb belonged to a king and dates to around 3150 BC, when the Egyptians imported wine from the Levant.

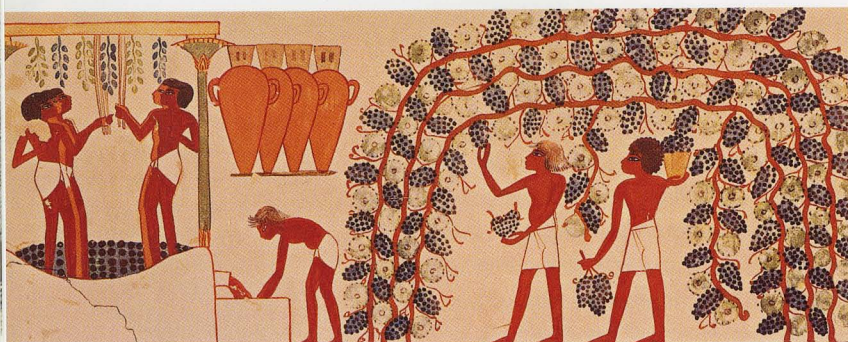


that went into making any fermented beverage was considerable.

Power & prestige

Universally, humans were primed by their genetics and environments to discover how to make fermented beverages. Almost without exception, these beverages assumed prime roles in the social customs, religions, cuisines, pharmacopoeias and economies of cultures everywhere, as is still evident today. The Judaeo-Christian tradition is focused on wine, as a symbol of sacrifice and life itself, as might have been expected for cultures originating in upland regions where the Eurasian grape vine thrives. In lowland regions or where natural sources of sugar were less plentiful, fer-

Vintage scene from the tomb of Nakht, Thebes, Egypt, c. 1400 BC. While two pickers gather in the harvest, five other men, holding on to ropes, tread the grapes. The red must is collected and fermented in amphoras, which are stoppered and labelled.



KEY DATES

intentional fermentation	Neolithic, Mesopotamia & China
oldest wine jar	7400 years ago, Iran
wine-making industry	c. 3000 BC, Egypt

mented beverages made from cereals – rice and millet wines in China, barley and wheat beers in northern Europe, and maize beer (chicha) in the New World – played similar roles in society and religion, marking major life events (birth, puberty, marriage, military victory, worship and death).

Once a fermented beverage had assumed a major role and established an economic foothold in one region, it could spread and encompass cultures elsewhere. Initially, a new beverage is introduced to elite members of a society through trade and ceremonial exchange. The prestige attached to the beverage and the vessels used to serve and drink it, which were often made of luxury materials, facilitated the transference. After its acceptance, the next logical step was to begin local production, thus assuring a more steady supply, at a lower cost and tailored to local tastes.

A prime example of this process is the establishment of a royal wine-making industry in the Nile Delta around 3000 BC. The earliest kings of Egypt imported their wines from the southern Levant. By transplanting the domesticated Eurasian grape vine to Egypt, where the wild grape had never grown, and drawing upon Levantine wine-making skills, the pharaohs created an enterprise that lasted thousands of years and was of far-reaching significance. Larger-scale production meant that wine could be integrated into society at large. Egypt's network of trade and political connections led to the further extension of the 'Near Eastern wine culture' in time and space, a process that continues up to the present in the New World.

The other important fermented beverages of the world followed similar courses from elite emulation to local production to mass acceptance, as illustrated by Chinese rice wine being adopted by the Japanese elite some 7000 years after its invention and by the progressive, millennia-long march of chicha and chocolate (p. 120) in the Americas.