

Wine Grapes

Vitis vinifera

Each July the *Tour de France* brings us competitive cycling through a celebration of French countryside, together with good food and wine, of course! Wine making in France dates back to the 6th Century BC, brought to southern Gaul (present day France, Belgium, and parts of Italy, Germany and Switzerland) by Greek settlers who founded the Greek colony of Marseille. However, there is evidence that fermented, alcoholic wine was made in Georgia 8000 years ago, Persia 7000 years ago and Italy just 4000 years ago.

The surprising thing about wine is that although there are almost 80 species of grape vines (*Vitis* sp.) in the world, **just one species, *Vitis vinifera***, is the source of just about all the grapes used in modern wine production. *Vitis vinifera* is one of the economically most important fruit crops of the world, grown for wine, grape juice, table grapes, dried fruit (sultanas and raisins), with leaves also used for many culinary purposes. Most species of *Vitis* come from temperate regions of the Northern Hemisphere, in particular south-eastern North America and east Asia. The genus *Vitis* believed to have originated in North America but *V. vinifera* has its origins in southern Europe and south-western Asia.



Photo: David Edgecombe



World-wide distribution of *Vitis* species. Red circled area is approximate natural distribution of the wine grape, *Vitis vinifera*. Modified from Wan Y-J et al. 2013.



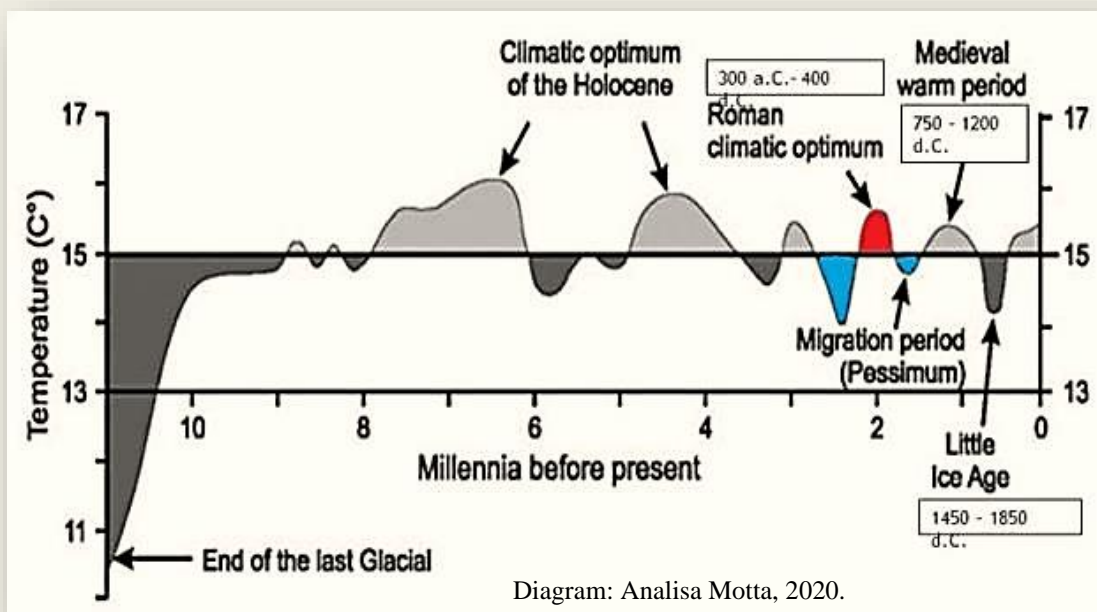
Photo: David Edgecombe

Even earlier, in China, evidence of fermented alcoholic drinks (made from a mix of wild grapes indigenous to China and not those of the Mediterranean wine grape, rice, and possibly other fruits) has been found in 9000-year-old pottery jars from the Neolithic site of Jiahu in Henan Province. Introduction of the **wine grape** to China was originally thought to have been in the 2nd century BC but there is evidence that the Mediterranean **wine grape** was cultivated in China from much earlier times. Radiocarbon dating of a grape stem discovered in the Yanghai Tombs at the base of the Flaming Mountains (火焰山) in Turpan, north-western China, has been dated at 2,300 years old.



Vineyards and grape drying buildings in the desert oasis of Turpan (吐鲁番) in north-western China.

Wine was an essential part of daily life in Ancient Rome, of great significance and importance in culture, society, the economy, religion and military operations. Of particular interest to biologists is the sequence of climatic events that greatly impacted the establishment of vineyards throughout the Roman Empire.



Rome was founded in 753 BC, during the time of a small ice age from 900 to 300 BC, shown in this diagram as the blue trough. At that time, vineyards would have had to have been at relatively low elevation, probably along the coast or in sheltered, south-facing areas. This period of cooling was followed by warming, known as the *Roman Optimum Climactic*, lasting from 250 BC to 400 AD. This allowed the Romans to establish vineyards throughout most of Europe, even in England where it was previously far too cold for grape vines. Vineyards were established in Marseille from 6th century BCE but

expanded rapidly northwards during the 1st century CE. These early vineyards were established around towns, along major roads and rivers, and particularly on warmer, south facing slopes.

However, this period of warming was followed by the *Little Ice Age* from ~ 400 AD. This had a massive impact, not only on vineyards, and the collapse of agriculture and horticulture is considered by many to have contributed substantially to the fall of the Roman Empire.



A Roman mosaic depicting the vintage at Cherchell in Roman North Africa, now present-day Algeria.

It may be that human activity during the time of the Roman empire influenced the climate. The Italian peninsula, prior to the establishment of the Roman empire, was covered in woods, forests and marshes but much of this was deforested by the Romans for building, fuel and ship building. The Romans themselves were aware of the degradation, Pliny the Elder wrote of landslides, floods, erosion, and water shortages.



Fresco showing a rooster pecking some grapes, from Pompeii, Naples. National Archaeological Museum. Photo: Carole Raddato from FRANKFURT. Germany. CC BY-SA 2.0. via Wikimedia Commons

In much the same way, present day climate change poses new threats to wine production as increasing frequency and intensity of droughts in southern Europe threaten the viability of wine production in countries such as Spain, France, Italy, Greece and Turkey. Vineyards are likely to be more sustainable in more northerly latitudes and on

farmland at higher elevations previously considered far too cold for wine production. A similar pattern of change is emerging in the southern hemisphere as climate change is forcing Australian, New Zealand and Chilean wineries to consider moving further south or to higher elevations!

The story of wine would not be complete without mention of Dionysus, or Bacchus, as he was known to the Romans, God of the grape harvest, winemaking, orchards and fruit, vegetation, insanity and a host of other things! In brief, Dionysus was the son of Zeus and Semele, a princess of Thebes and a priestess of Zeus. As a young man who enjoyed life, swimming and hunting, Dionysus met Ampelos, a beautiful young man, or perhaps a satyr,



Drunken Dionysus with satyr Ampelos.
Museo Nazionale Romano di Palazzo
Altemps, Public domain, via
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who became the love of his life. One day, when Ampelos was hunting alone in a forest, he was killed when attempting to ride a wild bull. Dionysus was overcome with grief, but his love rose from the grave, not as a young man, but as a grape vine, his feet formed roots, his fingers became small branches, and bunches of grapes grew from his elbows and neck. New plants grew from the horns on his head (he must have been a satyr) and grew into a vineyard. So, this is why Dionysus is known as the god of wine and of viticulture, and why all Greek and Roman myths agree that Dionysus discovered intoxicating wine!

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