

La dimension microbienne du vin

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Muséum national d'Histoire naturelle

Université de Gdansk (Pologne) & Viçosa (Brésil)

Cépages...



Cépages...

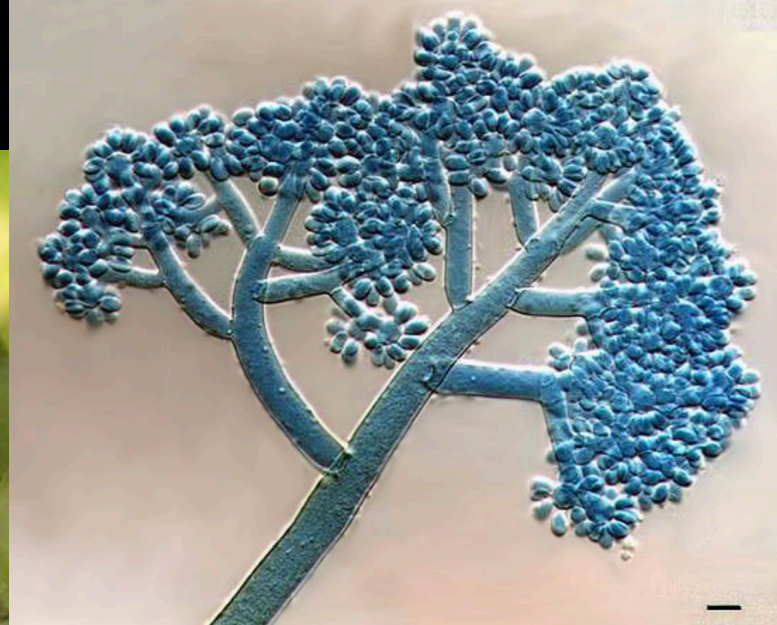


et vins

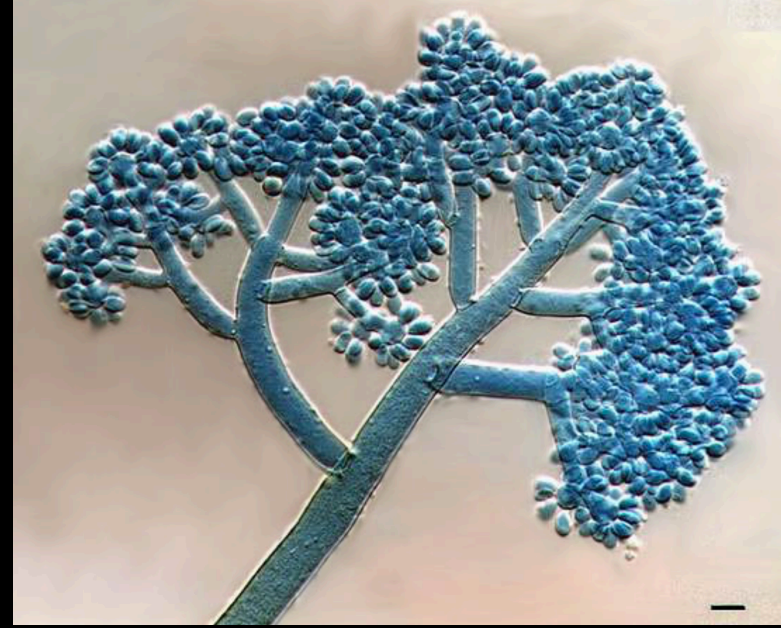


1

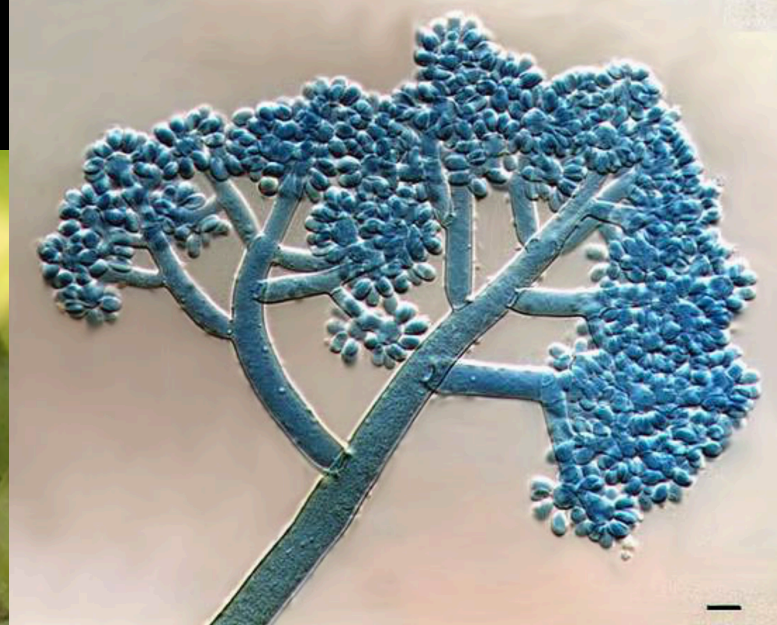
Dès avant la récolte...



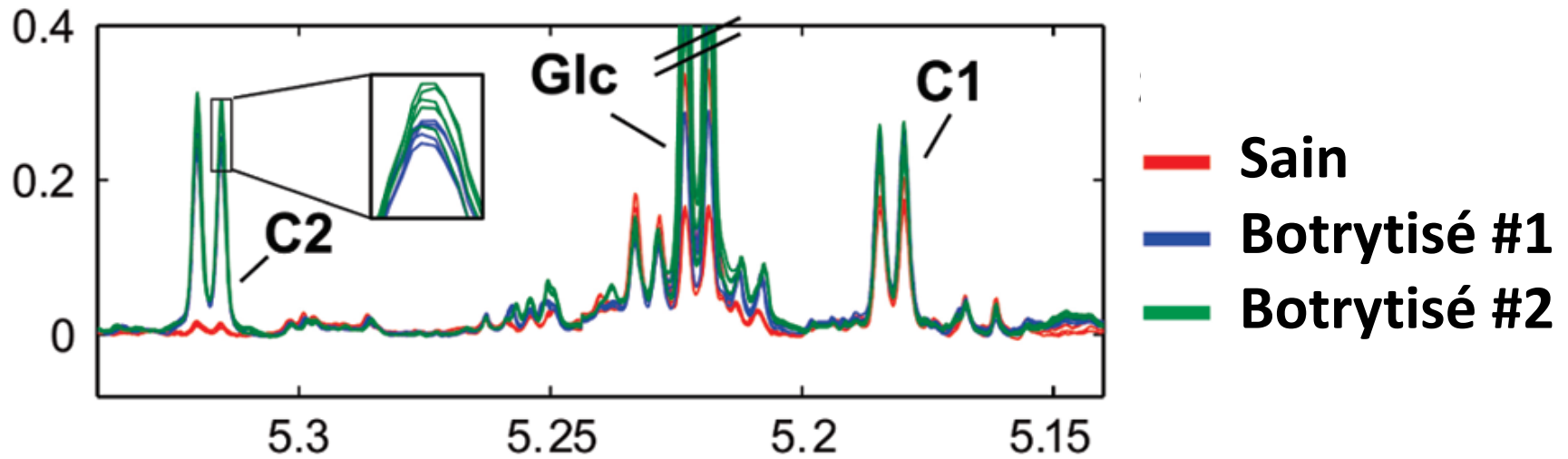
La pourriture noble (*Botrytis cinerea*)...



... ou le parasite ?

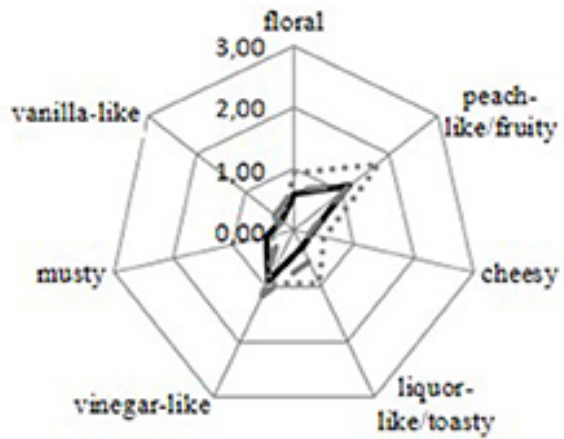


La pourriture noble (*Botrytis cinerea*)...

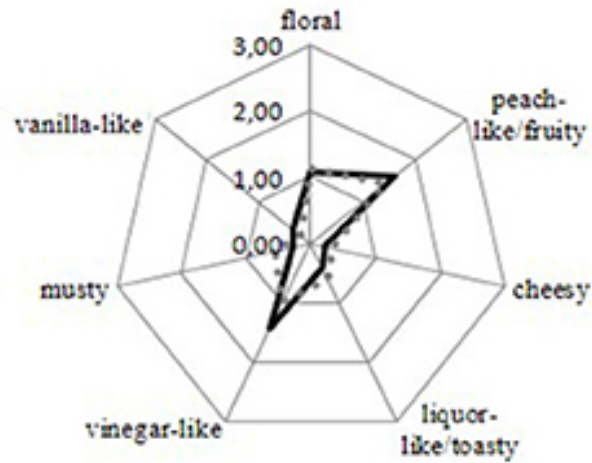


La pourriture noble (*Botrytis cinerea*)...

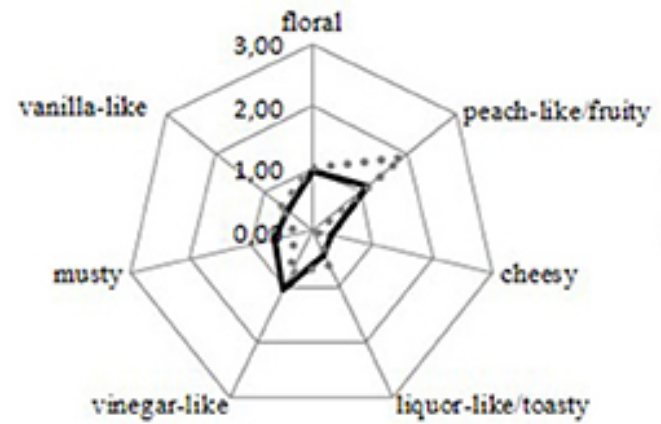
White Riesling



Red Riesling



Gewürztraminer



- Sain
- - Botrytisé (un peu)
- Botrytisé (beaucoup)



L'esca, une atteinte du bois...



L'esca, une atteinte du bois...



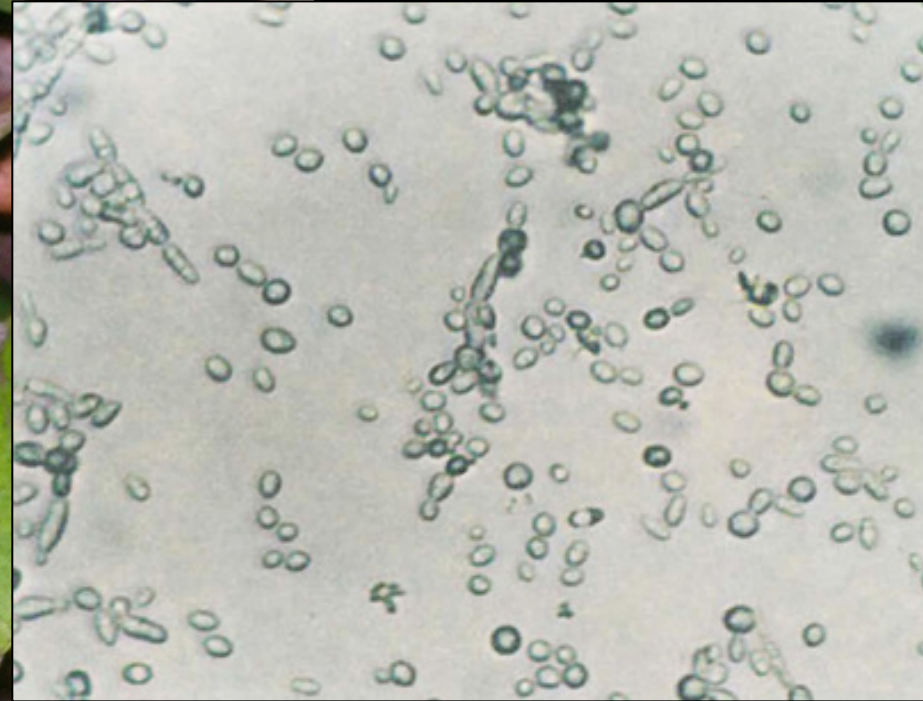
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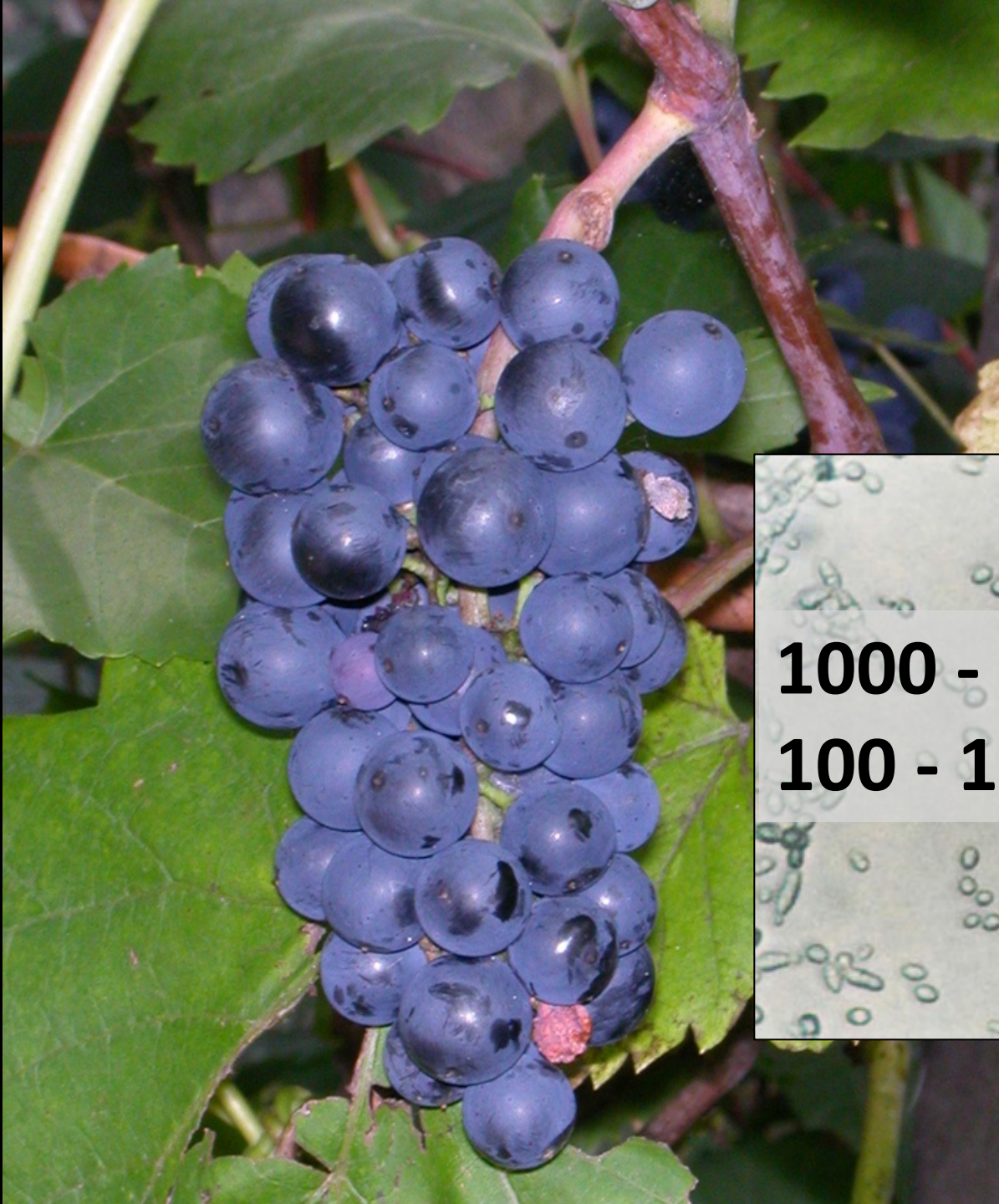
**Premiers pas
vers le moût...**



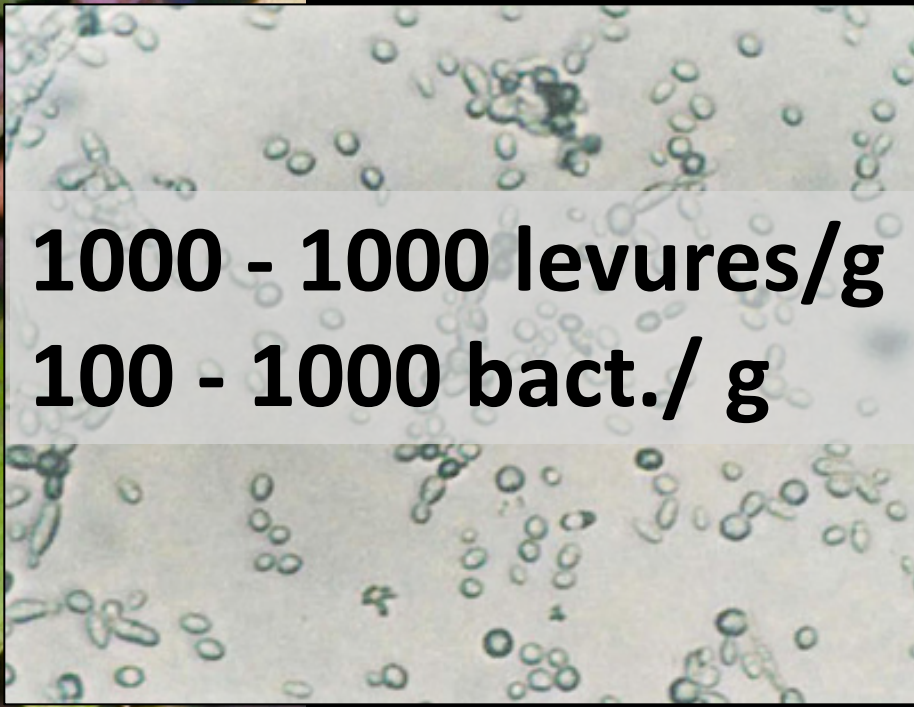
PRUINE

PRUINE

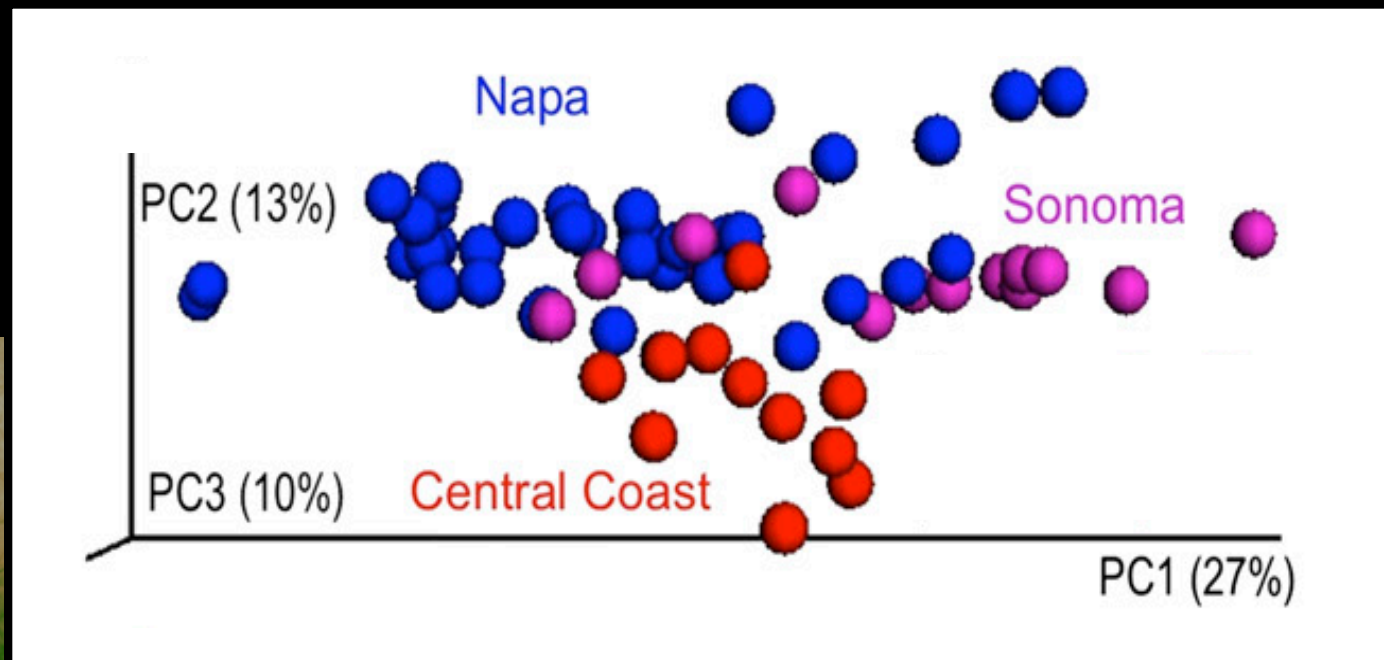
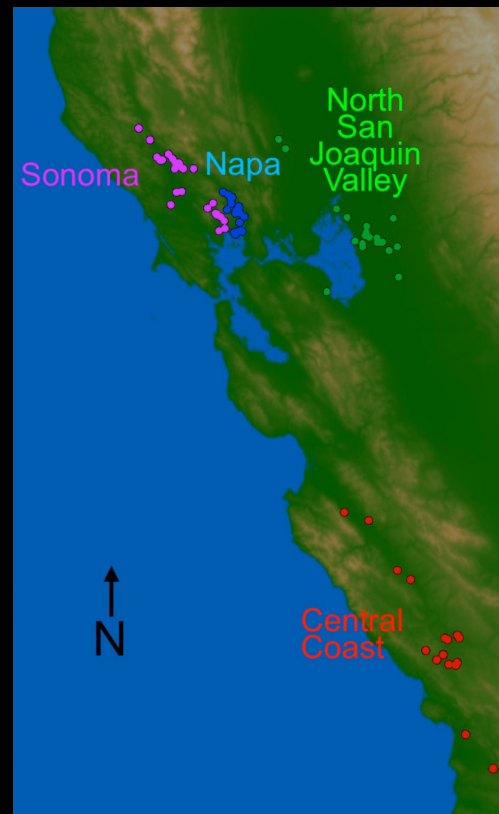


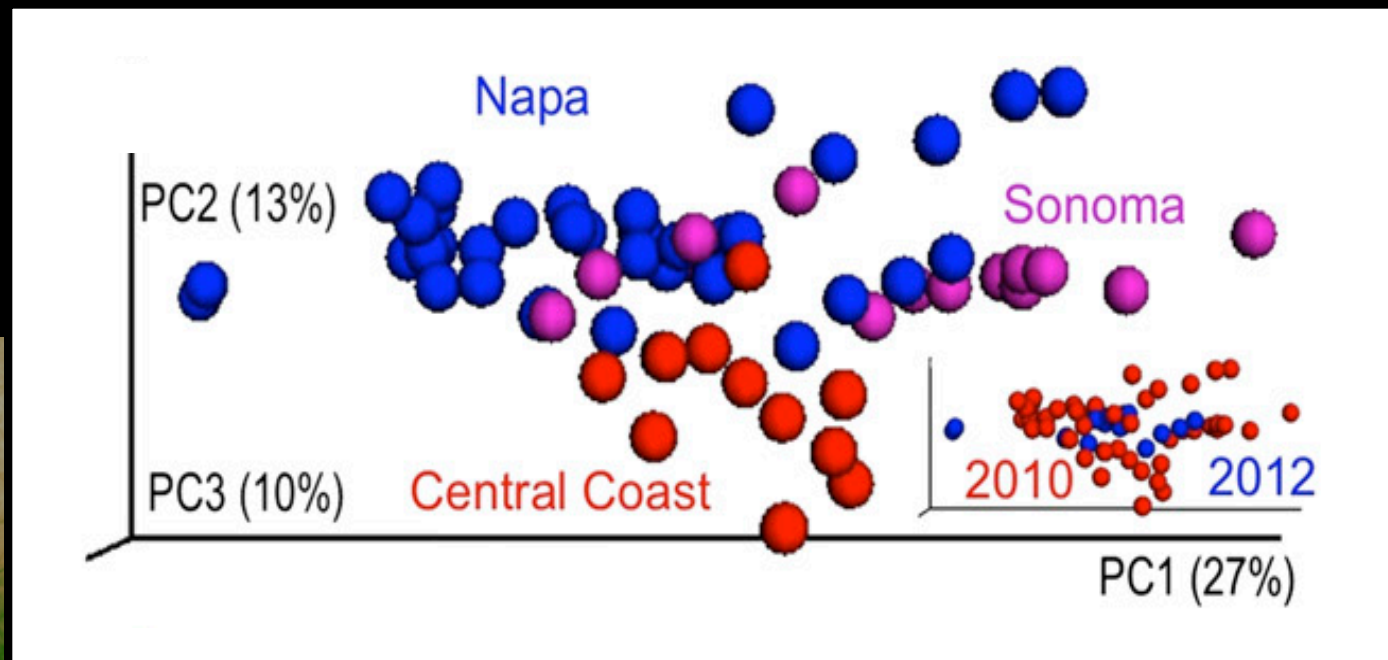
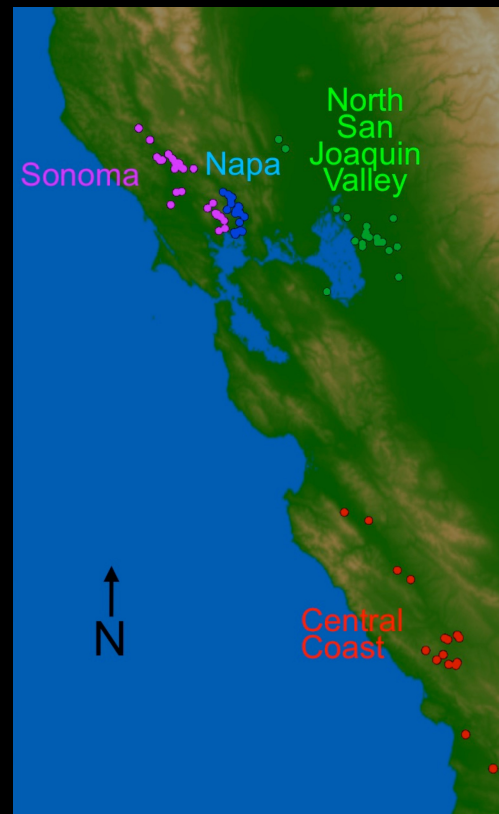


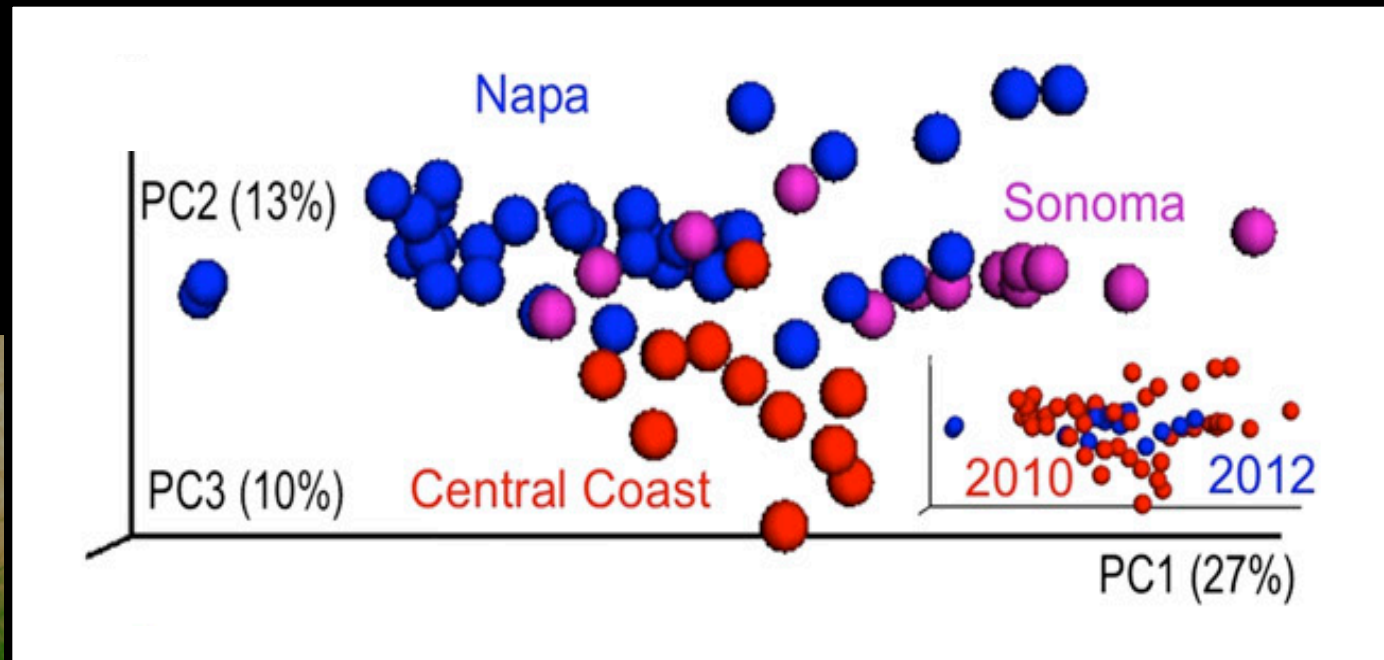
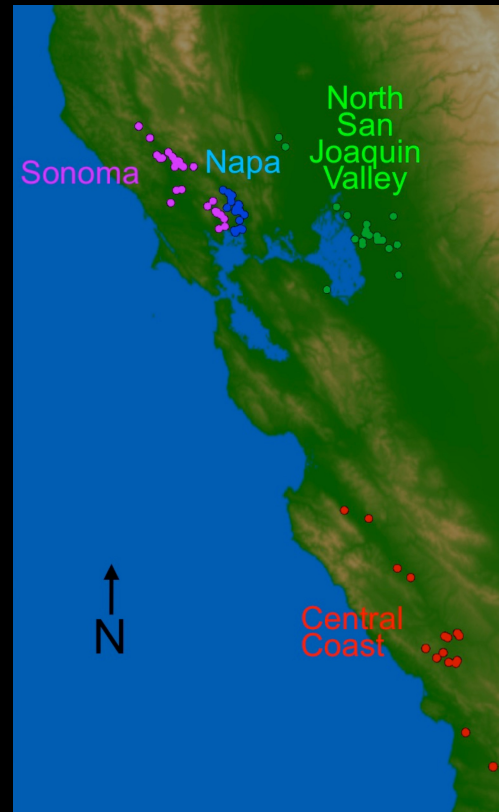
PRUINE



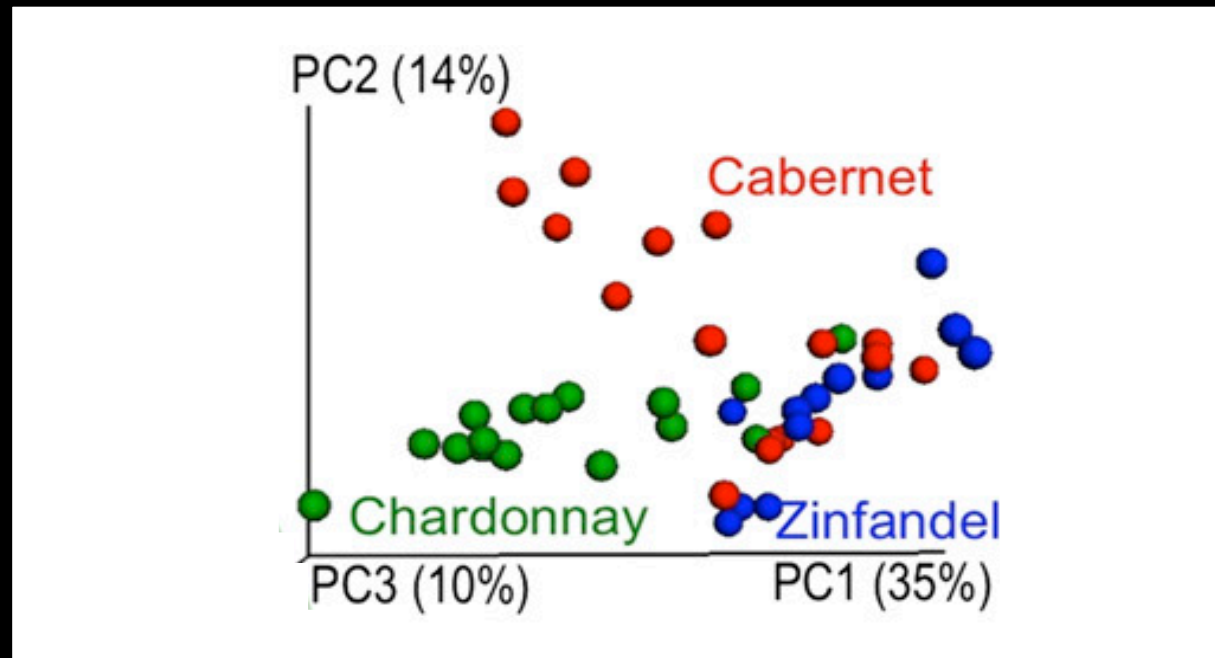
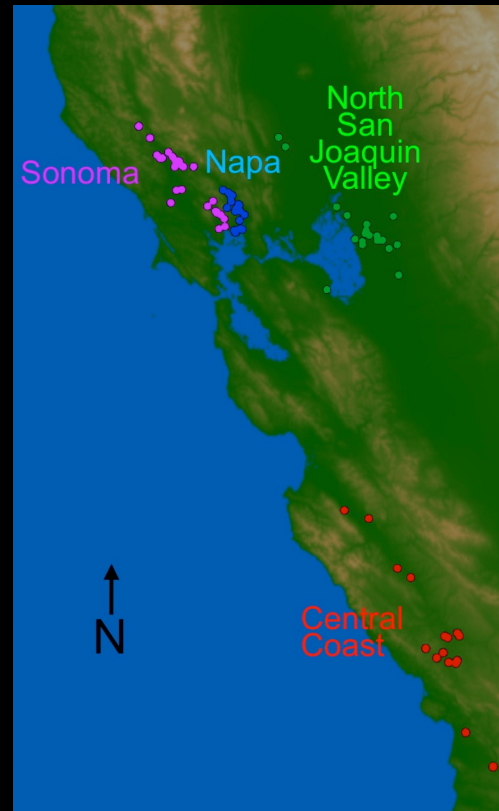
1000 - 1000 levures/g
100 - 1000 bact./ g





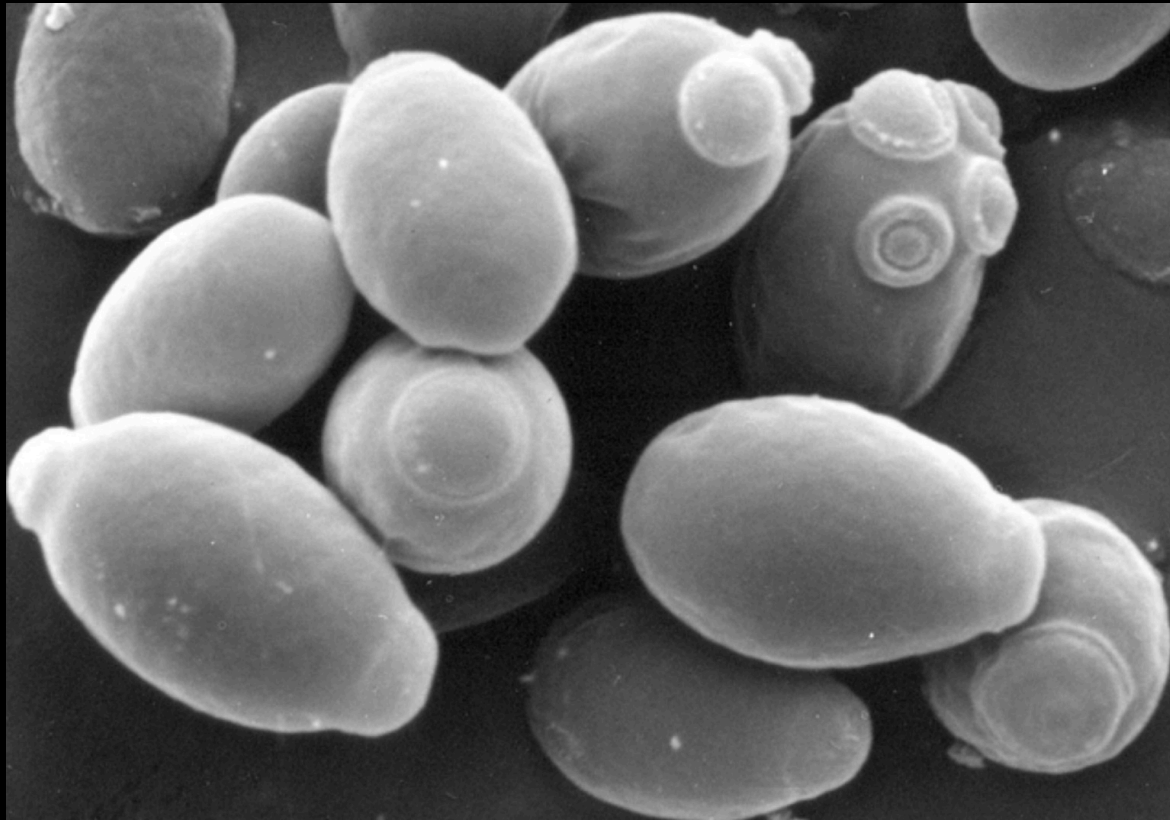


**La dimension microbienne
du terroir**



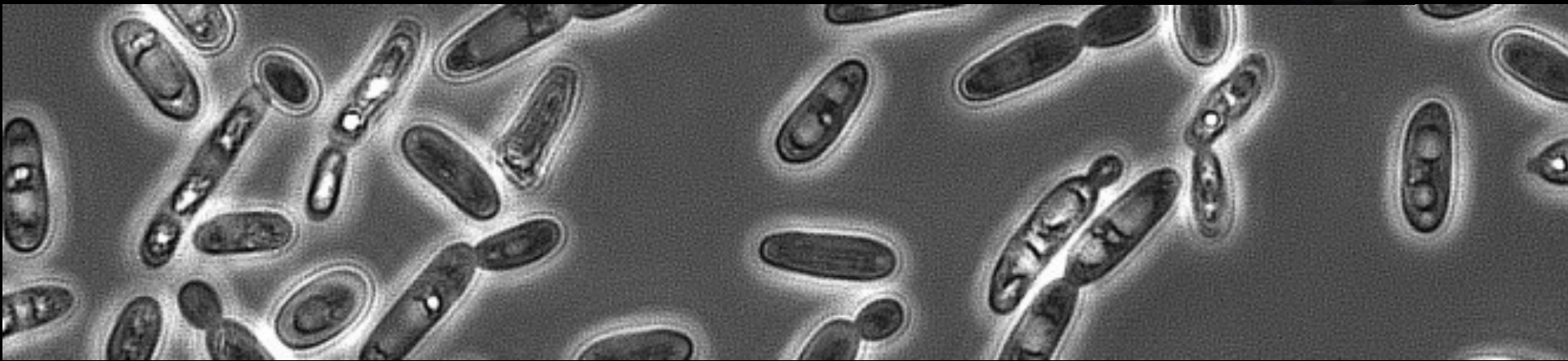
**La dimension microbienne
du terroir**

Zygosaccharomyces

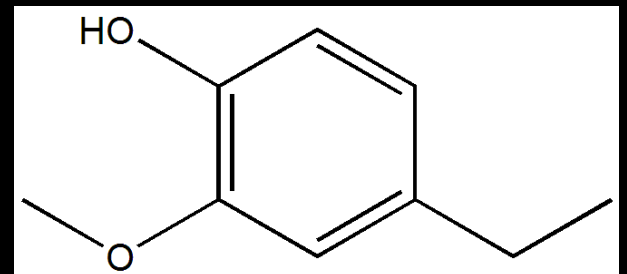


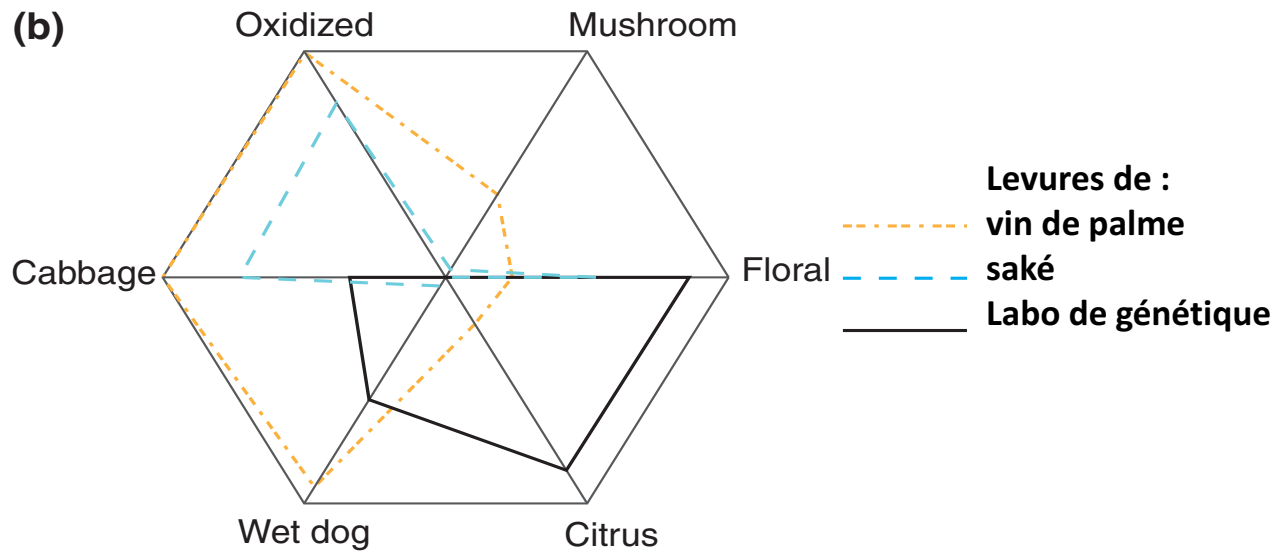
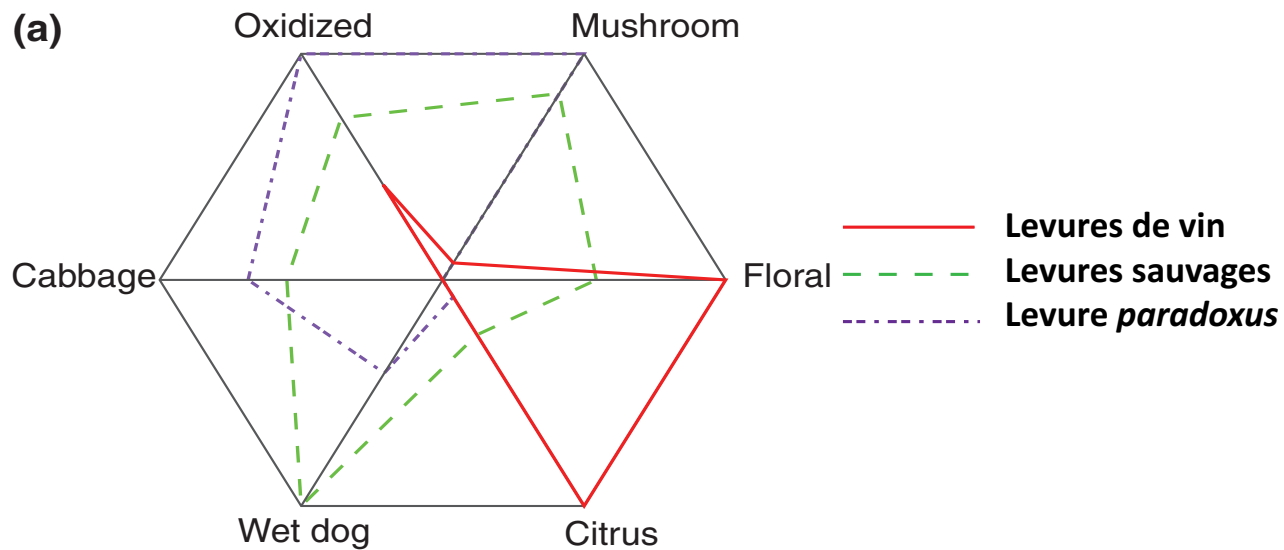
**supportent bien de fortes concentrations
de sucre, d'alcool, d'acide acétique etc.**

Brettanomyces



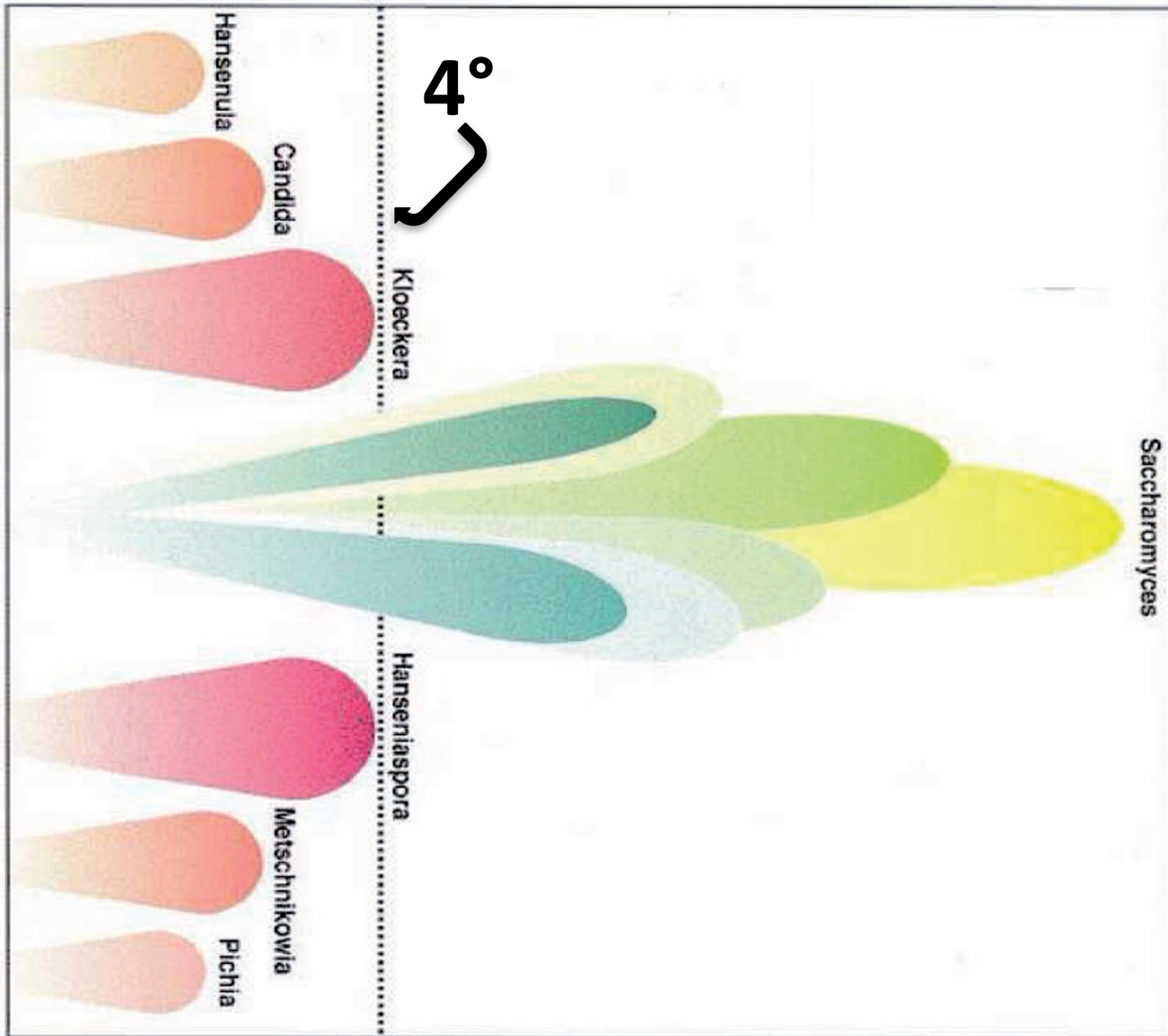
**Donnent les arômes
« brett » (4-éthylgâïacol)
Tolèrent l'alcool,
moins l'acidité.**





Sensory attributes differentiate between wine and non-wine strains of *Saccharomyces cerevisiae*. (a) Class means for wine strains, wild strains, and *Saccharomyces paradoxus* strains, and (b) means for the palm, sake, and laboratory strains

Temps = degré alcoolique croissant



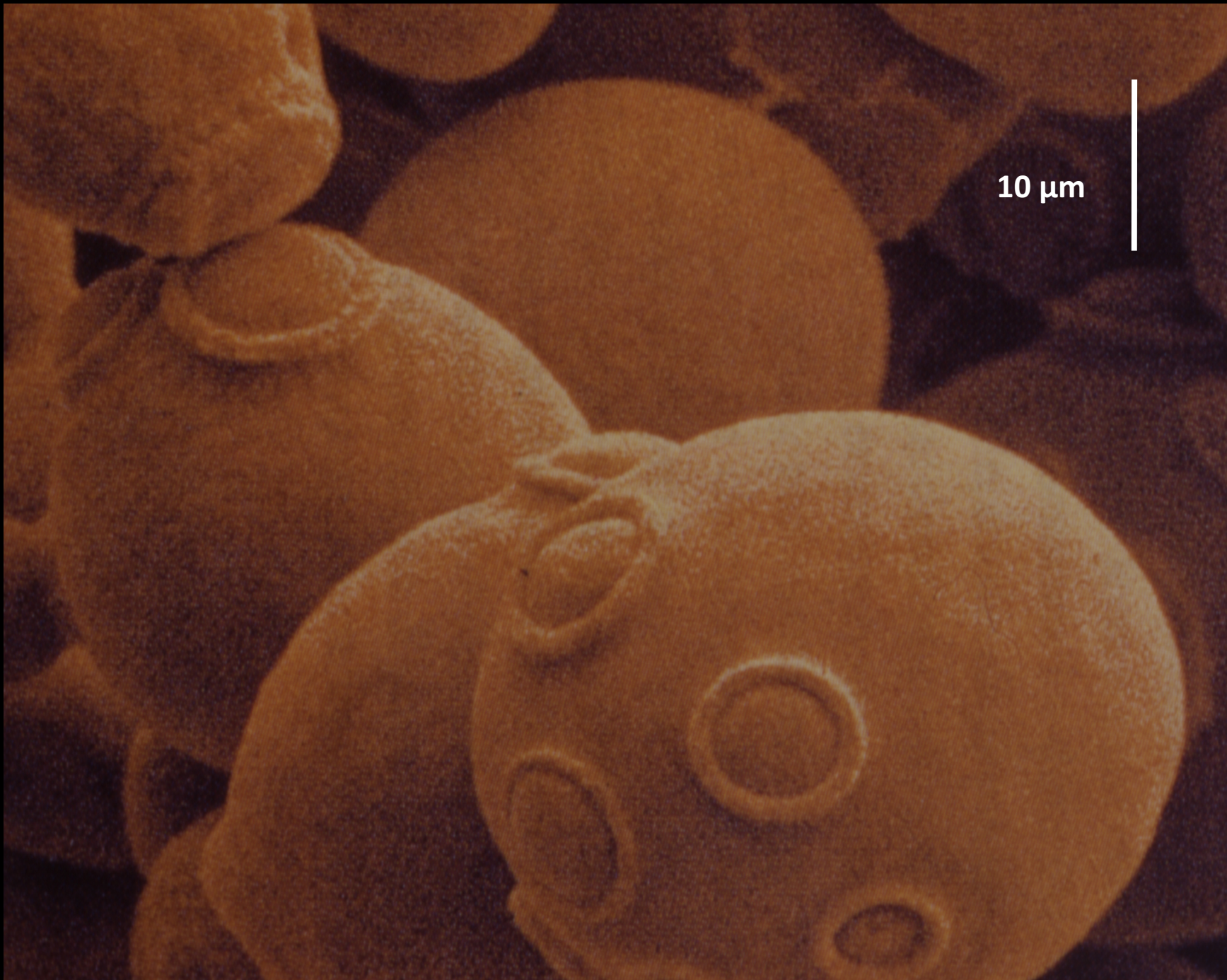
3

**La fermentation
alcoolique.**



SUCRES → **ALCOOL +**
GAZ CARBONIQUE





10 μm



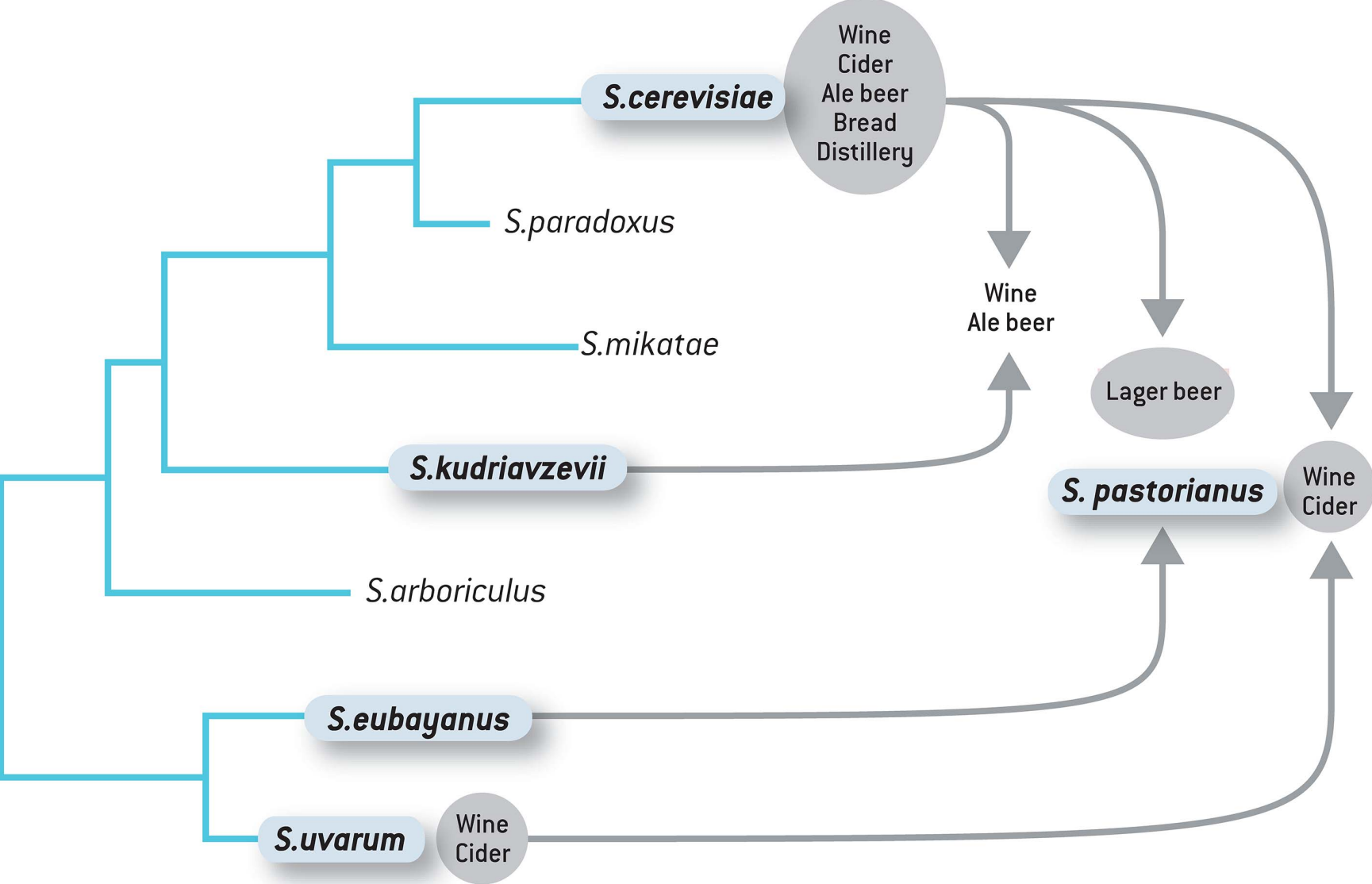
10 μm



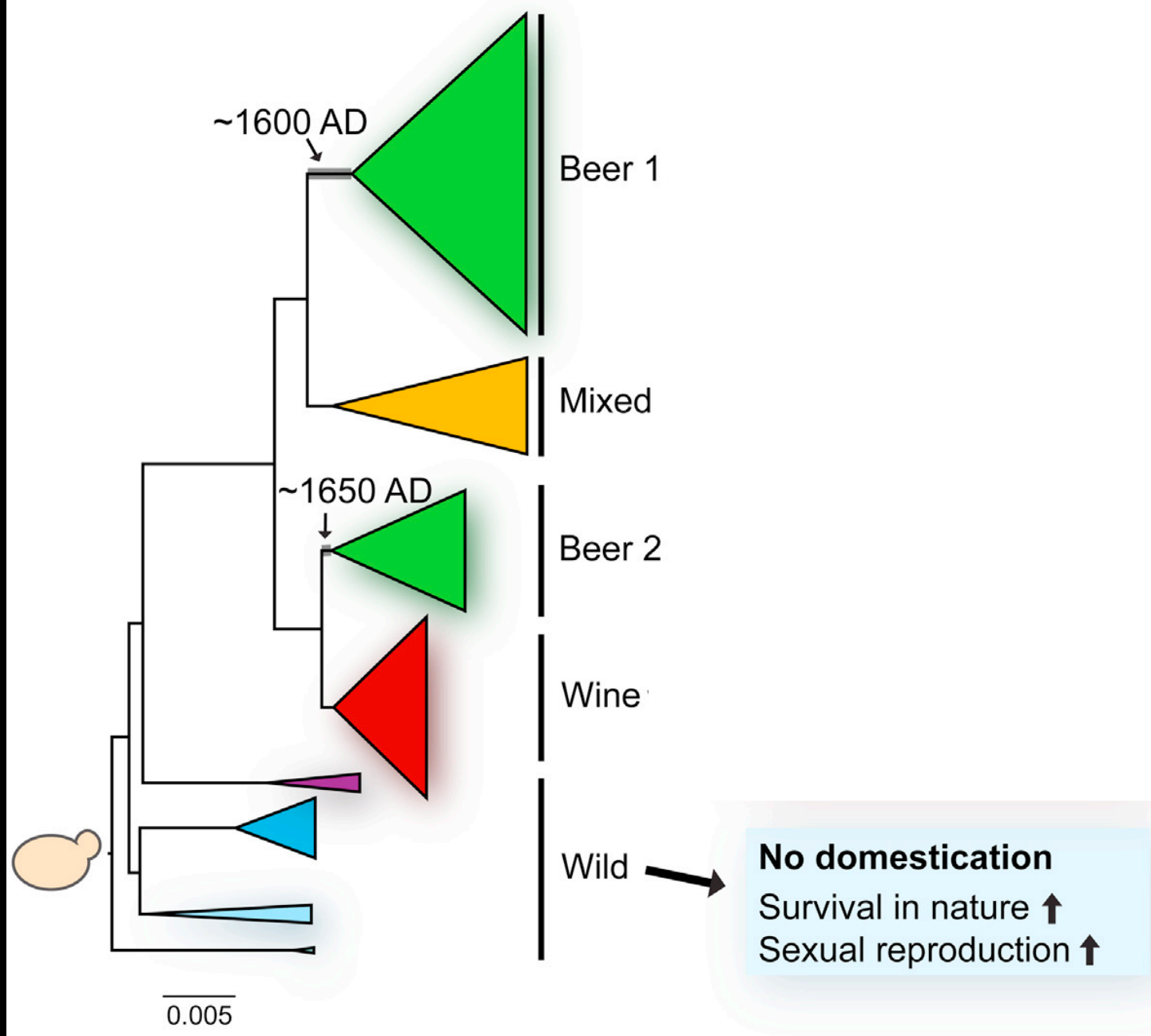


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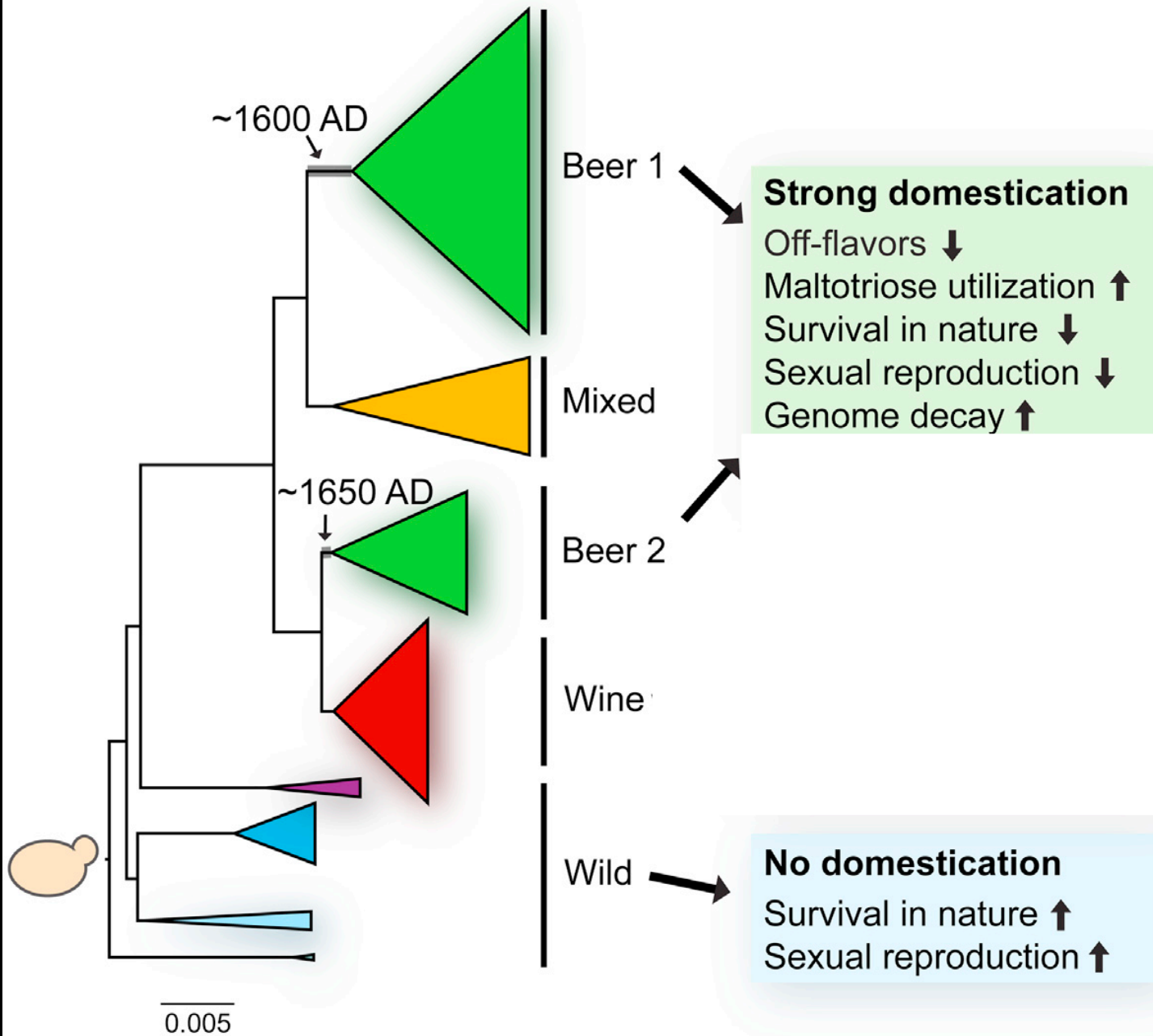
La généalogie du genre *Saccharomyces*...



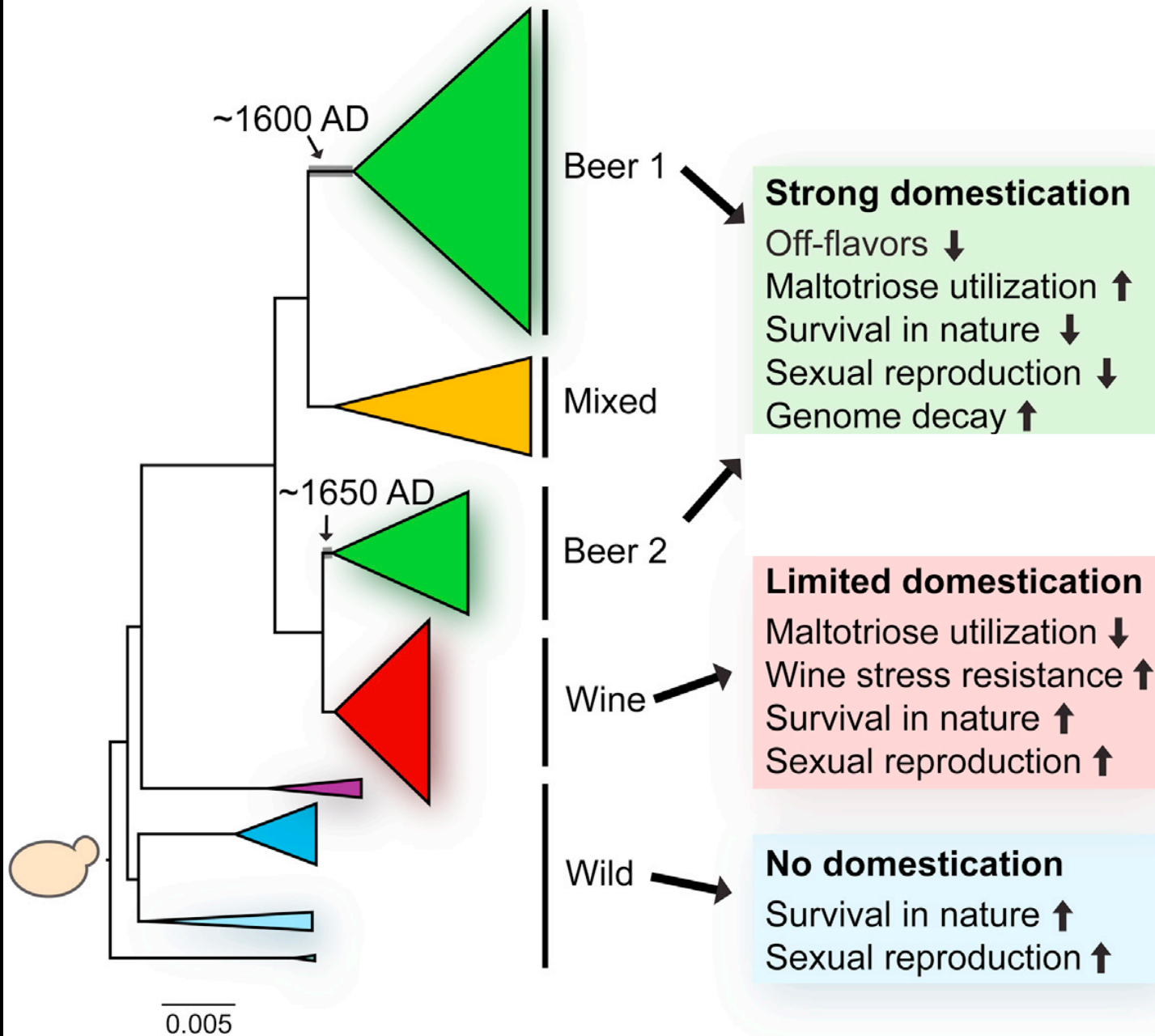
Domestication of industrial yeasts



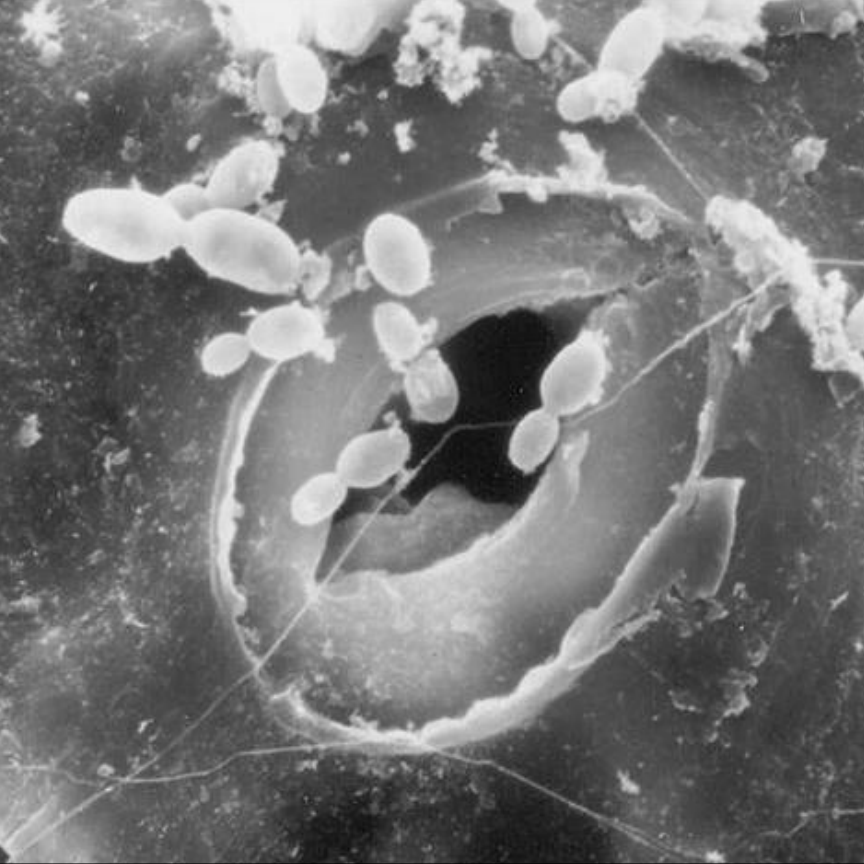
Domestication of industrial yeasts



Domestication of industrial yeasts











1 - Jeunes baies très peu colonisées (~0.05%), mais baies mures colonisées à 25%

2 - Et le passage de l'hiver ?



Role of social wasps in *Saccharomyces cerevisiae* ecology and evolution

Irene Stefanini^{a,1}, Leonardo Dapporto^{b,c,1}, Jean-Luc Legras^{d,e,f}, Antonio Calabretta^{a,b}, Monica Di Paola^g, Carlotta De Filippo^h, Roberto Viola^h, Paolo Capretti^c, Mario Polsinelli^b, Stefano Turillazzi^{b,i}, and Duccio Cavalieri^{a,h,2}

Un milieu pas terrible, le vin...

Concentration du milieu (180 - 260 g
sucre /litre),

Un milieu pas terrible, le vin...

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sucre /litre),

Acidité fermentaire,

Un milieu pas terrible, le vin...

Concentration du milieu (180 - 260 g
sucre /litre),

Acidité fermentaire,

Sulfites (40 to 80 mg/ litre) et cuivre,

Un milieu pas terrible, le vin...

Concentration du milieu (180 - 260 g
sucre /litre),

Acidité fermentaire,

Sulfites (40 to 80 mg/ litre) et cuivre,

Limitations alimentaires (azote, lipide,
vitamines...),

Un milieu pas terrible, le vin...

Concentration du milieu (180 - 260 g
sucre /litre),

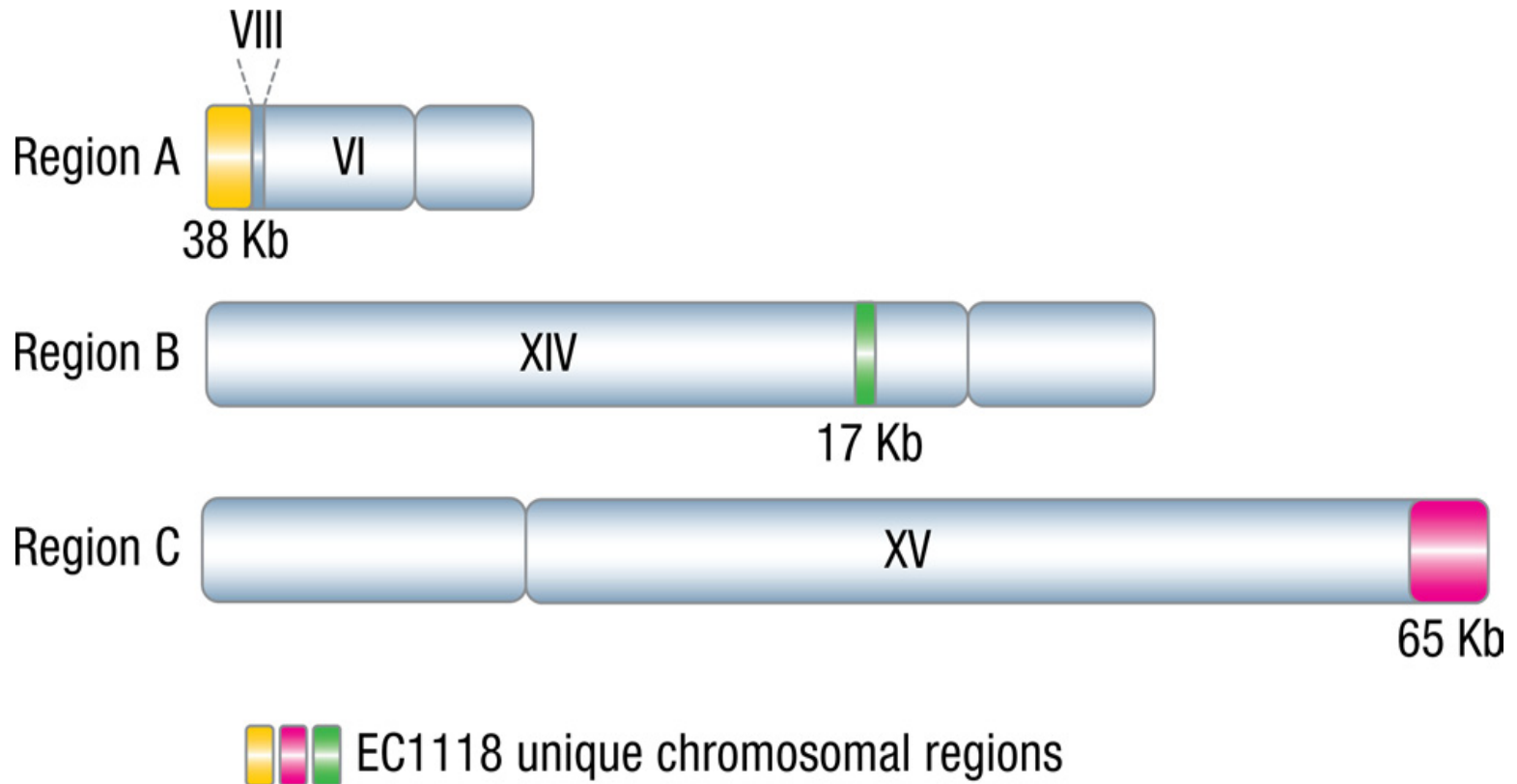
Acidité fermentaire,

Sulfites (40 to 80 mg/ litre) et cuivre,

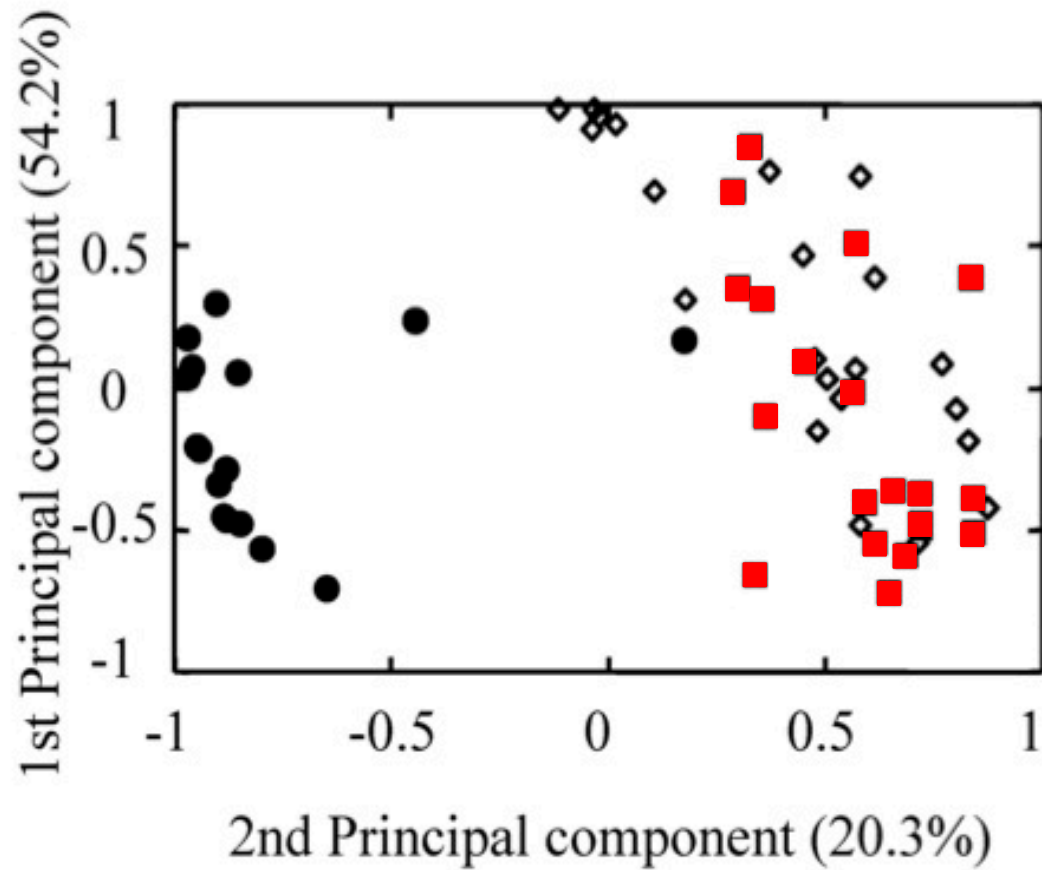
Limitations alimentaires (azote, lipide,
vitamines...),

Toxicité de l'éthanol.

Un milieu pas terrible, le vin...



Chromosomal distribution of the 3 unique EC1118 regions. The alignment of EC1118 contigs with S288c chromosomes led to the identification of 3 genomic regions unique to EC1118. The localization and length of these 3 regions are indicated by colored chromosomal segments. The insertion into chromosome VI of a 12-kb fragment from chromosome VIII is also shown.



- Levures de la peau du raisin
- Levures du moût en fermentation
- ◇ Levures des surfaces de la cave

LEVURE SÈCHE ACTIVE OENOLOGIQUE / ACTIVE DRY YEAST / LEVADURA EMPLICADA

OENOLOGIA

EFF.3411

SACCHAROMYCES CARBONIS/DIYANUS

Sélectionnée pour les prises de mousse
et les reprises de fermentation

À conserver de préférence à température inférieure à 20°C

Manufactured in Belgium by Agul Bruggeman s.r.l. - Lanzerbruggestraat 32, 3000 Leuven, Belgium

FERMENTIS
Division of S.I. Fermentis

OENOLOGIA

Inoculer...

- pour aller vite !

Inoculer...

- pour aller vite !

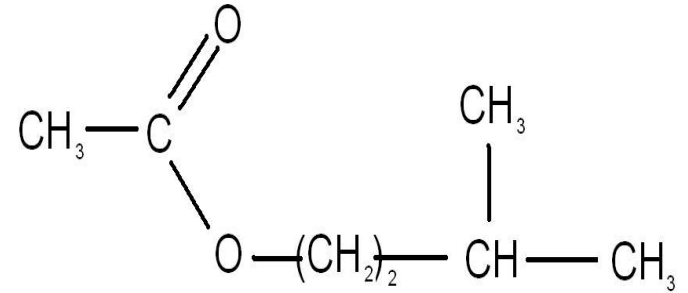
**Le problème
du virus *killer***

Inoculer...

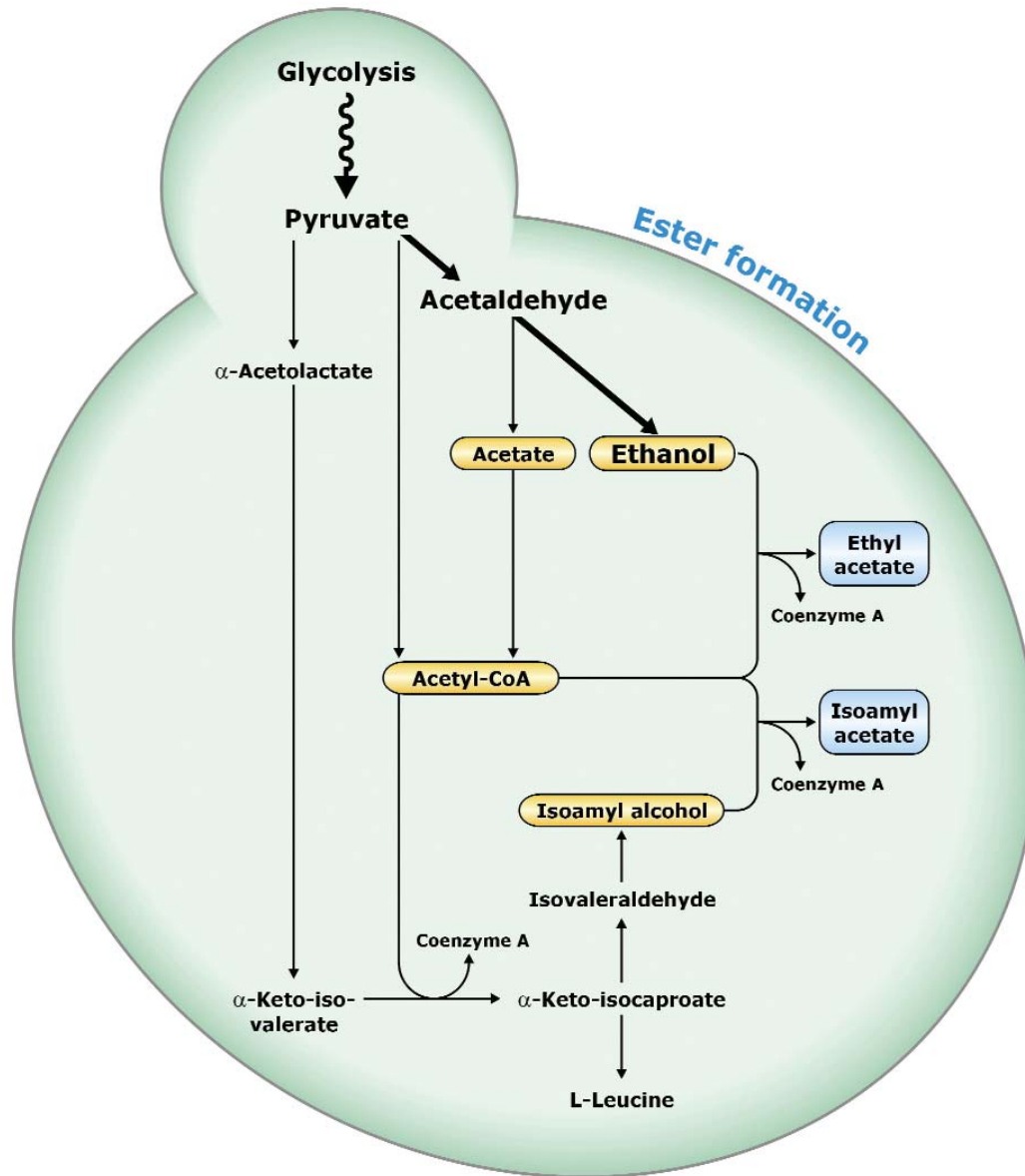
- pour aller vite !
- pour aller loin (13-15°) !

Inoculer...

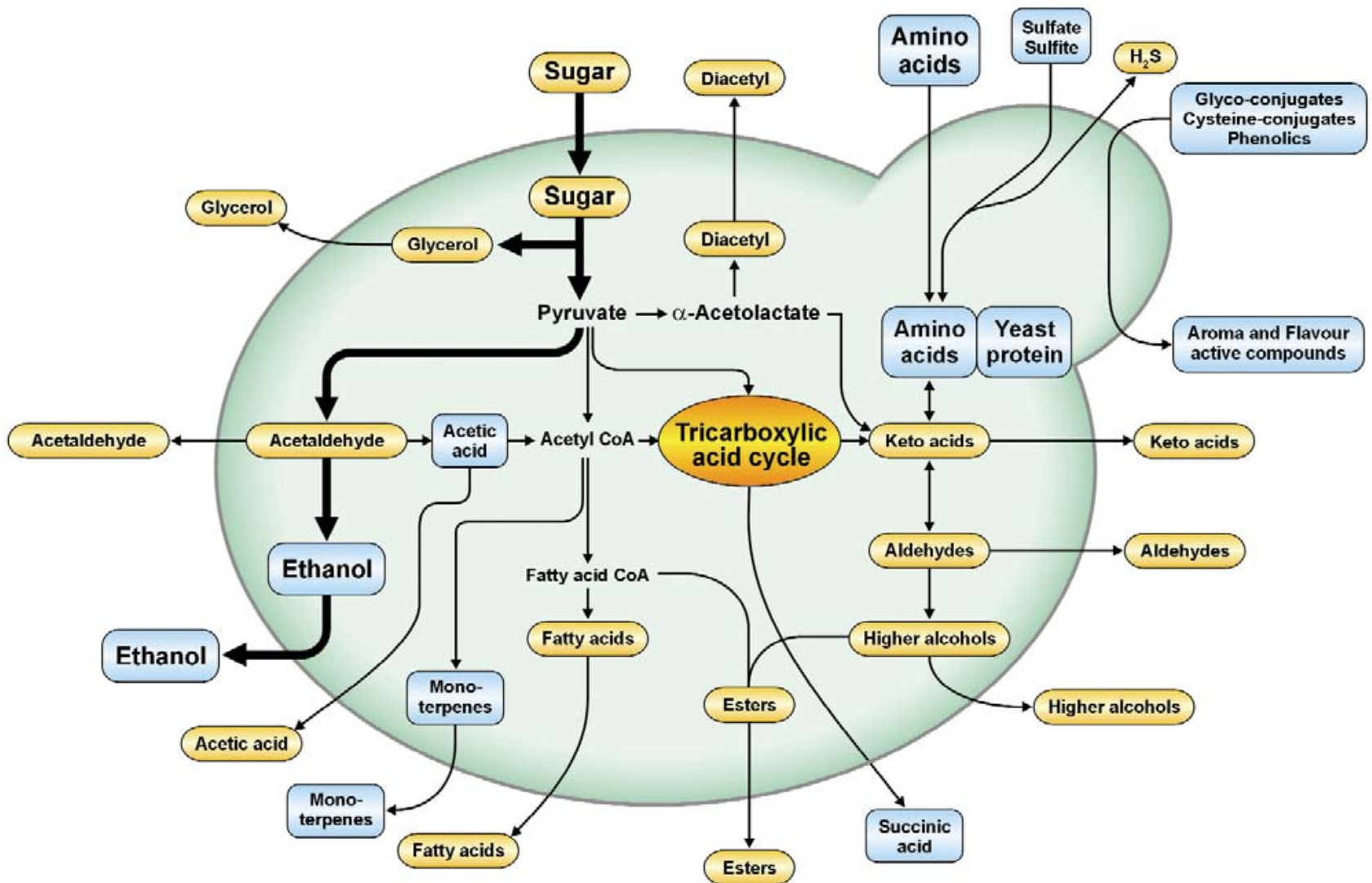
- pour aller vite !
- pour aller loin !
- pour aller « bien » (la 71B !)



Acétate d'isoamyle

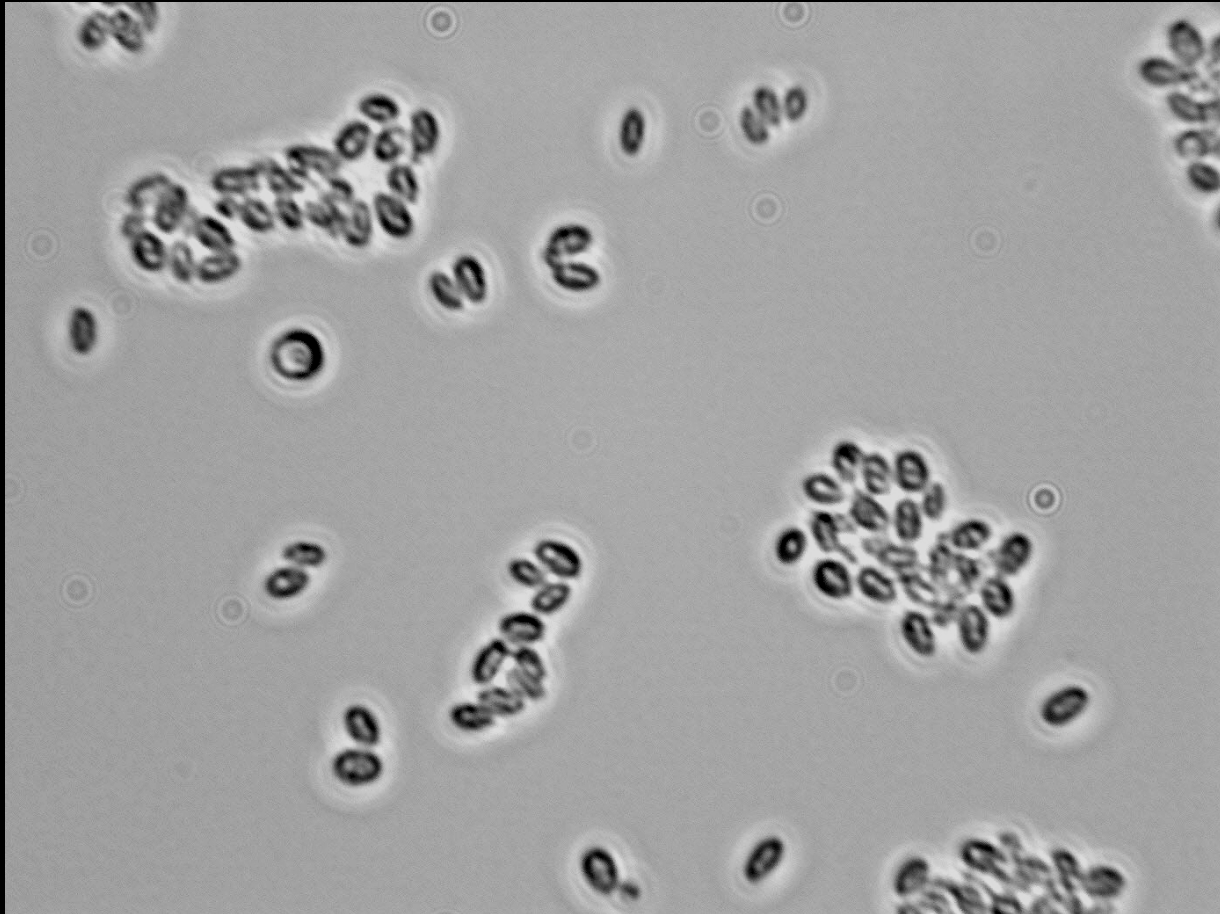


A schematic representation of the formation of ethyl acetate and isoamyl acetate



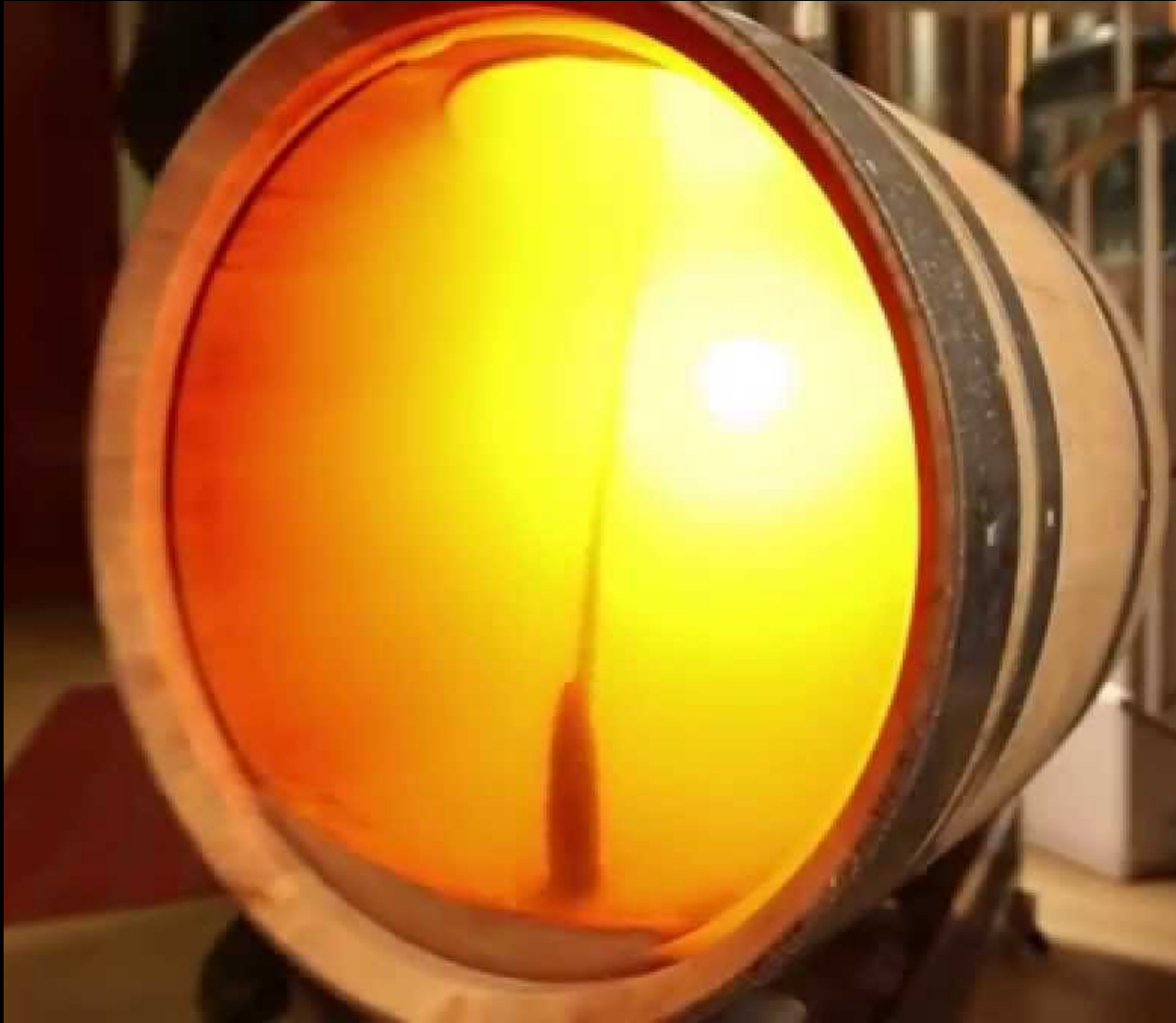
A schematic representation of derivation and synthesis of flavour-active compounds from sugar, amino acids and sulfur metabolism

Candida zemplinina



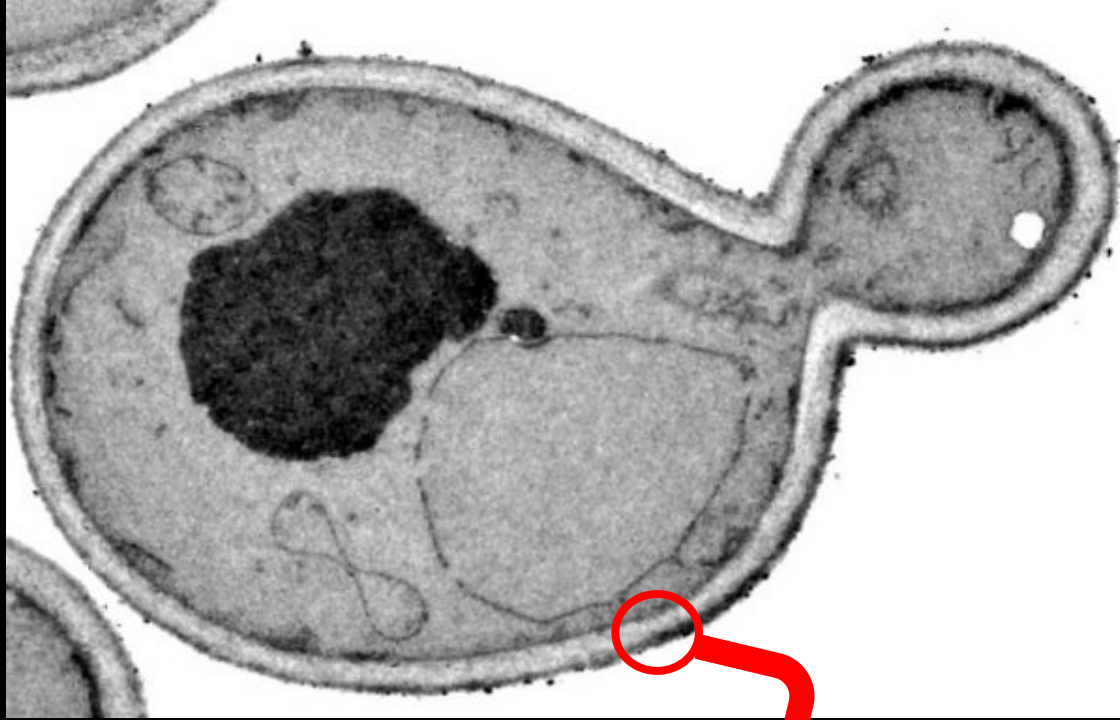
**Forte production de glycérol (liquoreux)
Favorisée à basse température.**

Lies

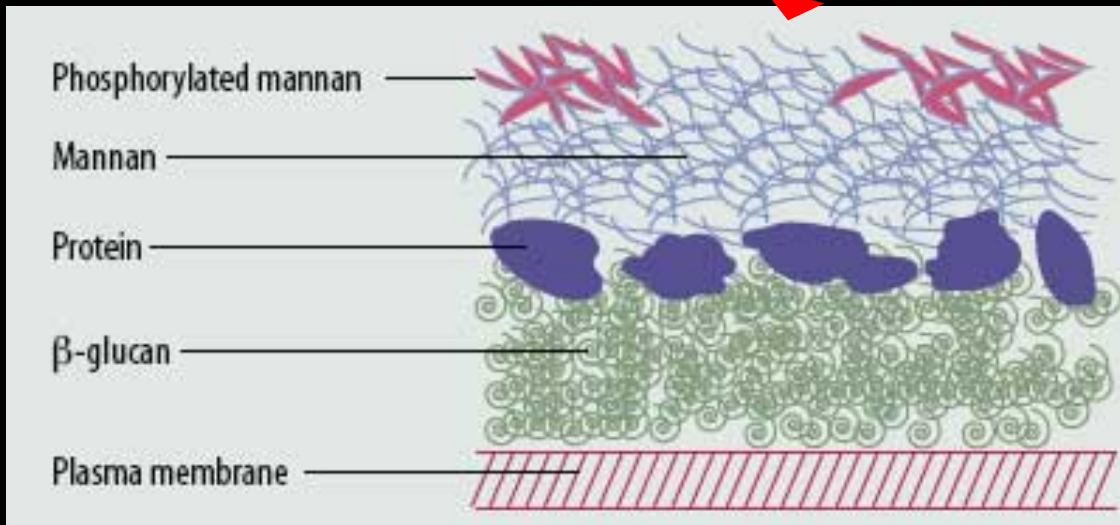




Lies
... et
bâtonnage



Lies
... et
bâtonnage



Source de
mannes et
d'arômes

Vins de voile



4

**La fermentation
malolactique.**



AC. MALIQUE



AC. MALIQUE

\(\rightarrow\) AC. + GAZ
LACTATIQUE CARBONIQUE

FERMENTATION MALOLACTIQUE

BACTÉRIES LACTIQUES
LACTIC ACID BACTERIA

REFLEX MALO.
360

Denococcus oeni
Sélectionnée par Sofralab

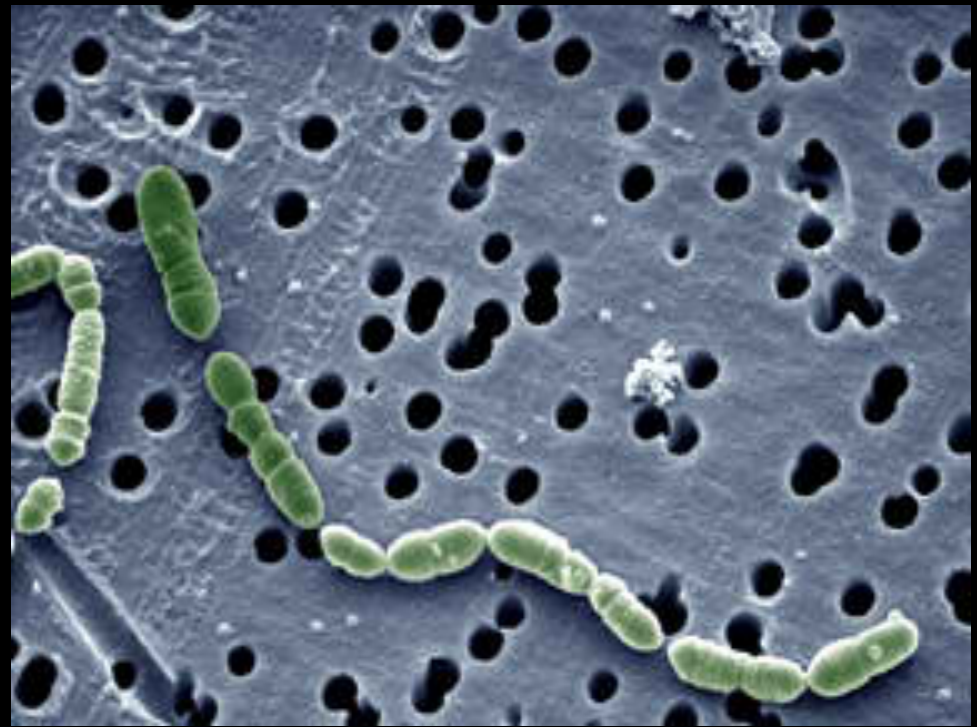
Tous les vins - All wines

 MARTIN
VIALATTE

IMP/EASYL0000 (R)/01

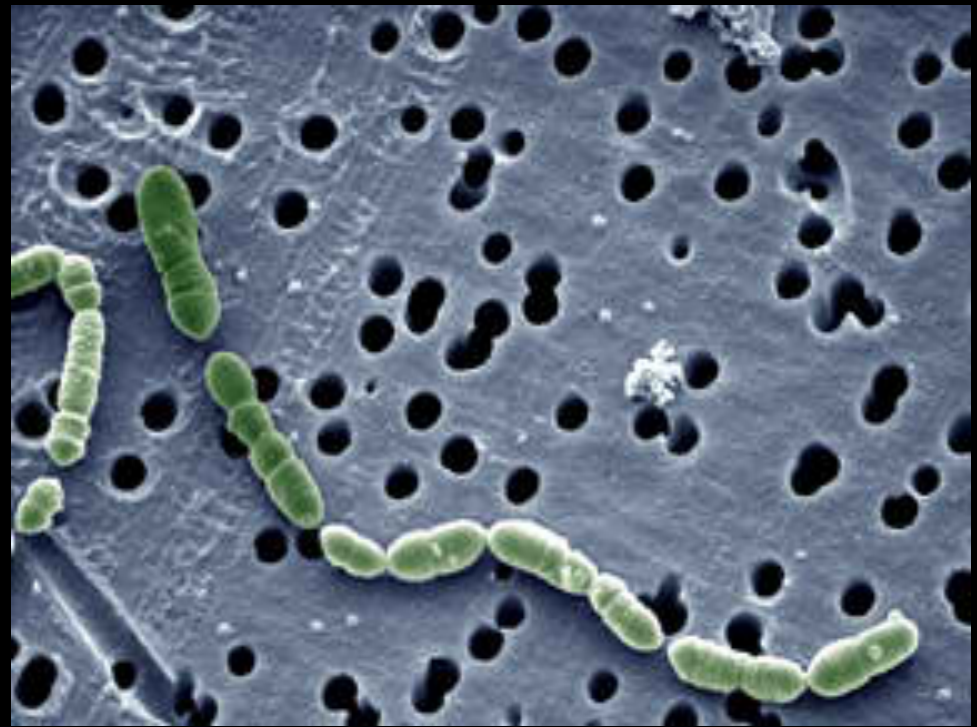
FERMENTATION MALOLACTIQUE

10 μm

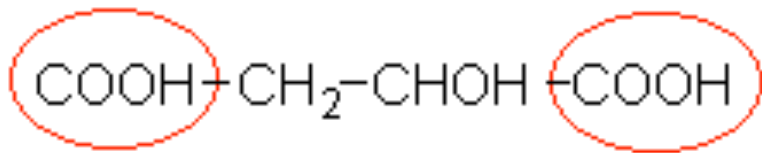


Oenococcus oeni

FERMENTATION MALOLACTIQUE



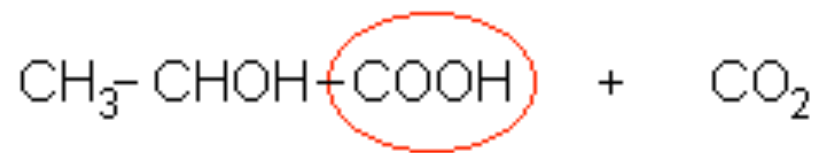
acide malique



2 fonctions acide

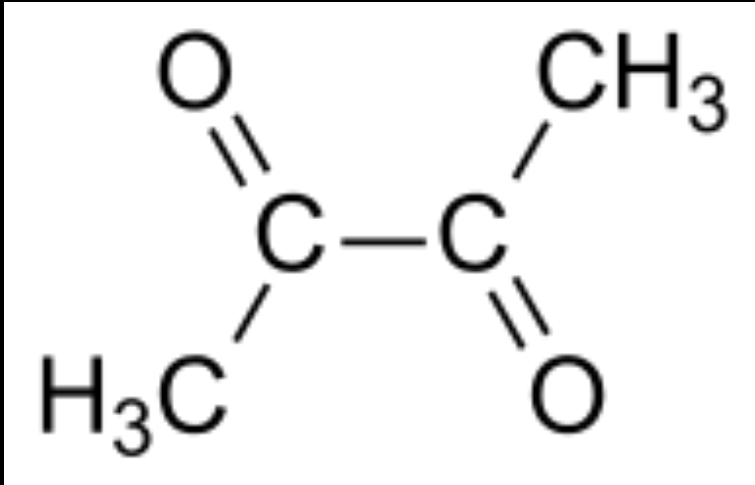
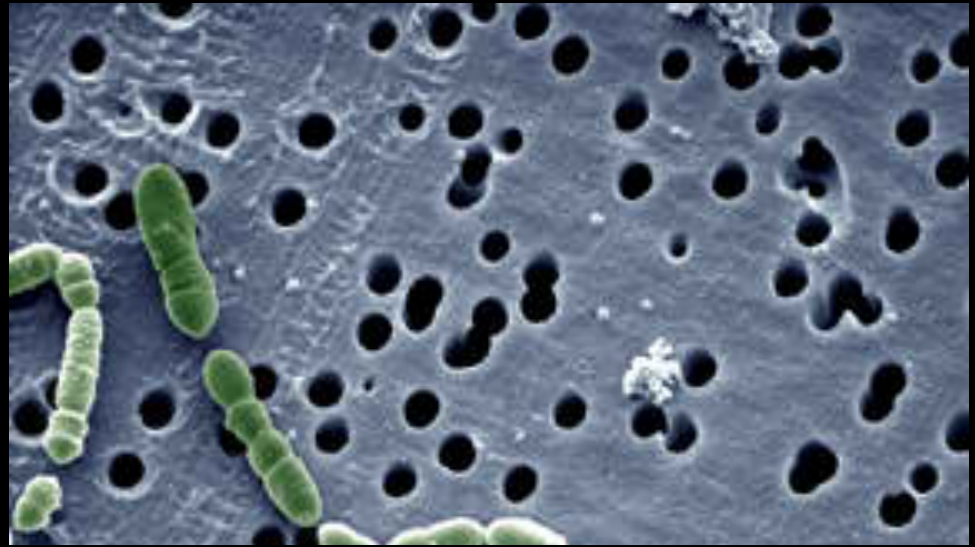


acide lactique



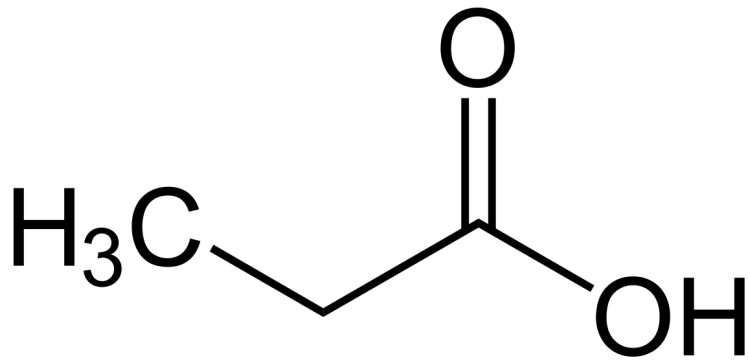
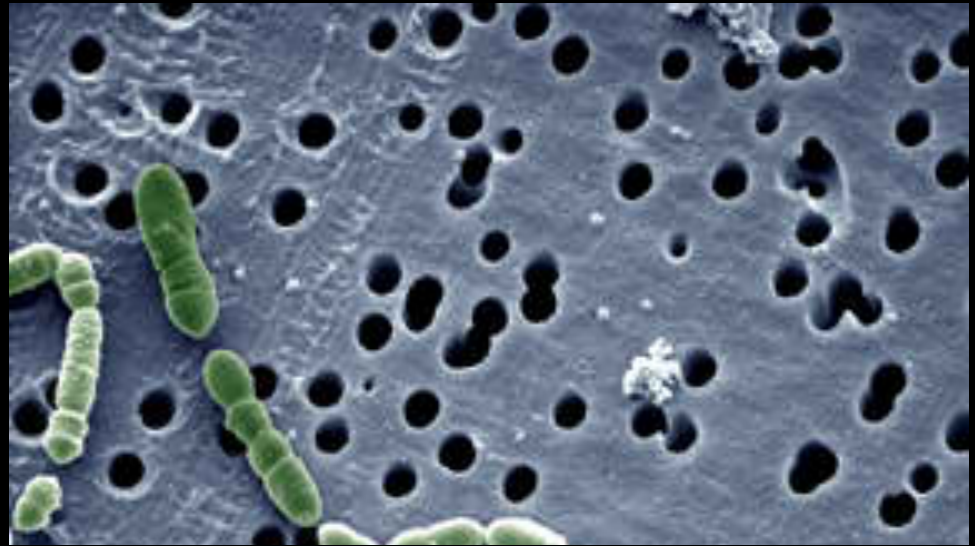
1 fonction acide

FERMENTATION MALOLACTIQUE

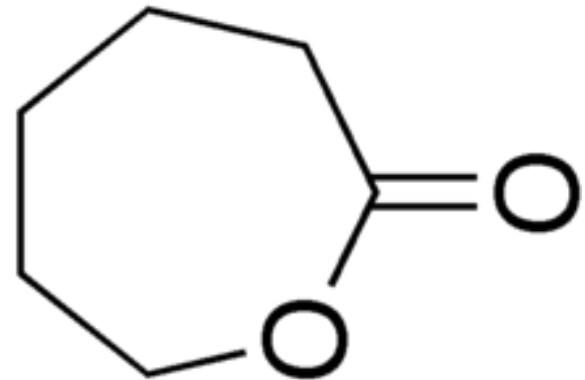


diacétyl

FERMENTATION MALOLACTIQUE



acide propionique



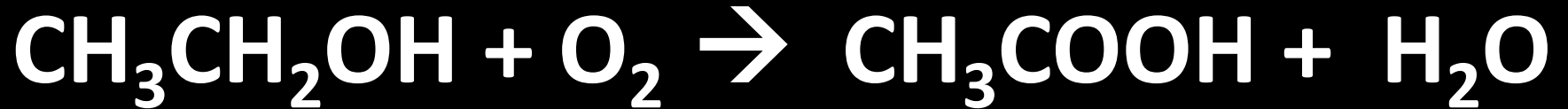
lactones



Aceto- bacteraceae



FERMENTATION ACETIQUE :



ALCOOL \rightarrow AC. ACETIQUE

4

**Les gardiens
du temple.**



La carotte...



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EUN - 39065R

For use in wine making - Für den Weinherstellungszweck
Zur Verwendung im Weinbau - Für den Weinherstellungszweck
Für den Weinherstellungszweck - Für den Weinherstellungszweck
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www.lamotte-actipols.com

Phosphate d'ammonium

Dose d'emploi : Selon la teneur du most en azote assimilable, 10 g/l apportent 21 mg/l d'azote assimilable.
Mode d'emploi : Incorporer en 2 fois :
- la première moitié au levain, après dissolution dans un peu de moût,
- la seconde moitié lorsque la densité du moût est tombée de 30 points, au cours d'un remontage avec aération (faire au préalable un test de tenue à l'air).
Dose maximum légale (réglementation CEE) : 100 g/hL.
Conservation : dans son emballage d'origine hermétiquement clos. Craint l'humidité.

Dose d'impiego: In funzione del tenore di azoto assimilabile del mosto, 10 g/hL apportano 21 mg/L di azoto assimilabile.
Modo d'impiego: Aggiungere in due volte :
- la prima metà all'incolto dei lieviti, sciogliendo il prodotto in un poco di mosto,
- la seconda metà dando la densità del mosto è scesa di 30 punti, durante il rimontaggio all'aria (effettuare preventivamente un test di tenuta all'aria).
Dose massima legale (regolamentazione UE) : 100 g/hL.
Conservazione: nel suo imballaggio originale, ermeticamente chiuso. Temere l'umidità.

Dosis de empleo: Según el contenido de nitrógeno asimilable en el mosto, 10 g/hl aportan 21 mg/l de nitrógeno asimilable.
Modo de empleo: Incorporar en 2 etapas :
- la primera mitad con el levadura, después de disolución en un poco de mosto,
- la segunda mitad cuando la densidad del mosto haya caído de 30 puntos, en el curso de un remontaje con aëration (realizar previamente un test de estabilidad al aire).
Dosis máxima legal (regulación CEE) : 100 g/hL.
Conservación: en su envase de origen herméticamente cerrado. Se altera con la humedad.

Benutzung: Je nach Gehalt des Mostes an aufnehmbarem Stickstoff, 10 g/hl bringen 21 mg/l an aufnehmbarem Stickstoff.
Anwendung: In zwei Schritten beimengen :
- die erste Hälfte in ein bißchen Most aufgelöst beim Heißsatz,
- die zweite Hälfte wenn die Mostdichte von über als 30 Punkte beträgt, beim Umpumpen mit Luftzufuhr (vorher einen Test an der Luft durchführen).
Maximal zugelassene Dosierung (EU Verordnung) : 100 g/hl.
Konservierung: In seiner hermetisch verschlossenen Ursprungsverpackung aufbewahren. Feuchtigkeitsempfindlich.

Aplicação: De acordo com o conteúdo de nitrogénio assimilável no mosto, 10 g/hl aportam 21 mg/l de nitrogénio assimilável.
Modo de emprego: Incorporar em 2 etapas :
- a primeira metade com a levedura, depois de dissolução num pouco de mosto,
- a restante logo que a densidade do mosto seja de 30 pontos, e no decurso de um remontagem com aeração (fazer previamente um teste de estabilidade ao ar).
Dose máxima legal (regulamentação CEE) : 100 g/hL.
Conservação: na embalagem de origem herméticamente fechada. É sensível à humidade.

Dose de utilização: Incorpear em duas etapas :
- metade no momento da fermentação, após dissolução num pouco de mosto,
- a restante logo que a densidade do mosto seja de 30 pontos, e no decurso de um remontagem com aeração (fazer previamente um teste de estabilidade ao ar).
Dose máxima legal (regulamentação CEE) : 100 g/hL.
Conservação: na embalagem de origem herméticamente fechada. É sensível à humidade.

Thiamol®

Activateur de fermentation alcoolique

Solution nutritive à base de thiamine (1,2 g/l) et de sulfate d'ammonium (400 g/l) pour assurer le développement des levures pendant la fermentation.

Mode et doses d'emploi

Incorporer Thiamol soit en une fois à l'encuvage soit en 2 temps : une demi-dose à l'encuvage et l'autre demi-dose à mi-fermentation.

Dose moyenne d'emploi : 40 ml par hl

Dose maximum légale : 50 ml par hl

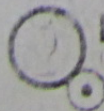
Composition : sulfate ammonium, thiamine, bisulfite de potassium (SO₂: 2 g/l)

Stockage : Fabri de la chaleur

Lot : 26610

DLUO : 09/2012

5 kg net



LA LITTORALE

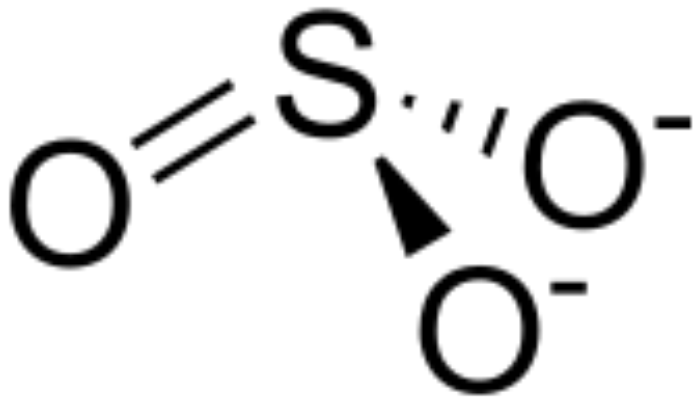
le plaisir du vin nous concerne aussi


ZAE La Baume - 34290 Servian - Tél 04 67 39 29 70



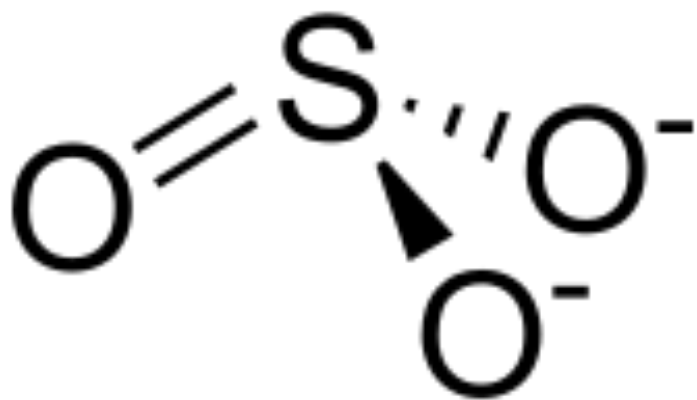
... et le bâton

Les sulfites

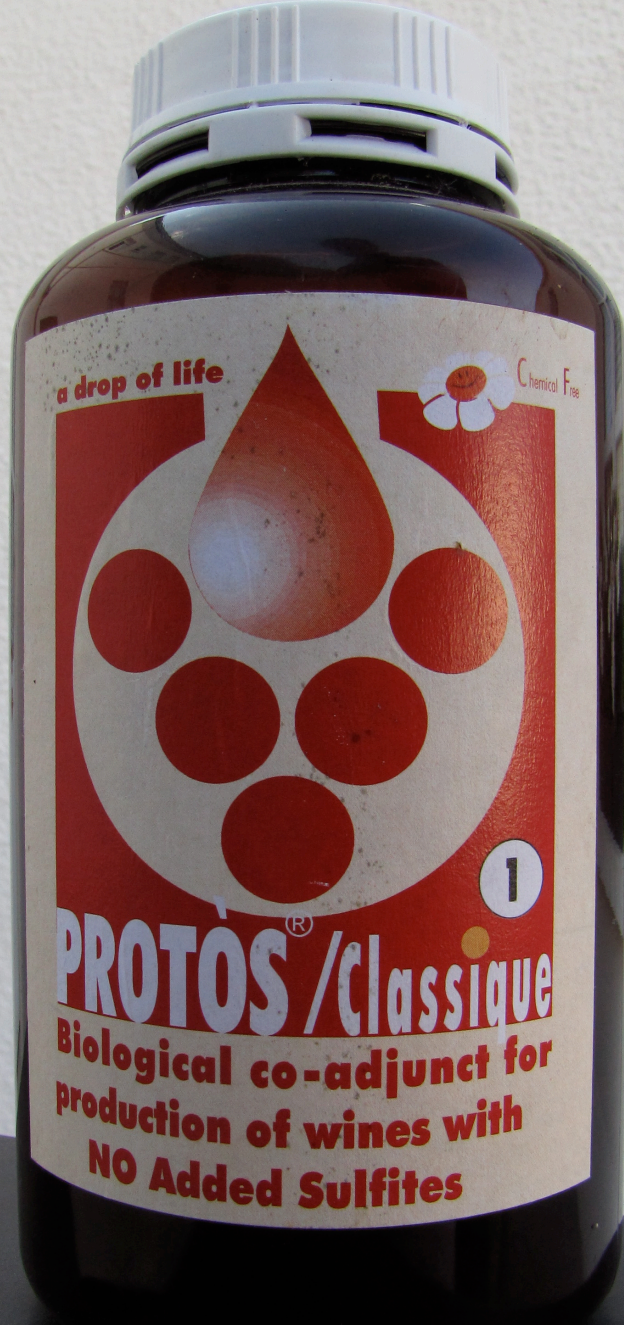


FRANCE - PRODUIT
in.com
CONTIENT DES SULFITES
alc./vol. Alc. 13,5% vol 

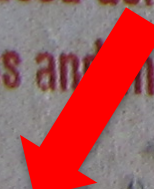
Les sulfites



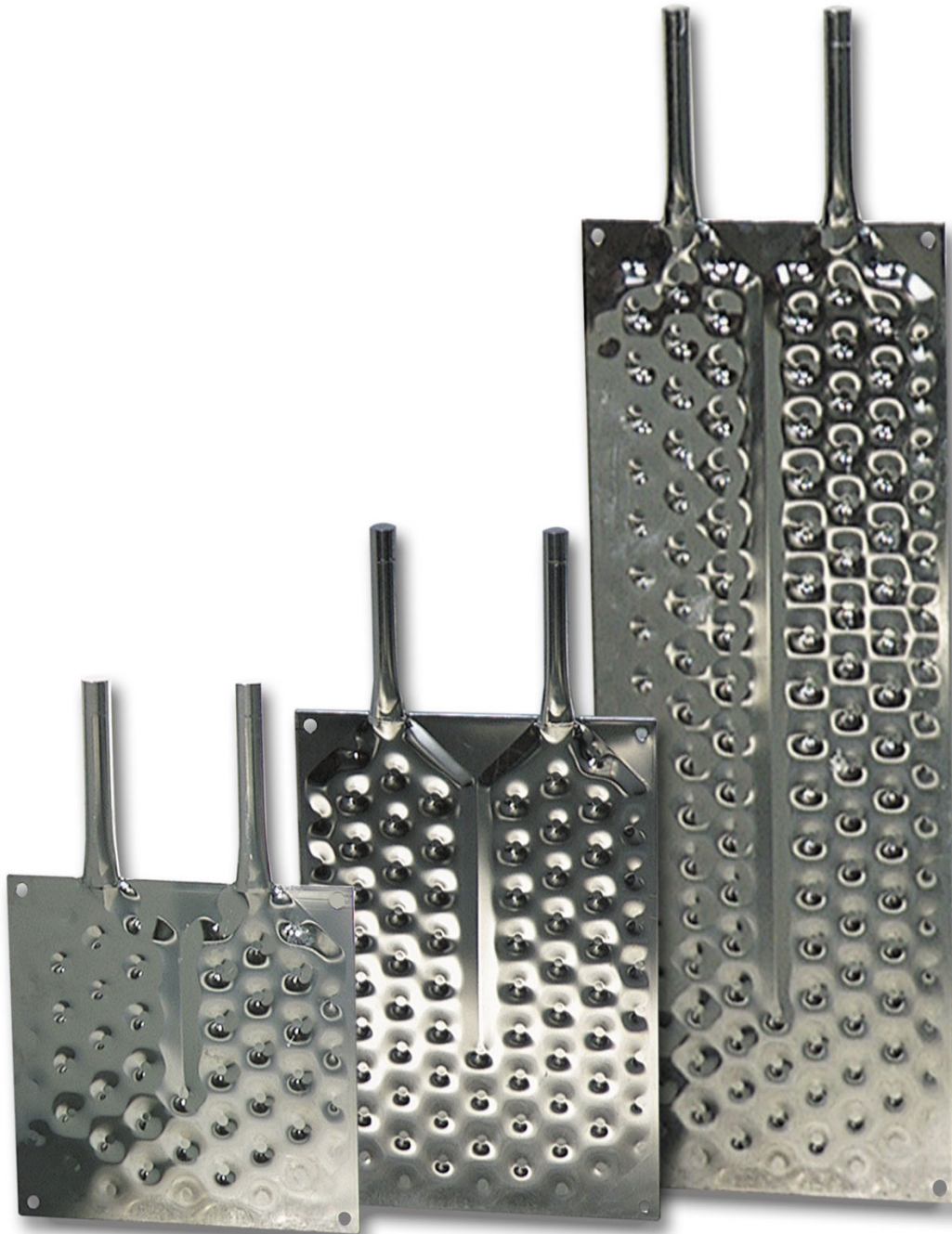
Les tanins



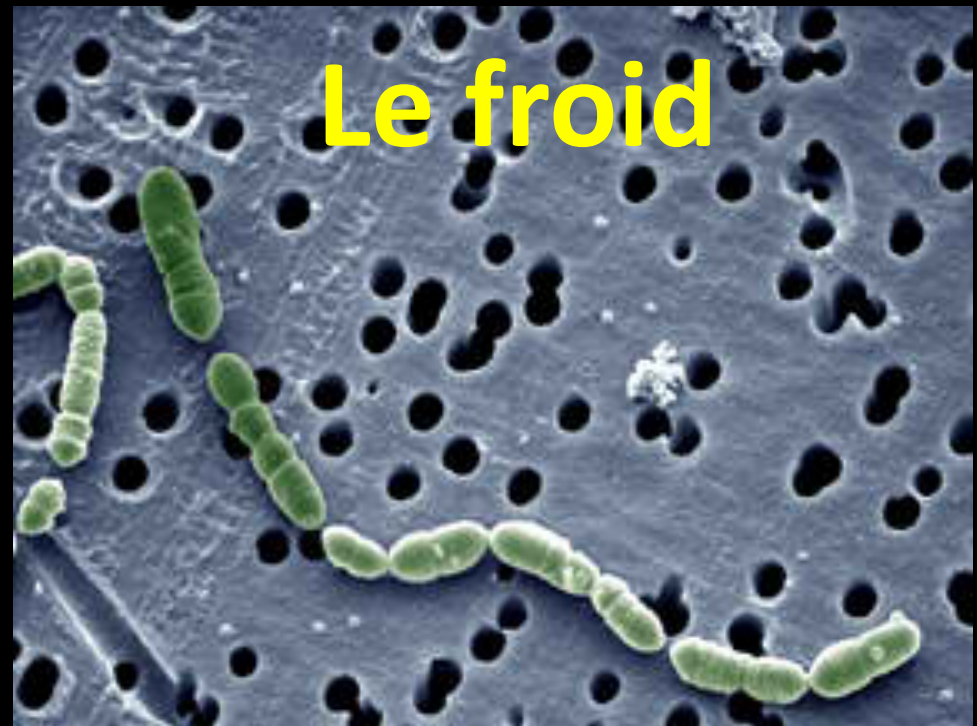
stabilization, preserving aromatics and grape polyphenolic
result is the production of CLASSIQUE and rosé wines from t
the use of sulfites. The wines produced using PROTOS 1 C
with exceptional aromatic freshness and increased mouth
Analysis and Composition:
Demineralized water, total polyphenols min. 350 mg/L
Dosage and Method of Use:
1 (one) liter PROTOS 1 CLASSIQUE x 1,000 liters of grape r
Mix into must, during or immediately after inoculation wit
Product Type and



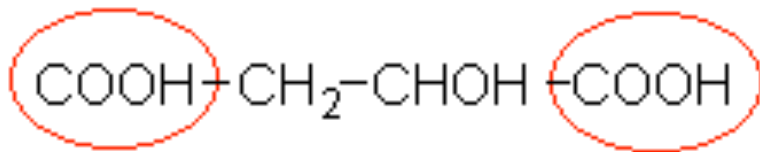
Le froid



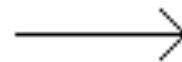
FERMENTATION MALOLACTIQUE



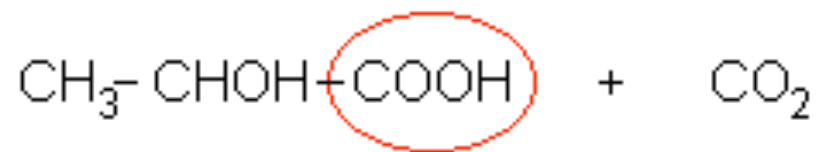
acide malique



2 fonctions acide



acide lactique



1 fonction acide

**Le pH
(acide
tartrique)**



Autrefois

...



Autrefois

...



HYPOCRAS

Apéritif

du Haut Moyen Age

Fabrication Artisanale

Route de Nérac
32100 Condom - France

Boisson aromatisée à base de vin
Produit de France Servir frais
Contient des sulfites. Lot 343-10

11.5 %vol

37.5cl

La filtration



5

Même après...



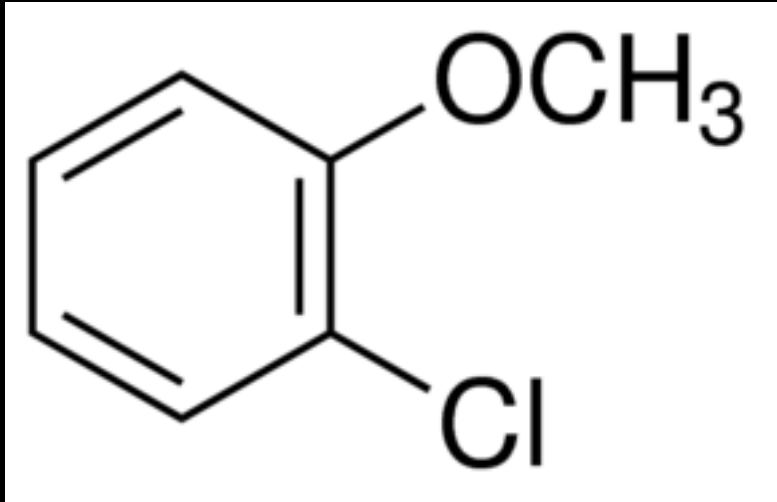
A photograph of a cellar or wine vault. Several large wooden barrels, bound with dark metal hoops, are stacked on wooden racks. The background is a dark, rough stone wall. The lighting is low, creating a moody atmosphere. The text "La part des anges..." is overlaid on the right side of the image.

**La part des
anges...**

The image shows a dark, almost black, textured surface, likely a rock or fossil. There are several bright, irregular patches of light, possibly representing mineral inclusions or fossil remains. The texture is rough and uneven, with some fine fibers or cracks visible. The lighting is dramatic, highlighting the bright patches against the dark background.

**La part des
anges...**

Le goût de bouchon



chloro-anisol



Le goût de bouchon



SAUVIGNON BLANC

PAYS D'OC

INDICATION GÉOGRAPHIQUE PROTÉGÉE

*Terroirs de Langlade
plus grand respect
condition*

11

FRANCE



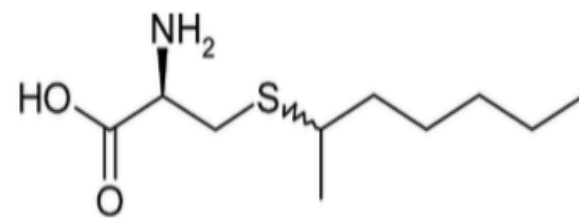
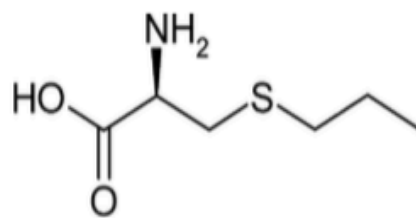
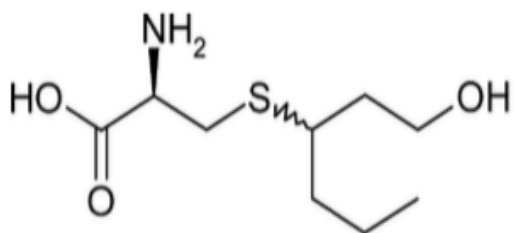
Le goût
du vin ?

SAUVIGNON BLANC

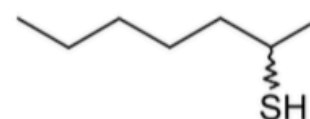
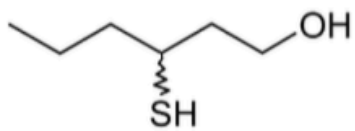
PAYS D'OC

INDICATION GÉOGRAPHIQUE PROTÉGÉE

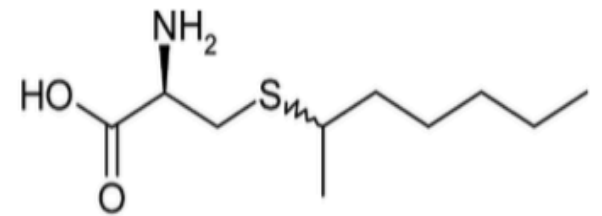
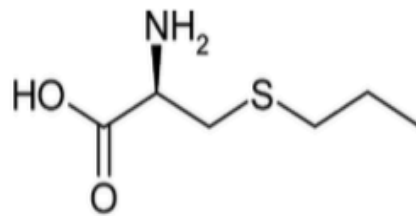
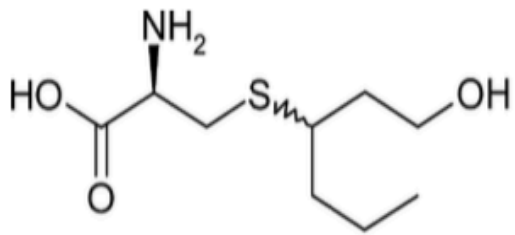
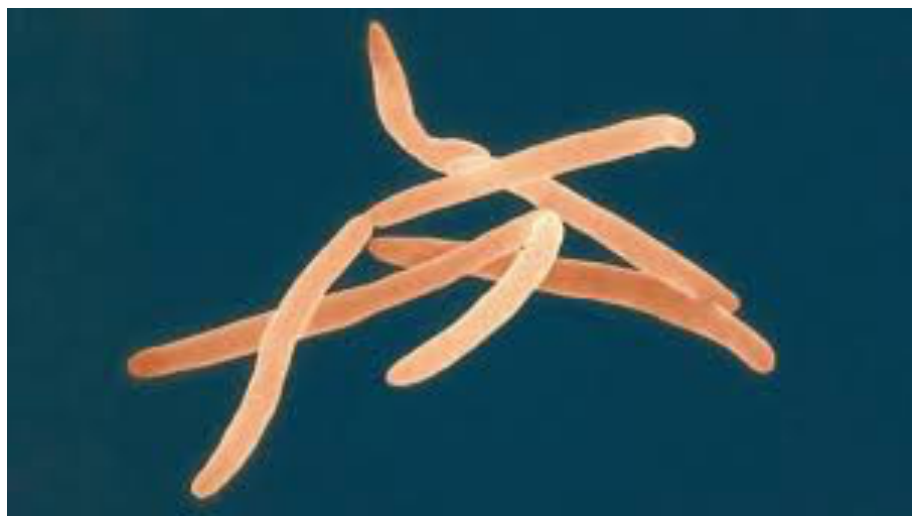
*trois de langue
des mandolins*



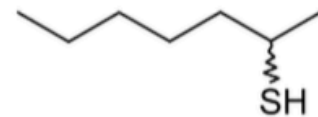
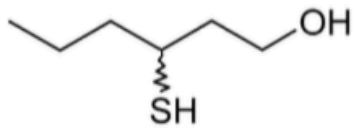
dérivés
sapides



Fusobacterium



**dérivés
sapides**



De l'alcool et des bulles

Des arômes et de la structure

De la stabilité et de la limpidité

De l'alcool et des bulles

Des arômes et de la structure

De la stabilité et de la limpidité

... les microbes et le plaisir