

forum
2011
9-11 November

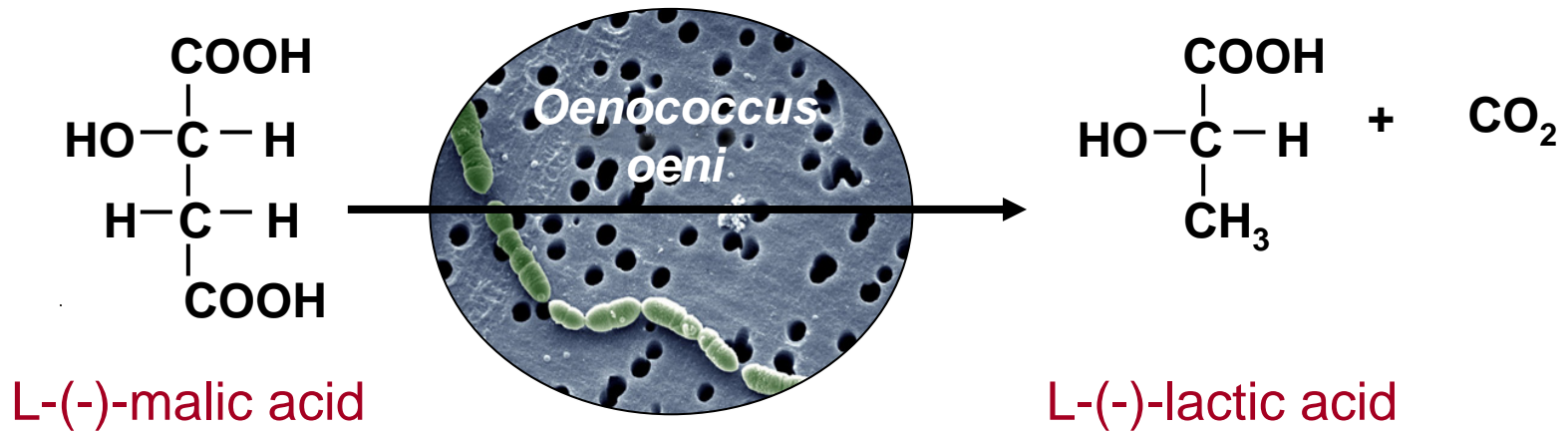


RESEARCH IN LACTIC ACID BACTERIA



Cristina Reguant Miranda

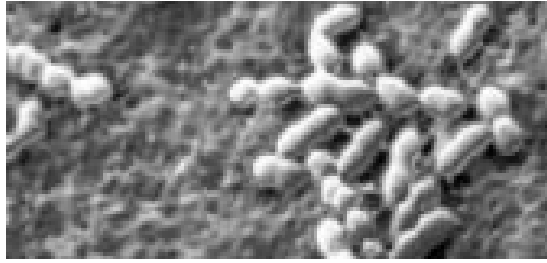
MALOLACTIC FERMENTATION (MLF)



WINE
QUALITY
IMPROVEMENT



acidity decrease
microbiological stabilization



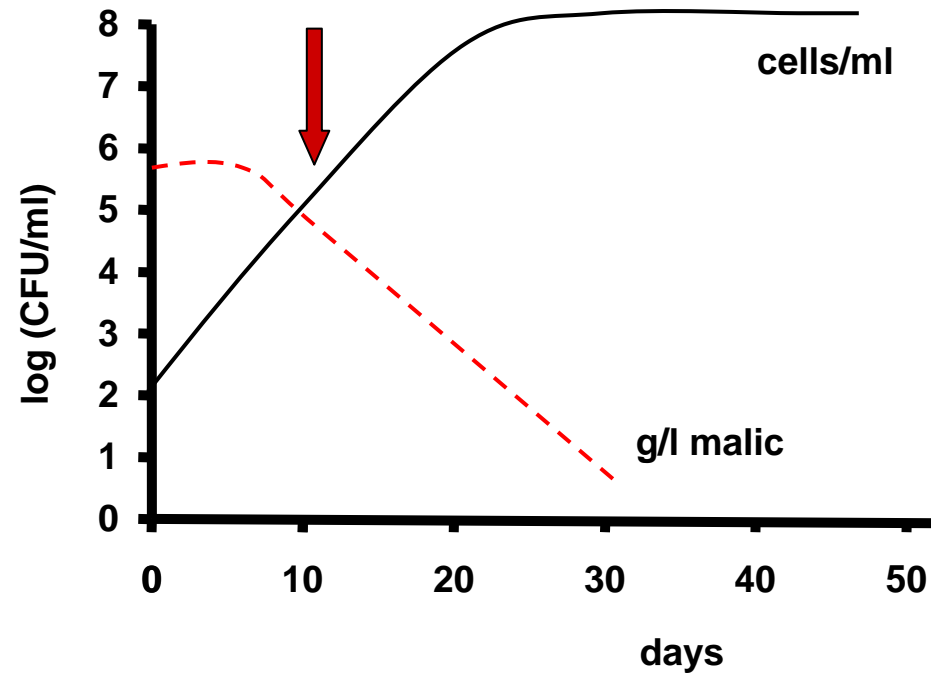
acidophilic nature

tolerance to ethanol

Best adapted to wine conditions

Oenococcus oeni

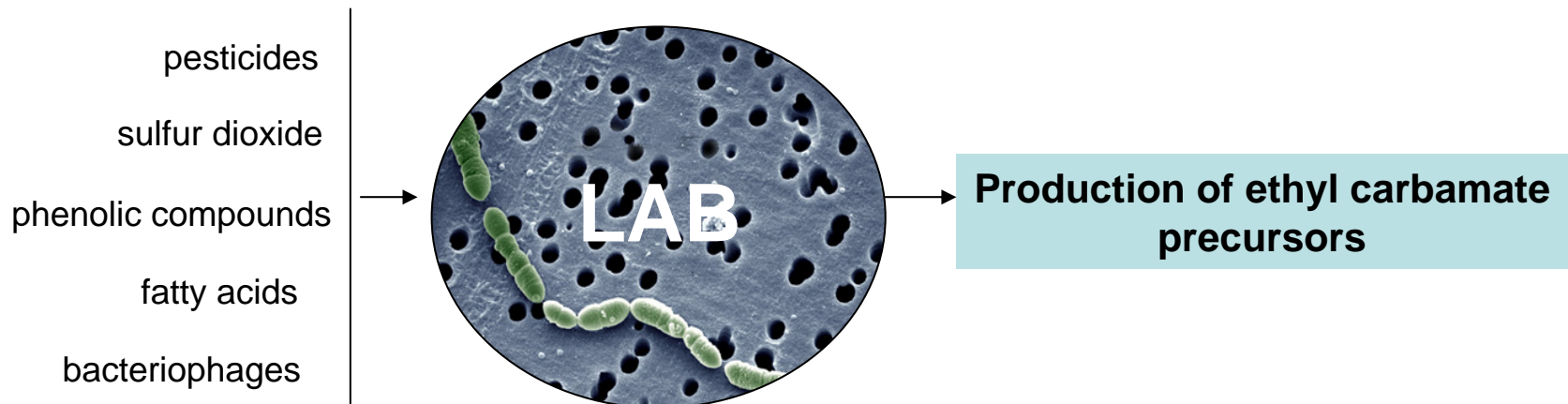
Start FML: population aprox. 10^5 cells/ml





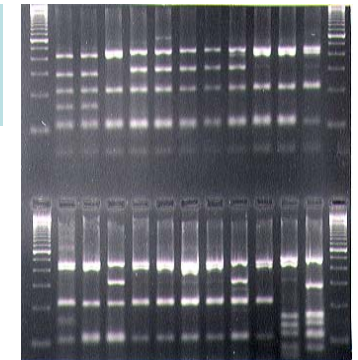
RESEARCH in wine LAB at URV 1990-2011

Influence of wine components on LAB and MLF



Molecular identification of LAB species and strains typification along vinification

Isolation and selection of LAB for MLF

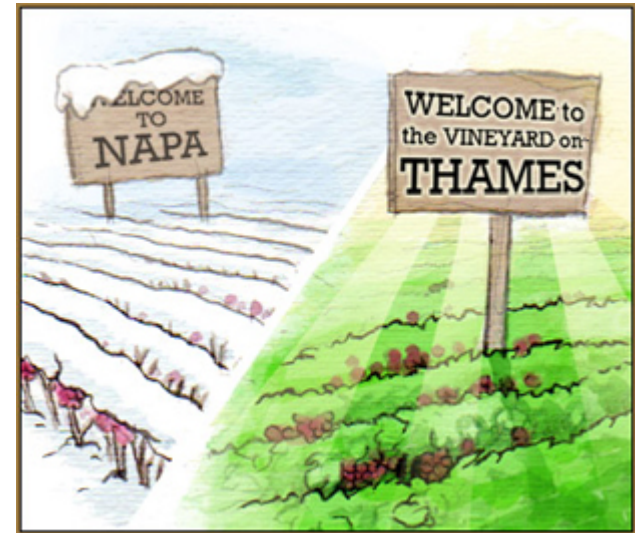


Molecular study of mechanisms of adaptation to wine stress

NEW CHALLENGES FOR *O. oeni*:

**CHANGES IN WINE COMPOSITION
DUE TO CLIMATE CHANGE**

- Higher ethanol content
- Higher pH
- Low L-malic acid concentrations



<http://wine.appellationamerica.com>



RESEARCH PROJECTS

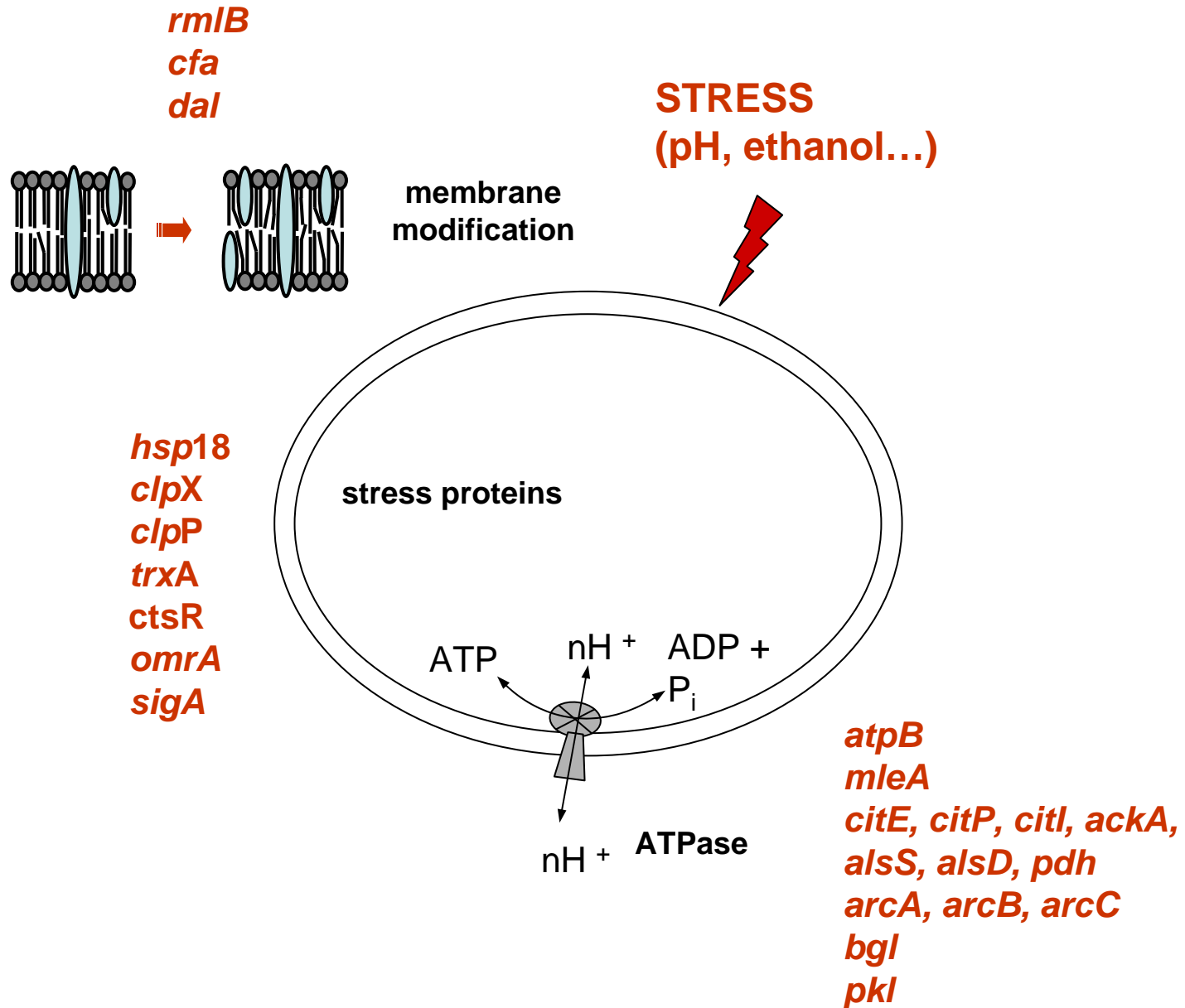


Study of *O. oeni* cellular mechanisms involved in tolerance to a higher alcohol content and other changes in the characteristics of the wine due to climate change: CENIT-DEMETER project



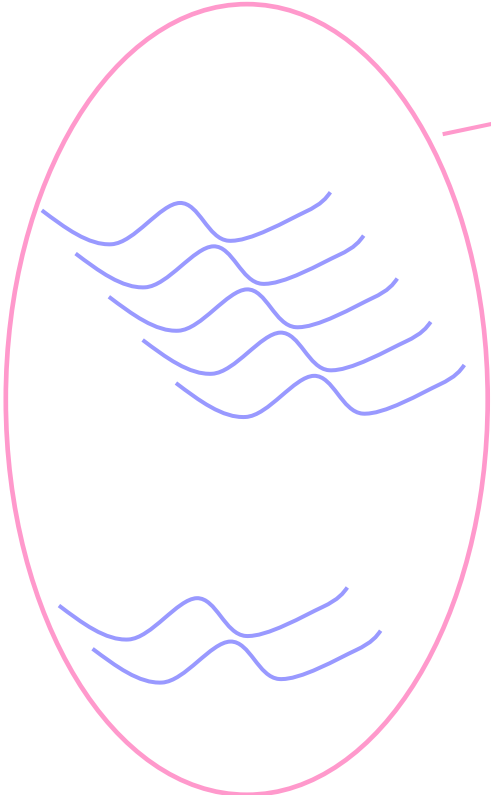
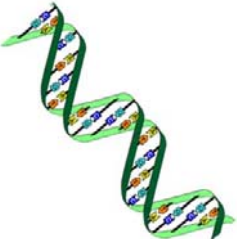
Study of the adaptation of *O. oeni* to wine stress conditions: a proteomic and transcriptomic approach: AGL 2009-07369

O. oeni CELL RESPONSE TO WINE STRESS CONDITIONS

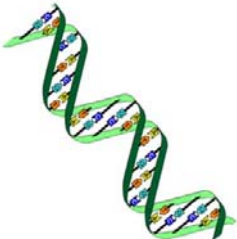


STUDY OF GENE EXPRESSION

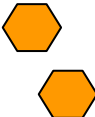
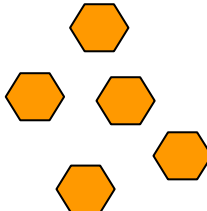
Strain A



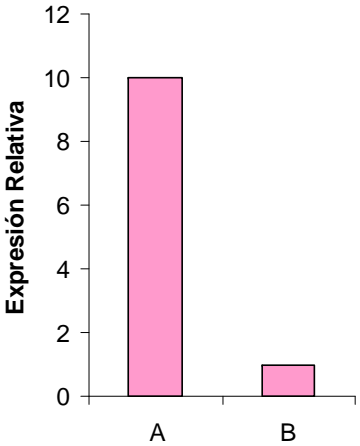
Strain B



Gene expression
mRNA



Protein activity



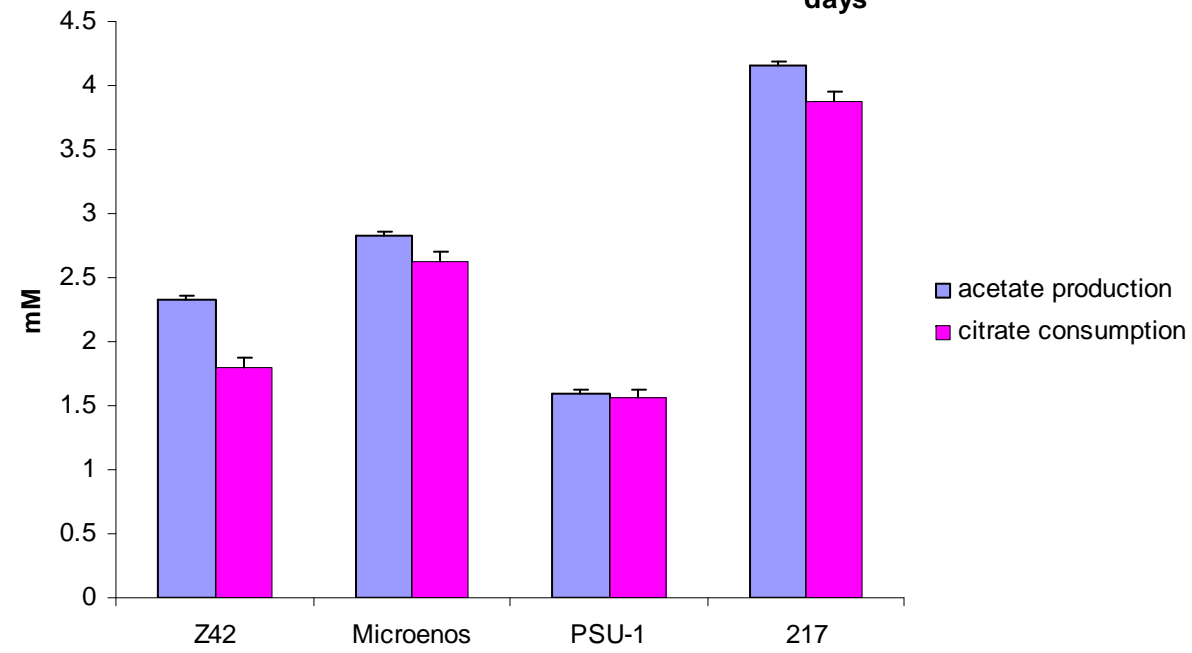
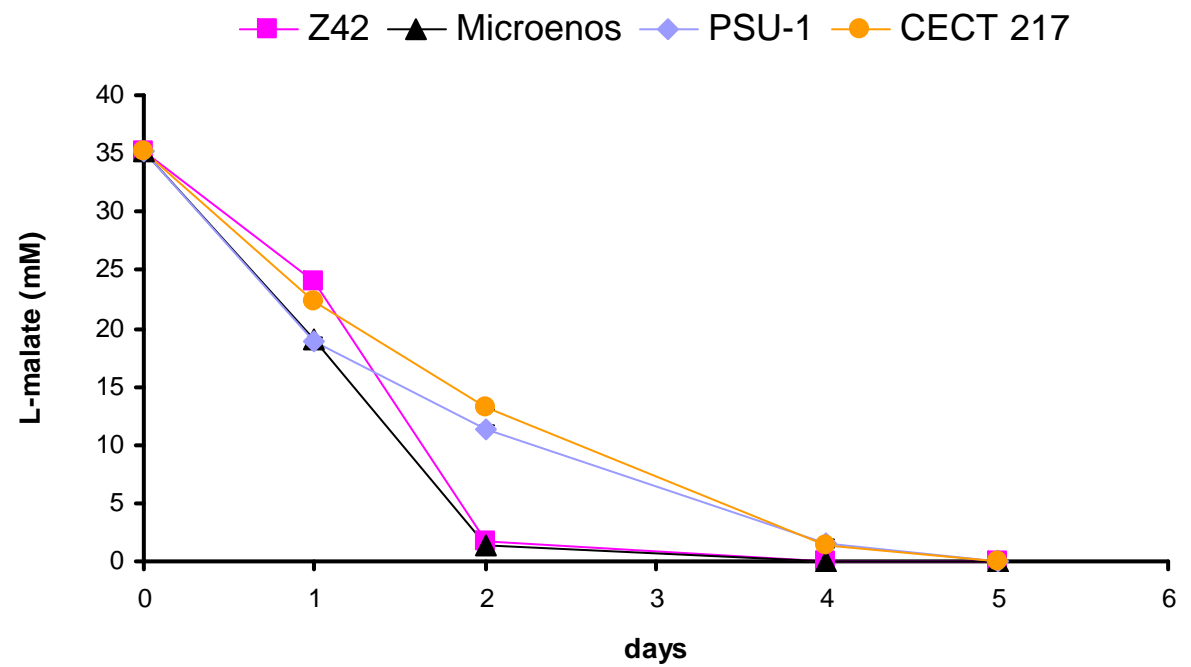
Wine changes

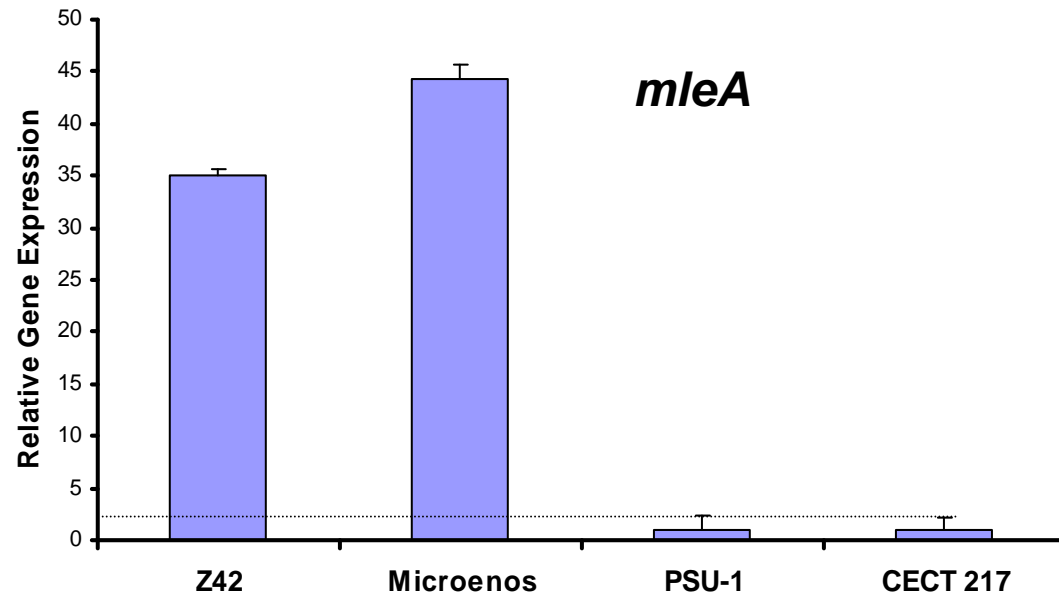
STRAIN COMPARISON

ethanol 12 %
pH 3,5

Malolactic Fermentation

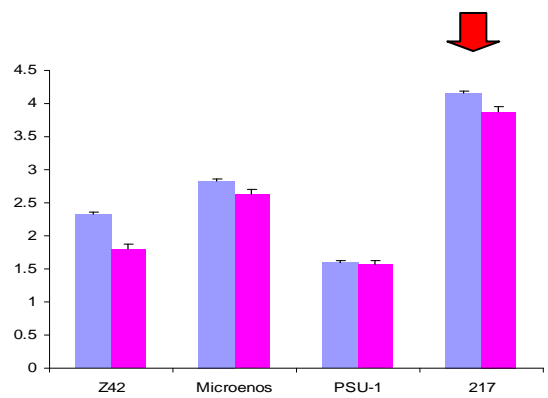
Acetic production/ citrate consumption end MLF



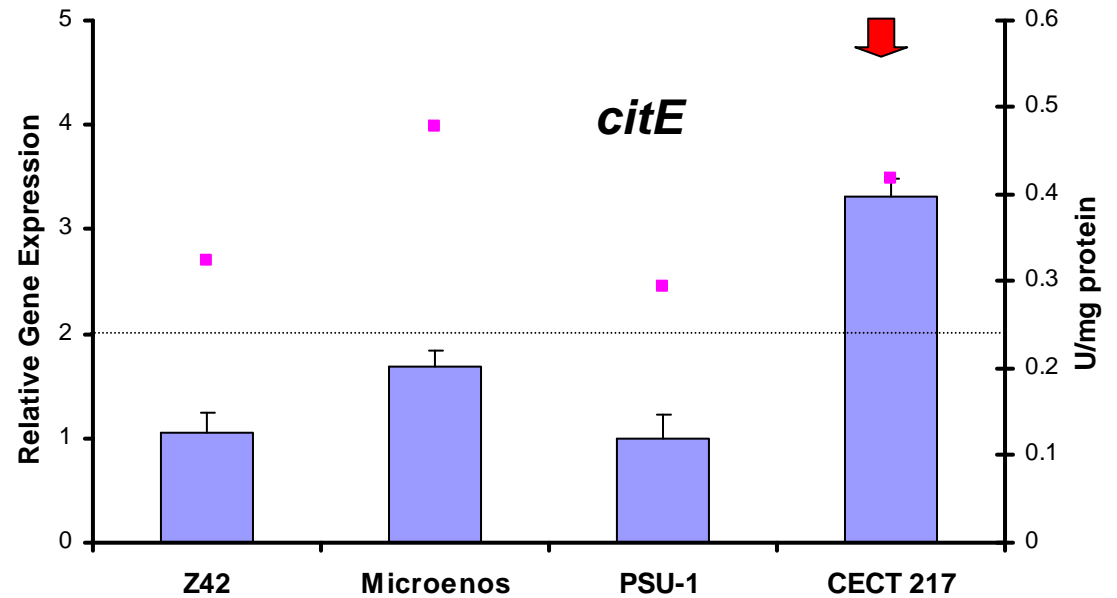


**Gene Expression /
Metabolic Activity**

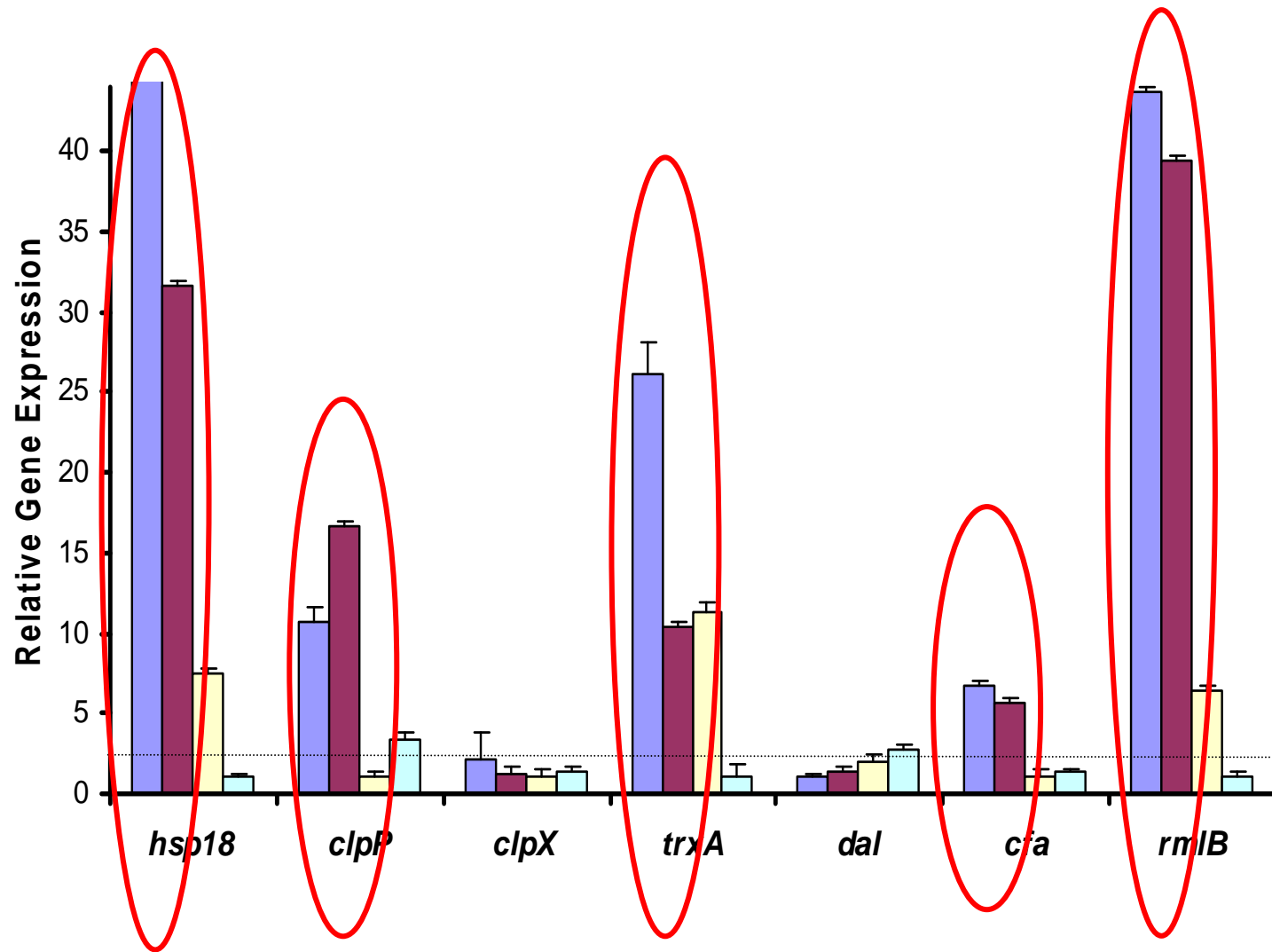
***mleA* : malate decarboxylase**



***citE* : citrate lyase**

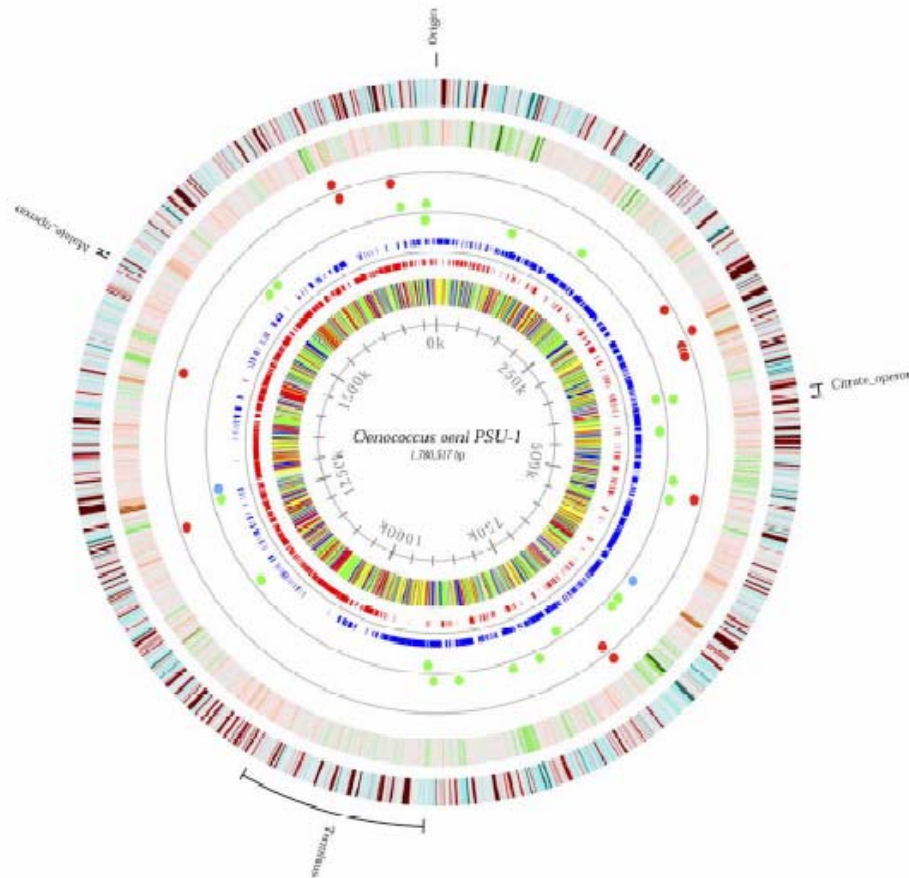


STRESS PROTEINS gene expression



24 hours after inoculation

O. oeni PSU-1 GENOME



2 more *O. oeni* strains

Other sequenced LAB:

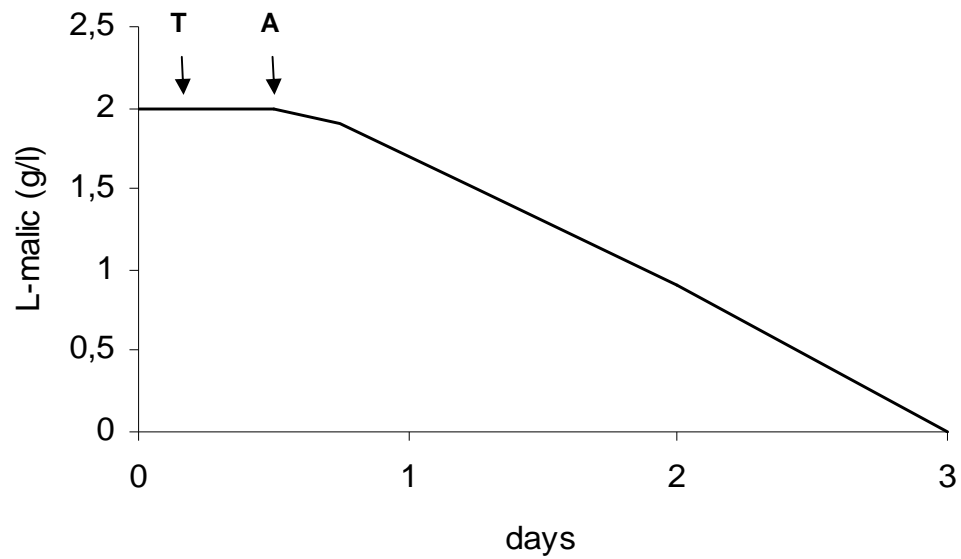
- 2 *Lactobacillus plantarum*
- 1 *Lactobacillus brevis*
- 1 *Leuconostoc mesenteroides*
- 1 *Pediococcus pentosaceus*
- 4 *Lactococcus lactis*



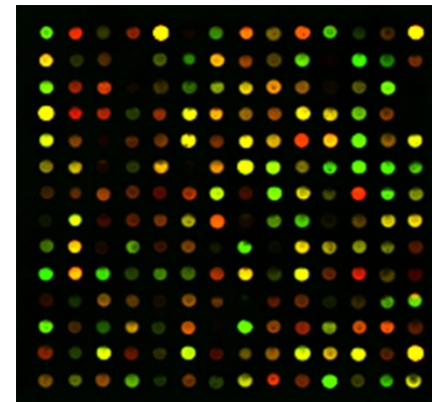
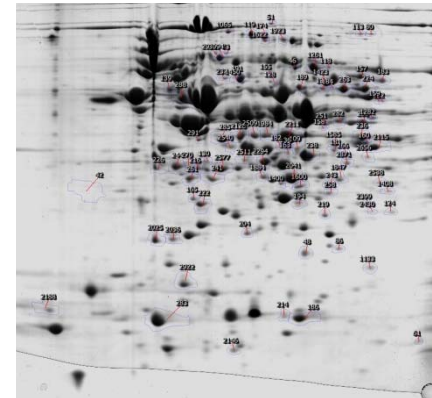
GLOBAL ANALYSIS

Mills et al. (2005) Genomic analysis of *Oenococcus oeni* PSU-1 and its relevance to winemaking. *FEMS Microbiol Rev* 29, 465-475

GLOBAL STUDIES: PROTEOMIC AND TRANSCRIPTOMIC



T: early response
A: progressive adaptation



PERSPECTIVES AND APPLICATION:

Knowledge of cellular and molecular mechanisms related to stress response and adaptation

```
graph TD; A[Knowledge of cellular and molecular mechanisms related to stress response and adaptation] --> B[Optimal conditions of preadaptation]; A --> C[Application of criteria in strain selection]; B --> D[IMPROVEMENT OF MALOLACTIC FERMENTATION]; C --> D;
```

Optimal conditions of preadaptation

Application of criteria in strain selection

IMPROVEMENT OF MALOLACTIC FERMENTATION

RESEARCH TEAM IN LAB



Dr Albert Bordons



Dra Isabel Araque

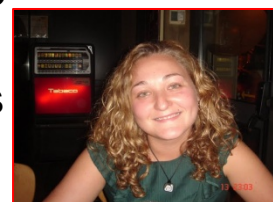


Dr Nicolas Rozès

Meritxell Bordas

Dra Cristina Reguant

Mar Margalef



and before..

Maria Gibert

Karoline Wagner

Michi Rathberger

Joan Oriol Alegret

....

Dr Albert Hurtado

Dra Nair Olguín

Dr Ramon Carreté

Dra Mariate Vidal

Dra Montse Poblet

Dra Magda Constantí

Dra M.Carme Masqué



Grup de Biotecnologia Enològica



DBB

Departament de Bioquímica i Biotecnologia



Facultat d'Enologia de Tarragona



Universitat Rovira i Virgili

