



Nutri

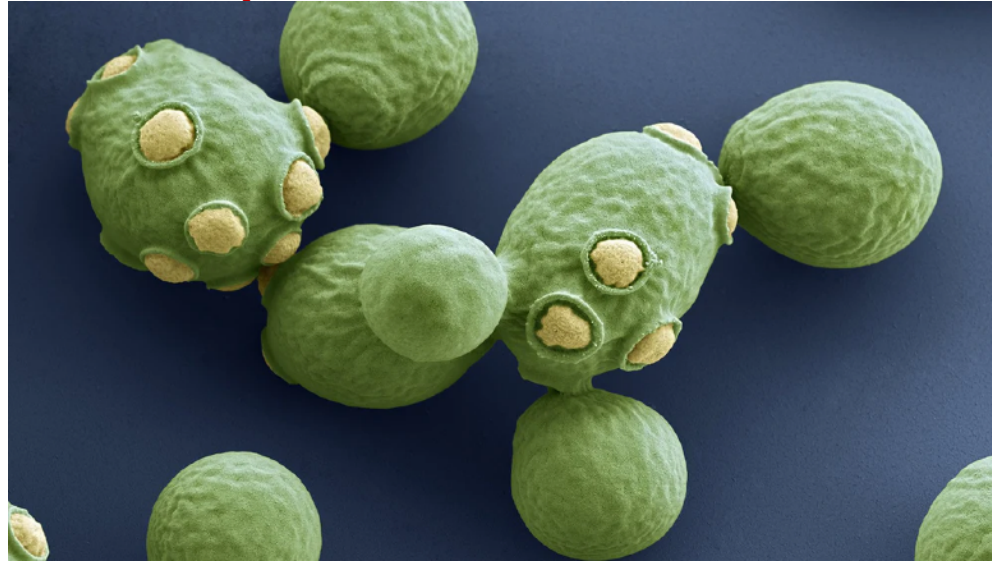
Previene

Ménage à trois: miele, lievito e vino nell'antichità

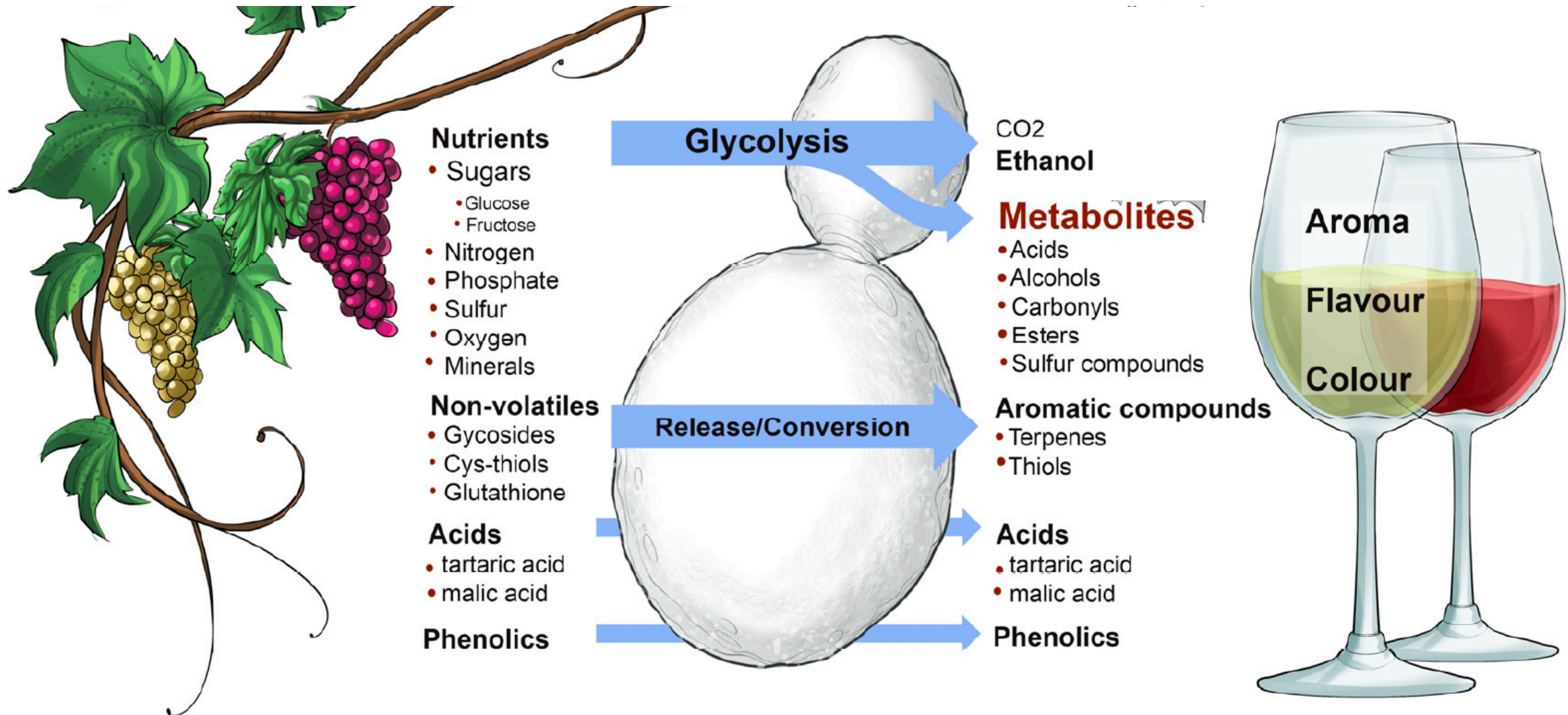
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Miele, lievito e vino



Microbial modulation of volatile compounds in wine

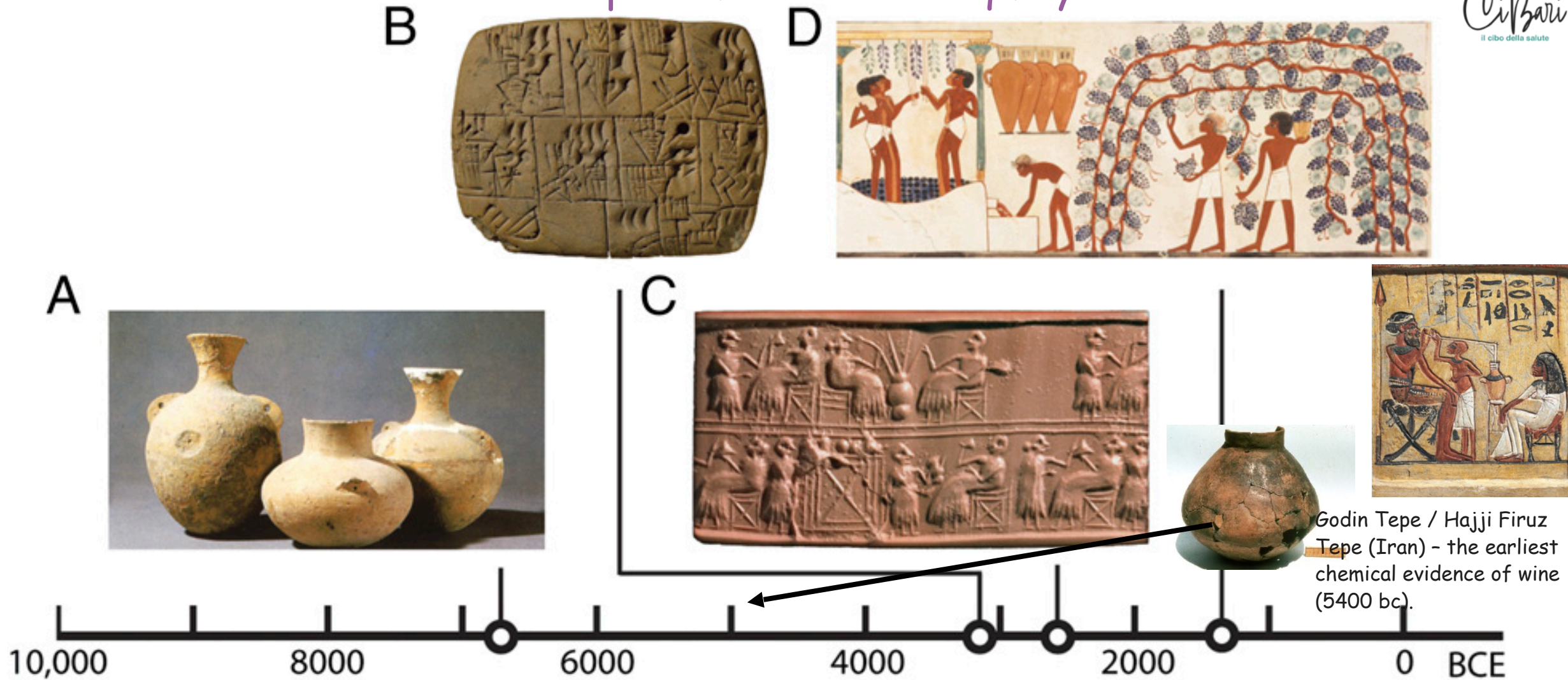


The conversion of grape juice to wine by the action of the yeast, *Saccharomyces cerevisiae*. A wine yeast converts grape nutrients into ethanol, carbon dioxide and secondary metabolites through its glycolytic metabolism. Some grape-derived compounds, such as acids and polyphenols, remain largely untouched by the yeast cells while other compounds are wholly generated as part of the fermenting yeast cells' metabolism. A number of the compounds synthesised or modified by yeast impart aromas that can diminish or enhance the quality of wine.

Histoires du vin



Alcohol production in antiquity



Godin Tepe / Hajji Firuz Tepe (Iran) - the earliest chemical evidence of wine (5400 bc).

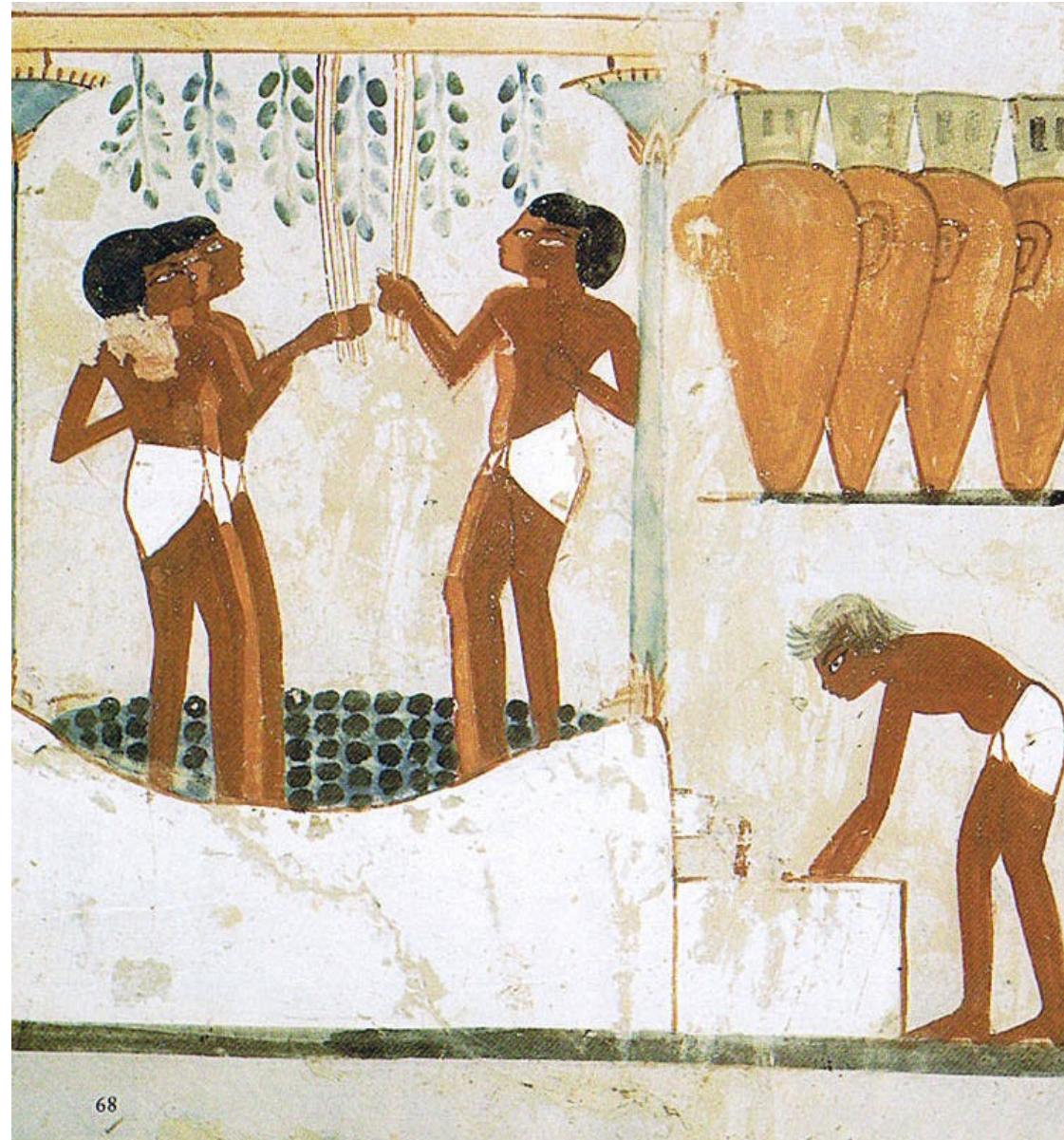
(A) Early Neolithic jars, with flaring necks and rims, from Phase 2-3 of Jiahu (Henan Province, China), ca. 6500-5500 B.C.E. Chemical analyses (6) indicate a fermented mix of rice, honey, and fruit.

(B) A Sumerian tablet reports the allocation of beer, Late Uruk period, ca. 3100- 3000 B.C.E. (British Museum).

(C) Impression of a Sumerian cylinder seal from the Early Dynastic IIIa period, ca. 2600 B.C.E.. The upper row depicts the use of long straws to drink unfiltered beer from a globular vessel (British Museum).

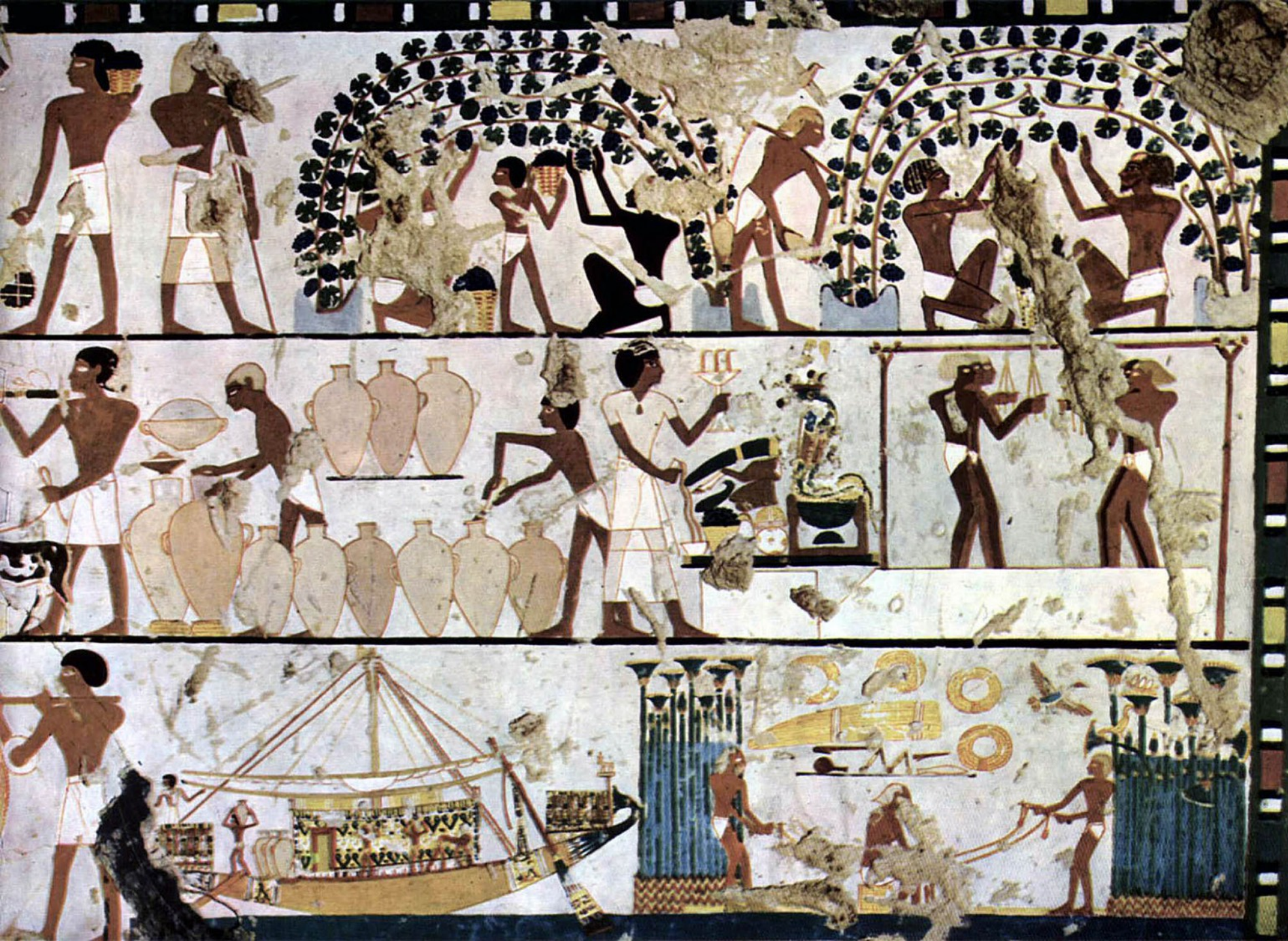
(D) Facsimile painting from the tomb of Nakht (Theban Tomb 52, Egypt), ca. 1400-1390 B.C.E. The scene depicts early viticulture and wine production.

Egyptian wine production



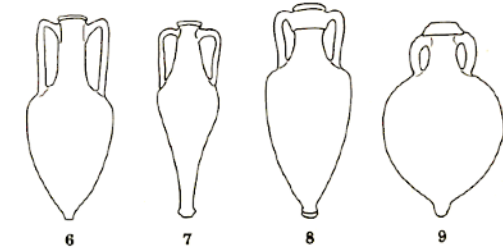
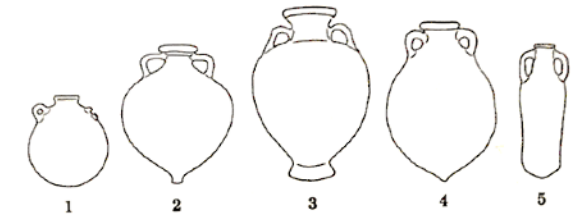
Foulage du raisin dans une cuve monolithe, tombe de Nakht, vallée des Nobles, Thèbes (Égypte), vers 1567-1320 av. notre ère.

Egyptian wine production



Peinture murale,
tombe du prêtre
Khâemouaset, vallée
des Reines, Thèbes
(Égypte), vers 1500

British Museum



1 Amphora for oil or wine

Roman or Islamic
Made in the Levant
7th-8th century AD

GR 1899.12-19.1

2 Amphora for oil or wine

Greek, probably made in Laconia
Late 6th century BC

GR 1845.6-19.10

3 Amphora for oil

Greek, made in Athens
About 600 BC
From Vulci, Etruria

This is the 'SOS' type so-called
after the depuration on the neck

GR 1848.6-19.9

4 Amphora for oil
Roman, made in Spain
3rd-4th century AD

Morel Collection
GR 1904.2-4.1451

5 Amphora for wine

Roman, eastern Mediterranean
6th-7th century AD
Said to have been found near
the Dardanelles

Given by Lord Clarence Paget
GR 1883.11-24.34

6 Amphora for wine

Greek, made in Rhodes
3rd-2nd century BC
From Cyrenaica

GR 1868.7-5.167

7 Amphora for wine

Greek, made in Thasos
5th century BC
From Camirus, Rhodes

GR 1864.10-7.34

8 Amphora for wine

Greek, made in Chios
5th century BC
From Camirus, Rhodes

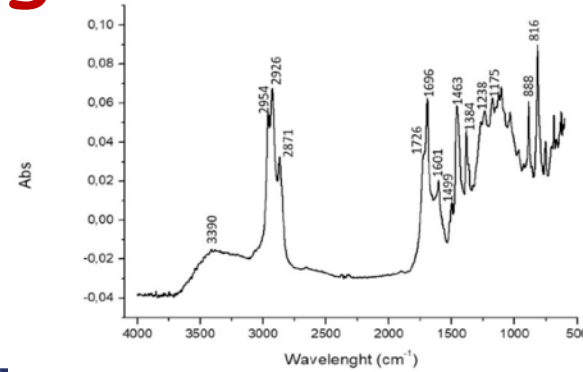
GR 1864.10-7.36

9 Amphora for oil or wine

Greek, made in Corinth
Late 5th century BC
Dredged up in the bay of
Prevesa, near Actium, on the
west coast of Greece

Given by Her Majesty Queen Victoria
GR 1872.12-14.2

Parco Archeologico del Colosseo



FT-IR analysis, terpenoid resin, pitch





Archeology ←

Biology →

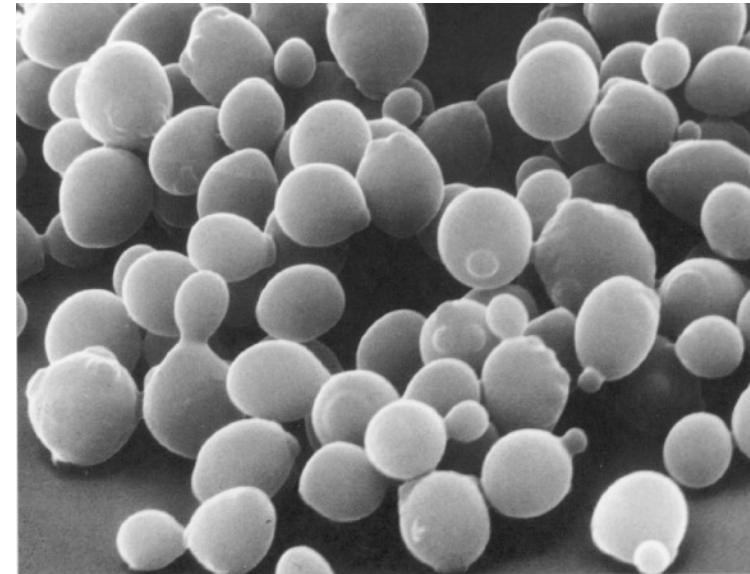


The tomb of King Scorpion I, Abydos, Egypt



Scorpion I's tomb at Abydos (3100 BC), showing one of the chambers filled with wine jars (300 jars) made out of clay from Palestine, which implies that the wine itself was imported from vineyards hundreds of miles away.

The 26 labelled jars of wine discovered in the tomb of King Tutankhamun include examples such as: "Year Four. Wine of very good quality of the House-of-Aton of the Western River. Chief vintner Khay."



From residue present inside one of the earliest known wine jars from Egypt, researchers have extracted, amplified, and sequenced ribosomal DNA from *S. cerevisiae*. These results indicate that this organism was probably responsible for wine fermentation by at least 3150 B.C.

Cavalieri et al. J Mol Evol (2003) 57:S226-S232

The tomb of Queen Meret-Neith in Abydos, Egypt



5000-year-old wine jars in the tomb of Queen Meret-Neith in Abydos during the excavation. The jars are in their original context and some of them are still sealed.



These excellently preserved grape seeds were found in the sealed wine jars in the tomb of Queen Meret-Neith in Abydos

09. October 2023. The tomb of Queen Meret-Neith in Abydos, Egypt. She was the most powerful woman in the period around 3,000 BC. Recent excavations prove her special historical significance: the researchers found 5,000-year-old wine and other grave goods. This fuels speculation that Meret-Neith was the first pharaoh of ancient Egypt and predecessor of the later Queen Hatshepsut.

<https://medienportal.univie.ac.at/en/media/recent-press-releases/detailansicht-en/artikel/5000-year-old-wine-for-egyptian-queen/>

Examples of amphoras

British Museum



Sealed transport amphora

Made in Chios
about 550 BC - 525 BC

This Chian amphora was discovered in the offering magazines of an Egyptian Temple at Tell Dafana. The mouth is sealed with plaster, stamped with the cartouche of the pharaoh Amasis.

From Tell Dafana

AES 37360 (1887.1-1.770)

Mostra Fenici e Cartagine, 2019, Colosseo



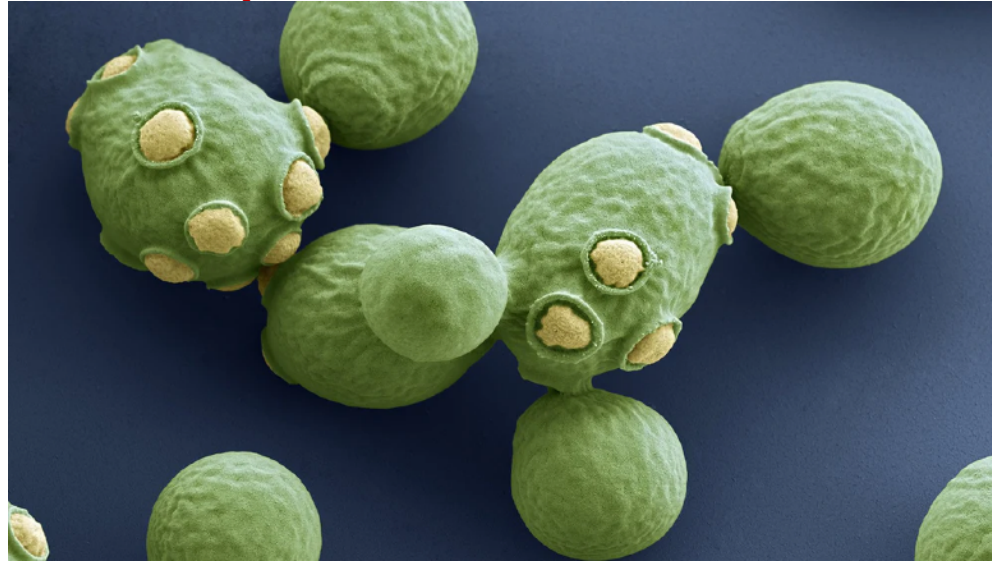
Examples of amphoras



Sampling of the sealed anphora



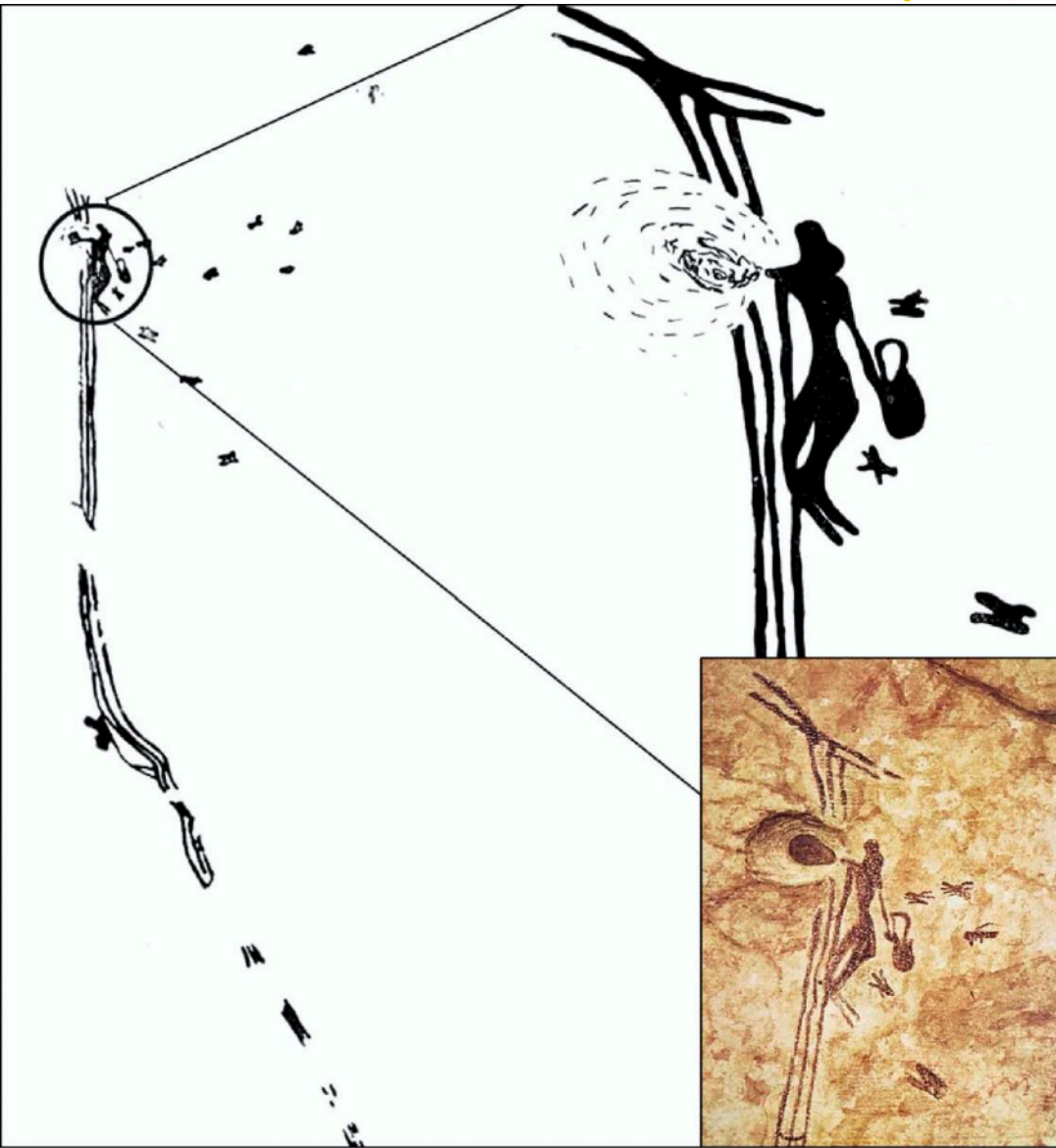
Miele, lievito e vino



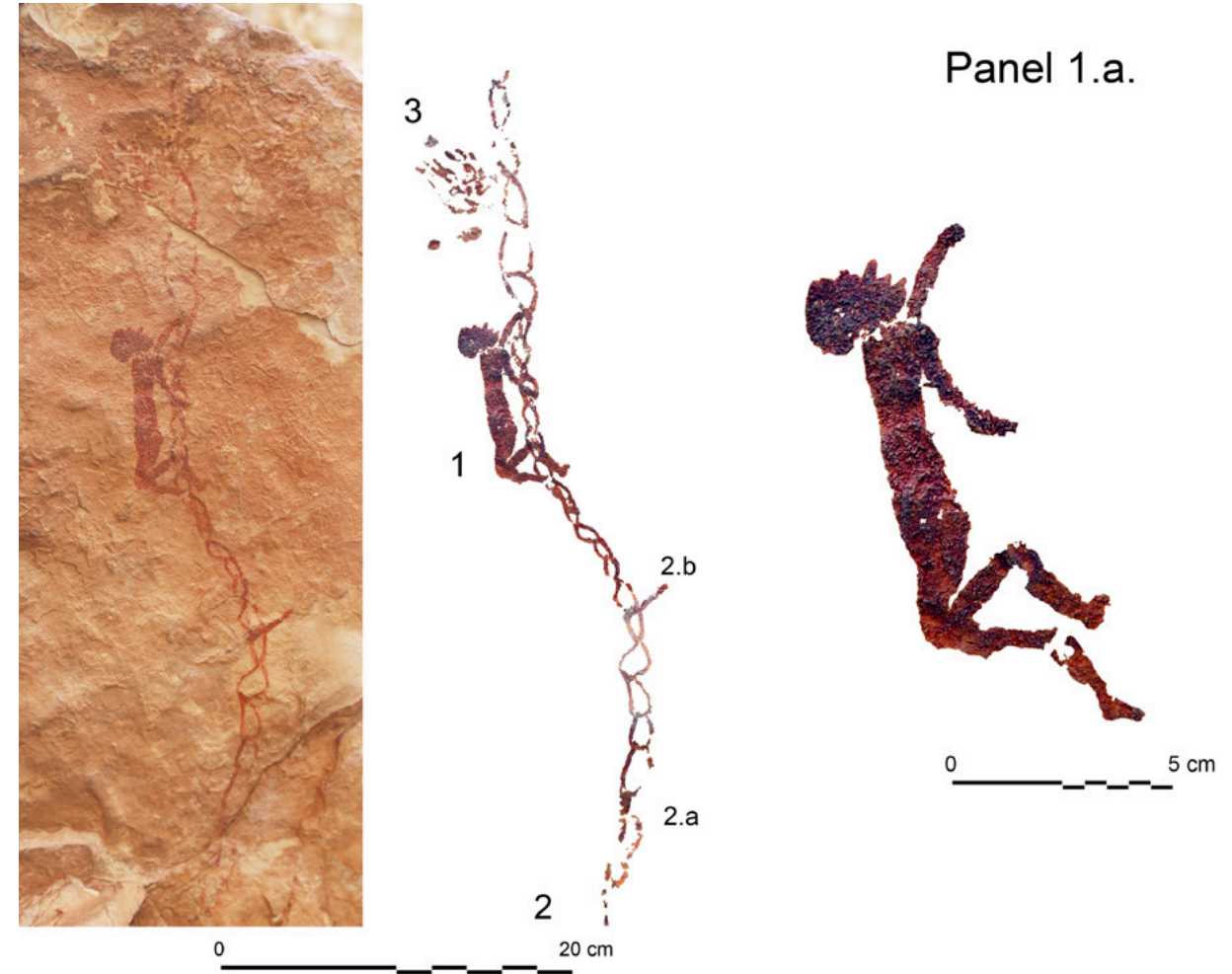
Honeybees



Honey hunter

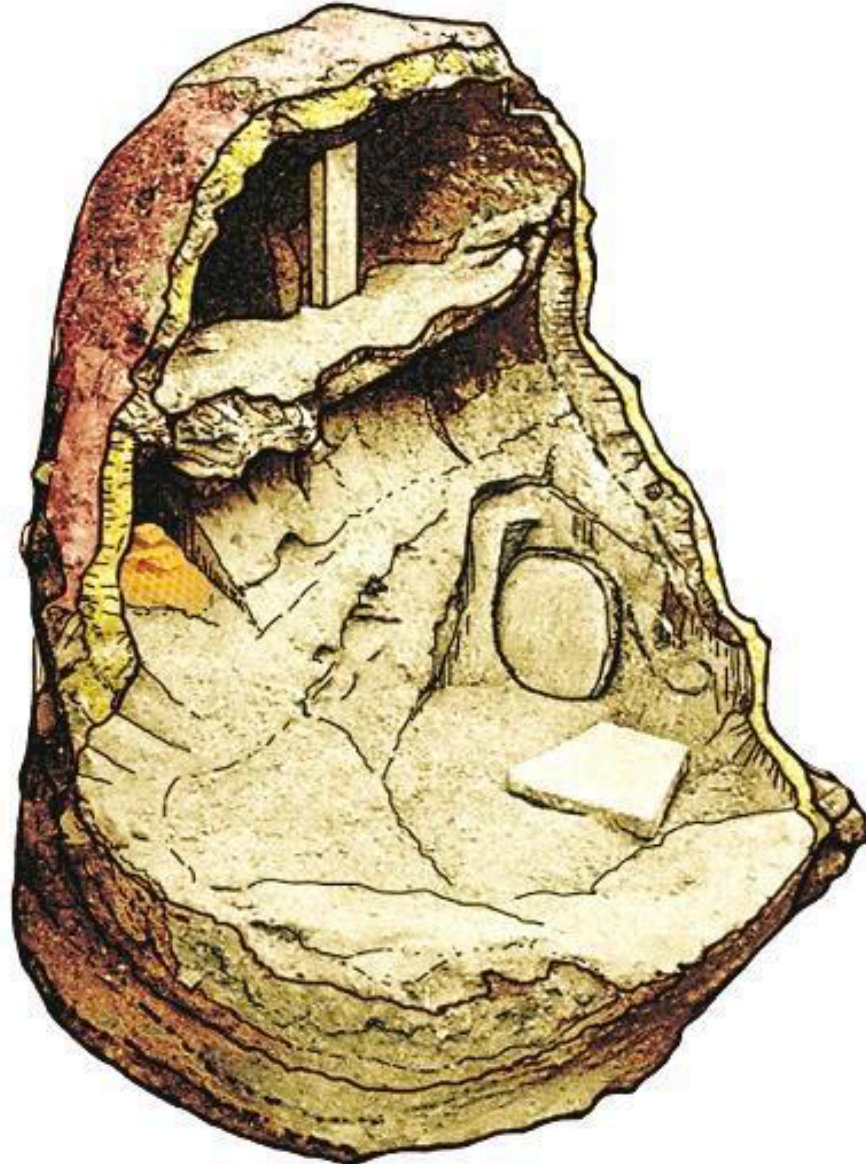
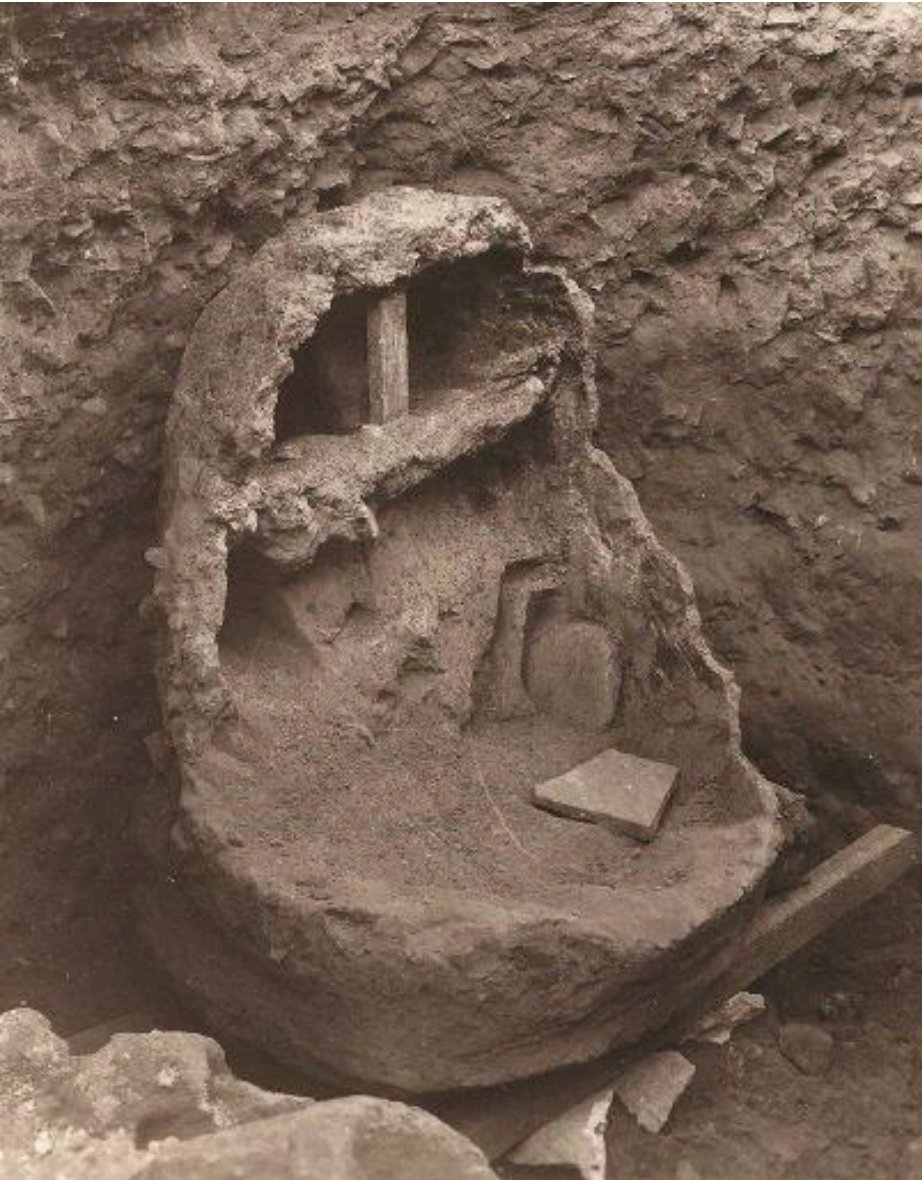


Rock painting showing a honey hunter taking honey from a nest and surrounded by angry bees, Cueva de la Araña (8000-6000 BC), Spain (Dams 1984, 230, fig. 195).



Shelter of Barranco Gómez (Castellote, Teruel, Spain). Honey-gathering scene on the ceiling and wall of Panel 1. a.: photograph and general tracing and detail of the climber; b.: photograph and detail tracing of one of the ends of the rope, the panel and several anthropomorphs, about 7,500 years ago.

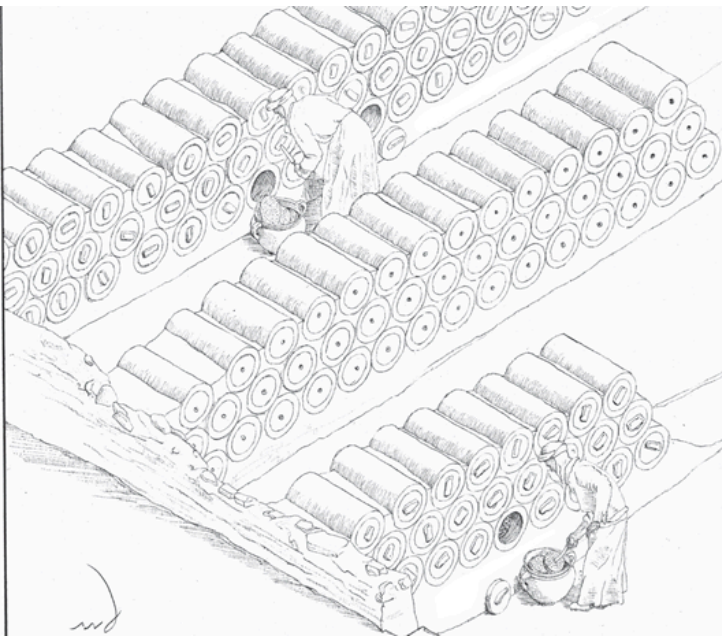
Beehive in Jericho



Bees were kept often in temples or in sacred places, such as in Pre-Pottery Neolithic B Jericho, where one of the **oldest hives** was found in the courtyard of the one of the earliest shrines so far known.

Sun-dried clay beehive found in the Level IX (Pre-Pottery Neolithic B, 7500-6000 BC) of the NE Trench at Tell es-Sultan/ancient Jericho, Garstang et al. 1936, 71, pl. XL:b; drawing by Lorenzo Nigro.

Apiary



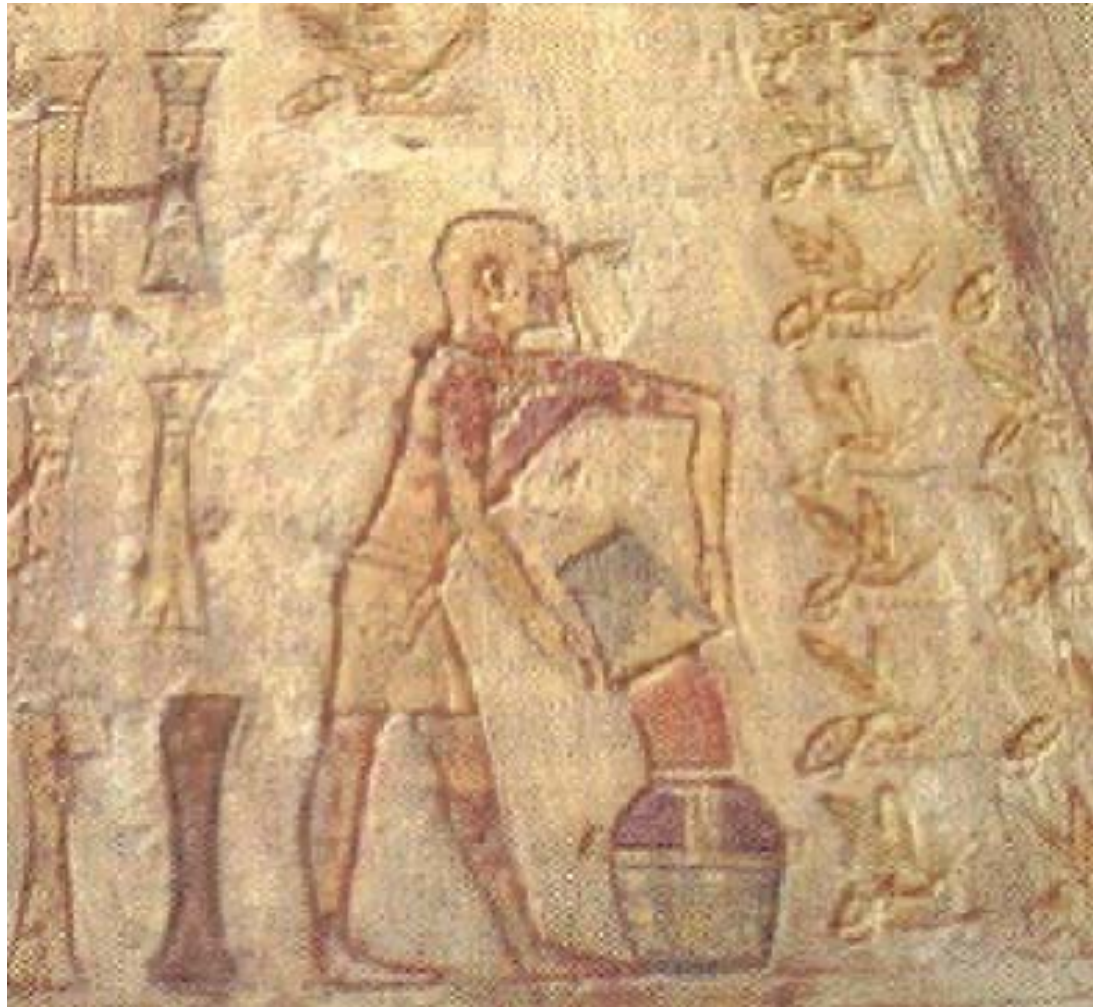
This is a perspective reconstruction of how the apiary might have looked during operation at Tel Rehov. Note how the flying holes face away from the workers, who are busy extracting honeycombs; this would have minimized the danger of getting stung when the bees left the hives.



Beekeeper and ancient hives (tomb of Pabasa)

Beekeeping in Ancient Egypt

Ancient Egyptians poured honey into a vessel

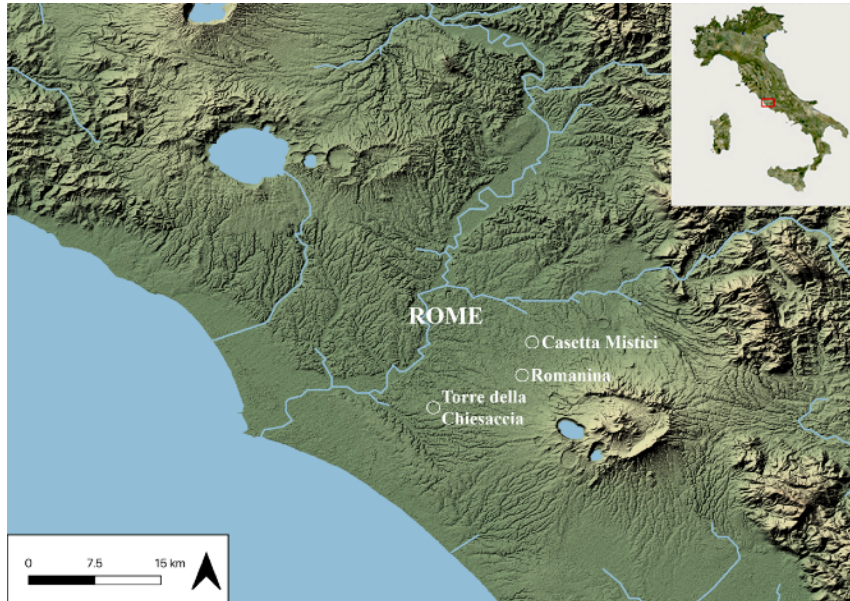


Ancient Egyptians bake honey cakes

Honey-fermented beverages in Europe



(4th-3rd millennium BC)



The bees of Malia



This famous gold ornament from Malia is a pectoral pendant consisting of two bees depositing a drop of honey in their honeycomb. They are holding the round, granulated honeycomb between their legs and the drop of honey in their mouths. On their heads is a filigree cage containing a gold bead, while small discs hang from their wings and the sting. This is a true masterpiece of the jeweller's art, combining repoussé, granulated, filigree and incised decoration.

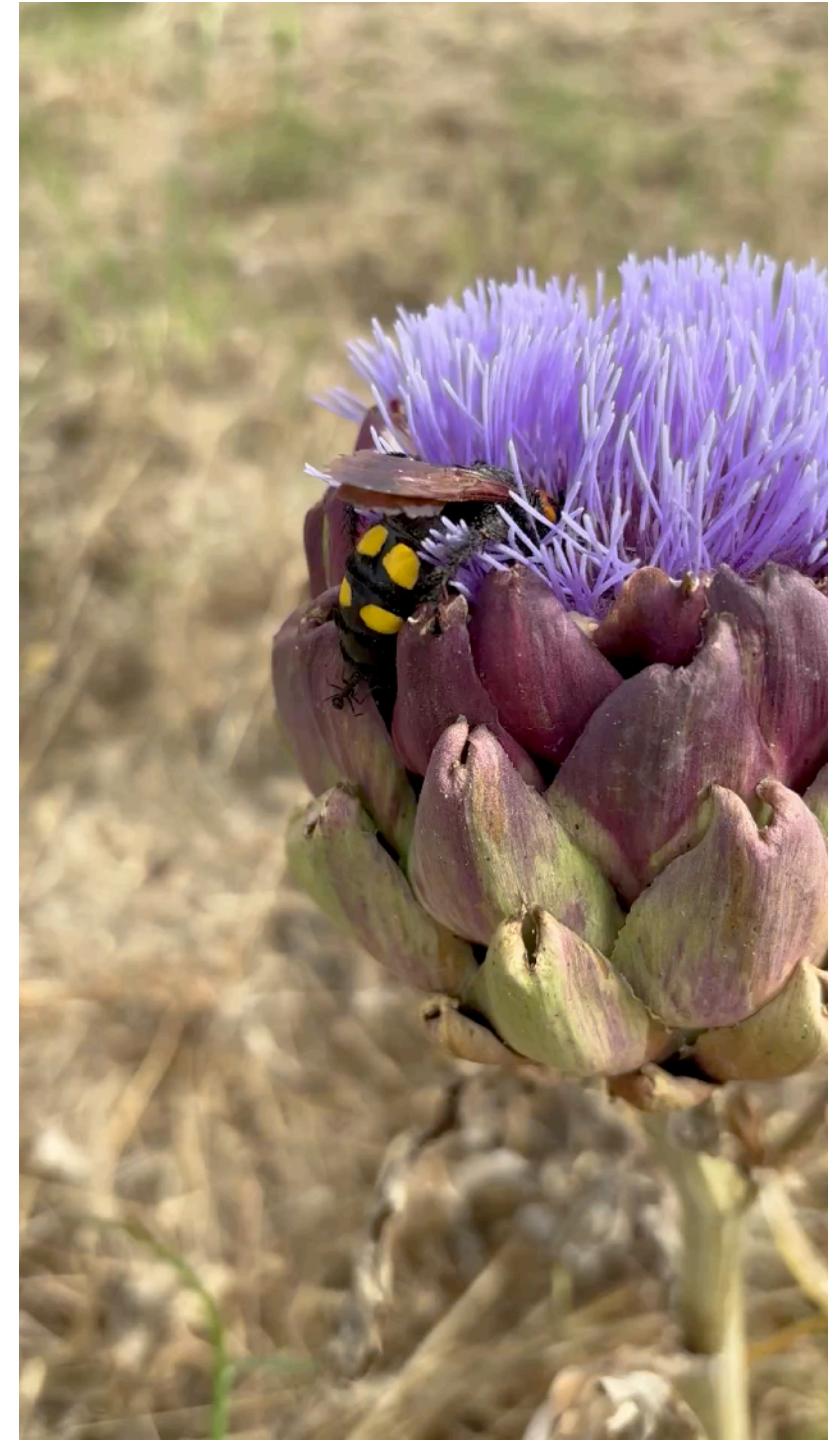
The Malia Pendant is a gold pendant found in a tomb in 1930 at Chrysolakkos, Malia, Crete. It dates to the **Minoan civilization, 1800-1650 BC**. 4.6 x 4.4 cm.



Tordylium apulum in fruit, in Crete.



Male *Megascolia maculata maculata* foraging on an inflorescence of *Eryngium campestre* L.



Insects present in the vineyard



ape



bombo



vespa



calabrone



Drosophila

Wasps

Hornets and wasps bite the grapes and help start the fermentation while grapes are still on the vines spreading the yeast *Saccharomyces cerevisiae*.

Wines would not taste the same without wasps, which have a **big impact on flavours**. The wasps also introduce other microorganisms to the grapes, which add flavours to the wine.

The ancient Romans winemakers have planted flowers near their vines to lure certain insects.



Other insects and birds also carry the yeast, but hornets seem to play a special role because they both harbor the yeast over winters and can pass them along to their offspring. **Wasps maintain yeast cells during the hibernation**, the «unfavourable» season for *S. cerevisiae*.

Hornets have the ability to metabolize ethanol



Three adult **Oriental hornet** (**calabroni**) workers (*V. orientalis*) feeding on a ripe fig, a potential source of naturally occurring ethanol. Both insects and primates have likely eaten fermented fruit for millions of years. Wasps have evolved the ability to metabolize ethanol.

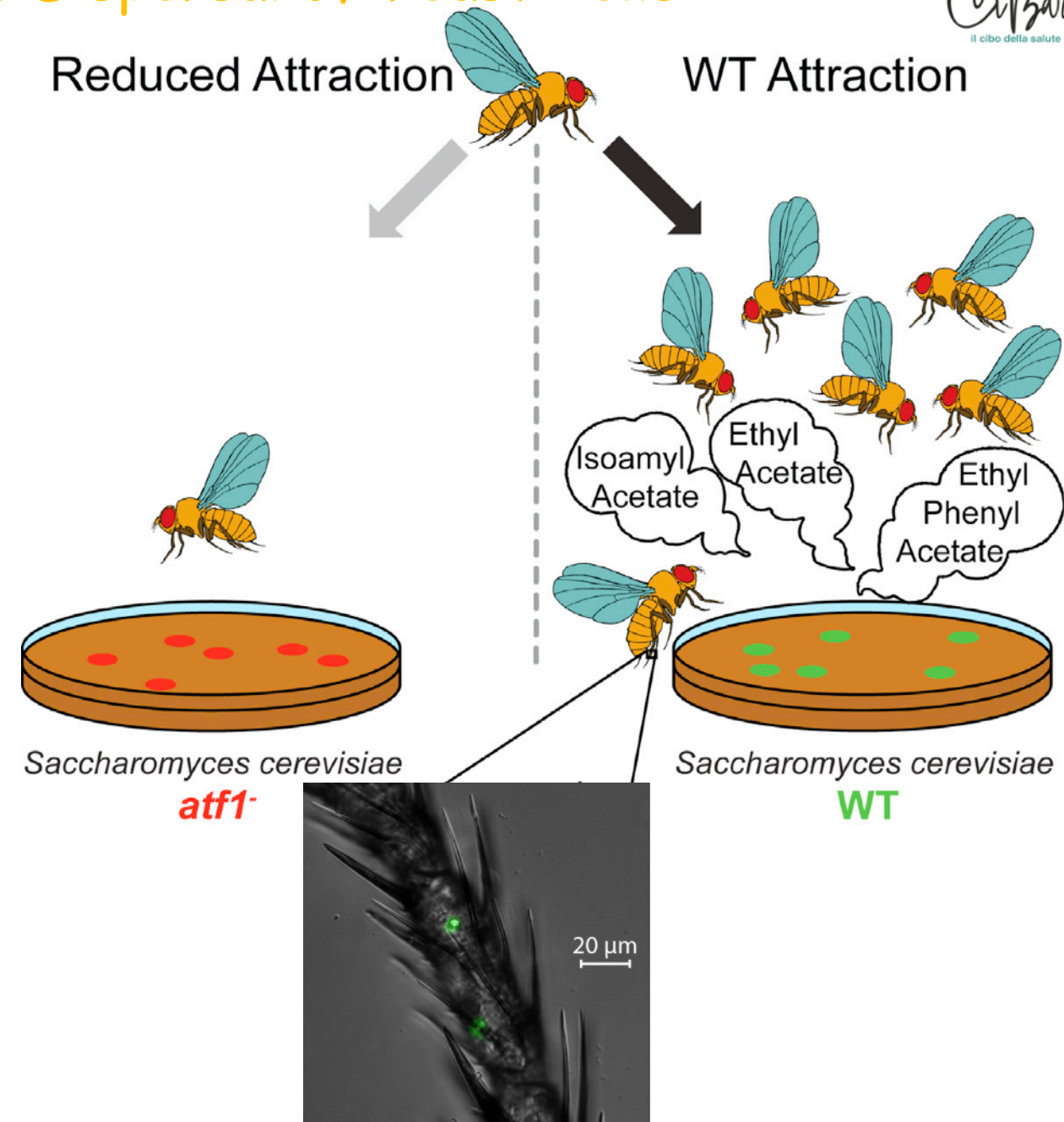
The ability to ingest fluid from rotting fruit is



Fungal Aromas Promotes Dispersal of Yeast Cells

Yeast cells produce several different volatile acetate esters. Whereas these fruity aroma compounds are key contributors to the pleasing aroma of fermented beverages like beer and wine, their physiological role for the yeast cells that produce them remains unknown. Researchers show that two acetate esters, ethyl acetate (acetone), ethyl phenyl acetate (honey, waxy, fruity) and isoamyl acetate (fruity banana or pear odor), help to attract fruit flies that serve as vectors that promote dispersal of the yeast cells.

Deletion of the yeast **ATF1** gene, encoding a key acetate ester synthase, drastically reduces *Drosophila* attraction and therefore limits yeast dispersal.



Ringraziamenti

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Biologia e Beni Culturali

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Marzia Beccaccioli
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ARCANES
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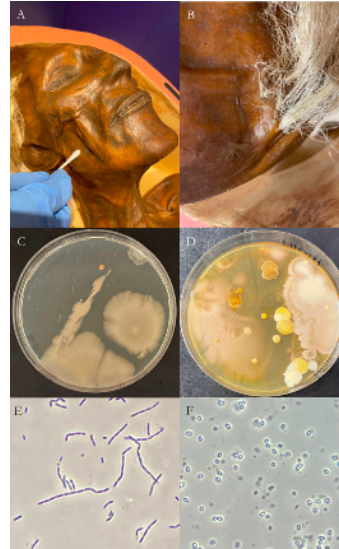
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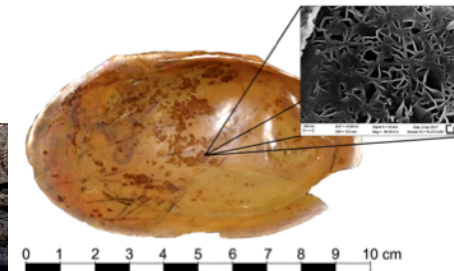
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CibiBari
il cibo della salute

Nutri

Previene

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