

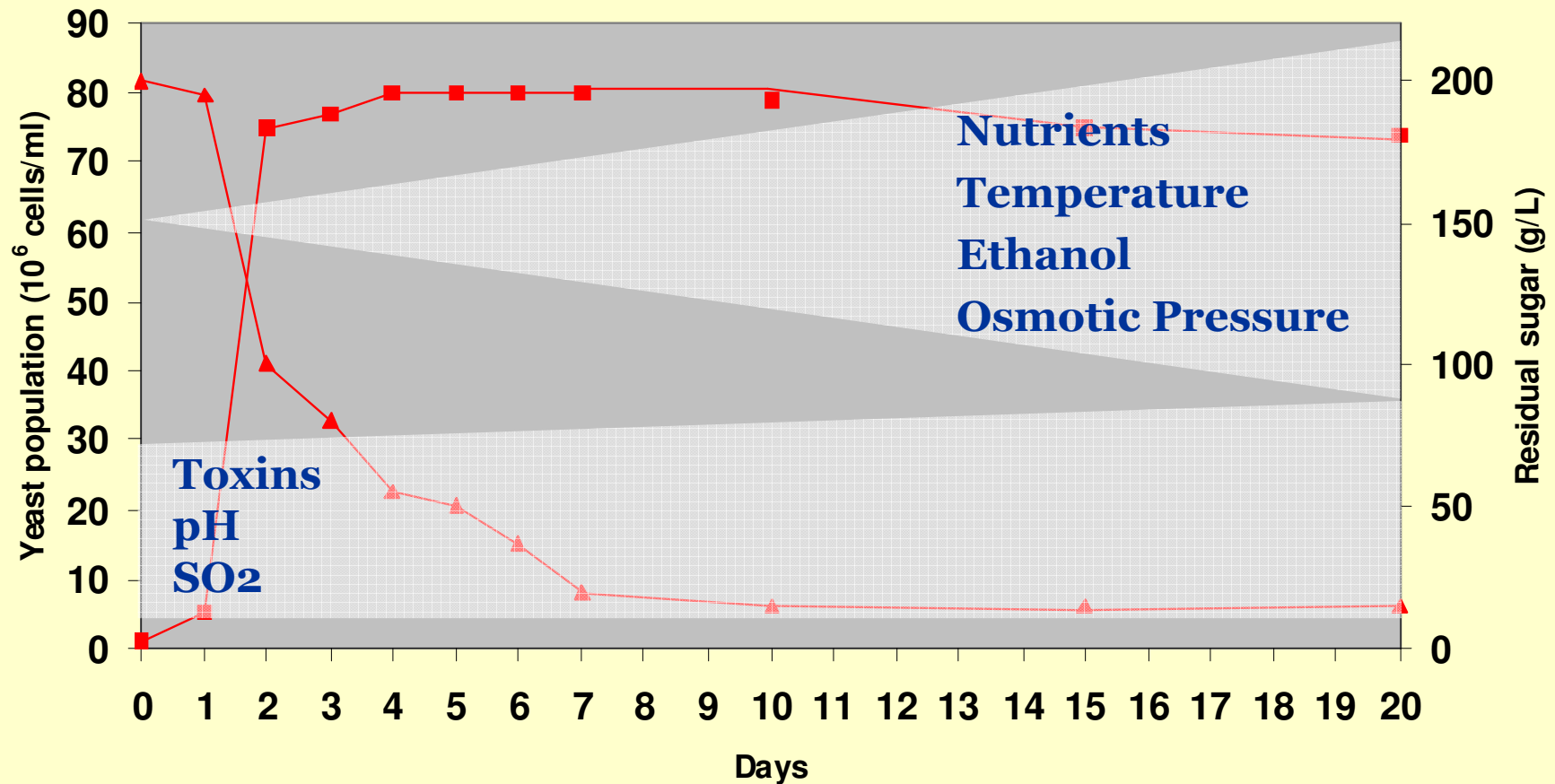
# Yeast Research Units

*Ricardo Cordero Otero*

Distinguido como  
Campus de Excelencia  
Internacional por el  
Ministerio de Educación



# Understanding Wine Yeast Stress



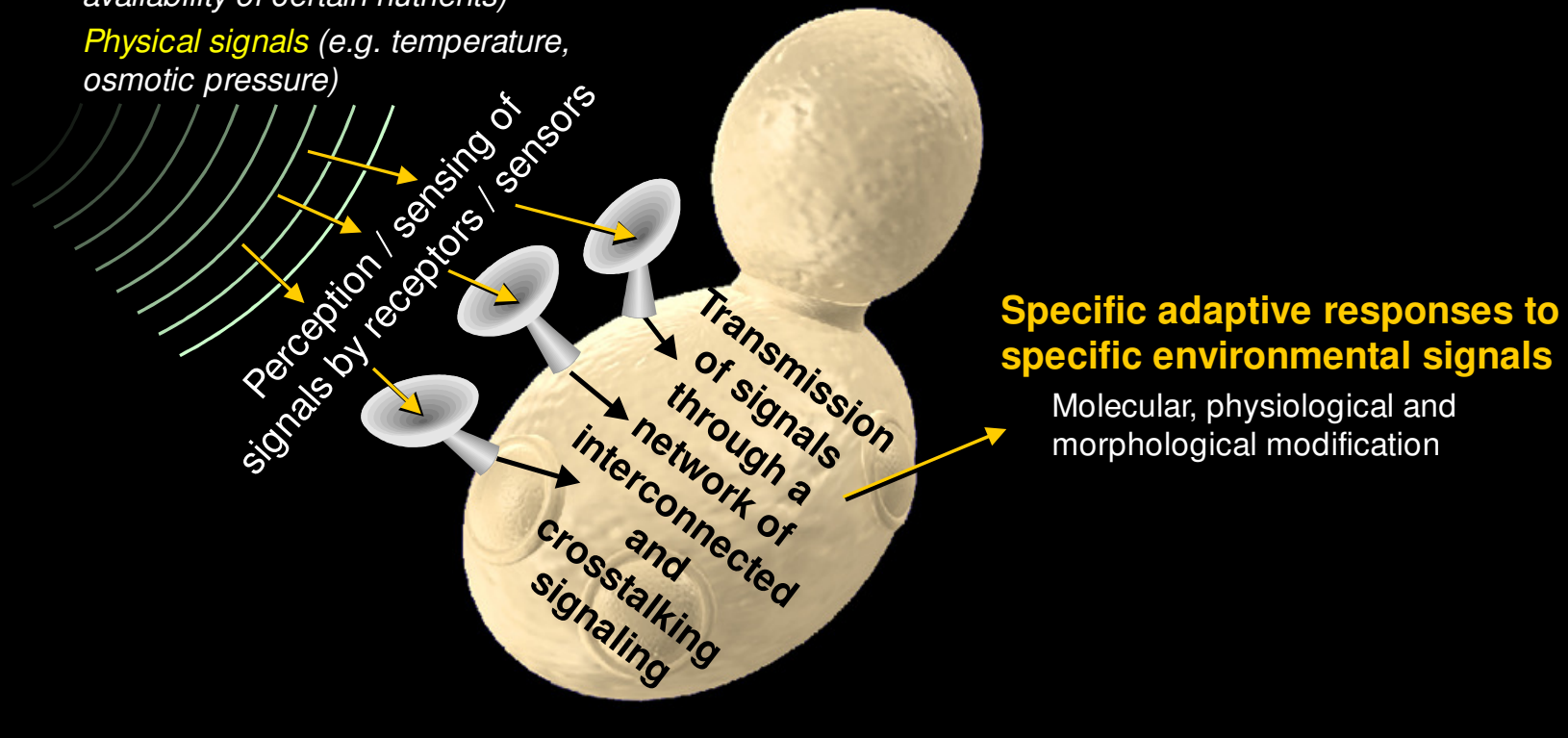
# Understanding Wine Yeast Stress



## Environmental signals

*Chemical signals* (e.g. concentration or availability of certain nutrients)

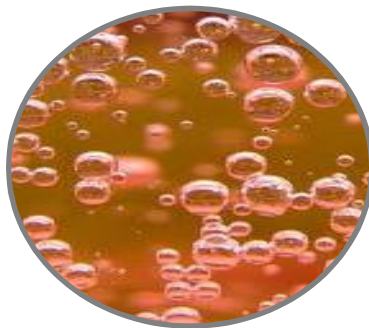
*Physical signals* (e.g. temperature, osmotic pressure)



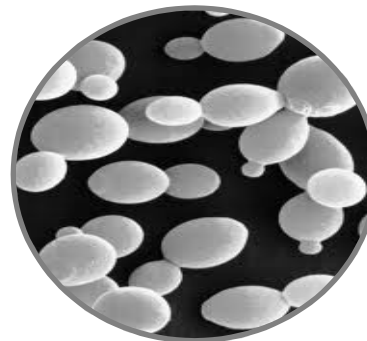
# The Amount and Quality of Nitrogen Consumed by Yeast Affects:



Fermentation kinetics



Yeast growth

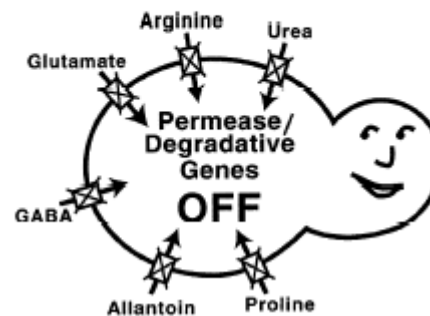


Aroma production

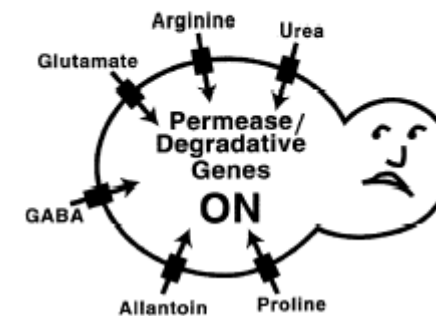


**Nitrogen Catabolite Repression (NCR)**

**Excess Nitrogen**  
Gln, Asn, NH<sub>4</sub>



**Limiting Nitrogen**  
Proline, Allantoin



# Analysis of the Responsible Physiological and Molecular Mechanisms for the Adaptation of Wine Yeast to Changes in Nitrogen Availability

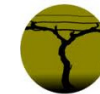


Research Project



*URV Researchers: G. Beltrán, A. Mas;*

*IATA Researcher: J.M. Guillamón*



ProyectoDeméter



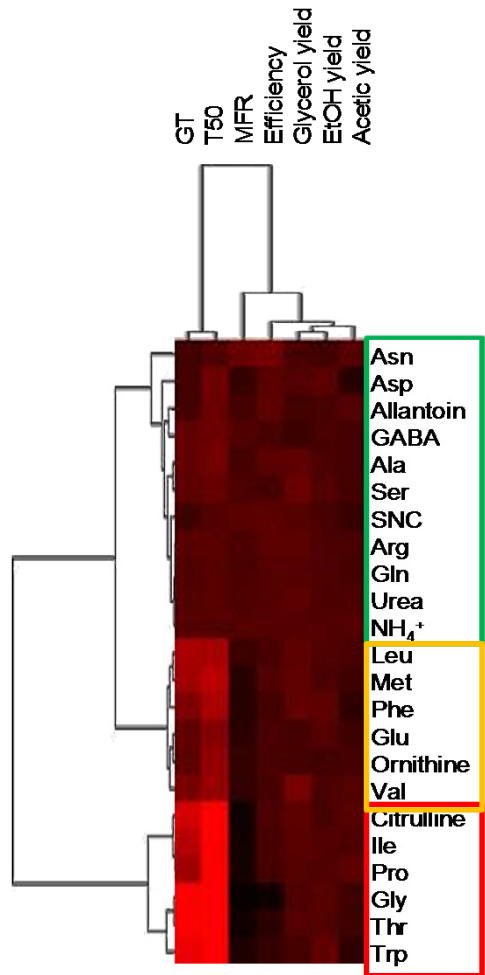
**Objectives:**

1. **Nitrogenous** nutrients during the **alcoholic fermentation**:  
needs and effect on its development
2. **Nitrogen** needs during **second fermentation** for cava  
production

# To Determine the concentration and nitrogen sources for optimal yeast growth and development of alcoholic fermentation



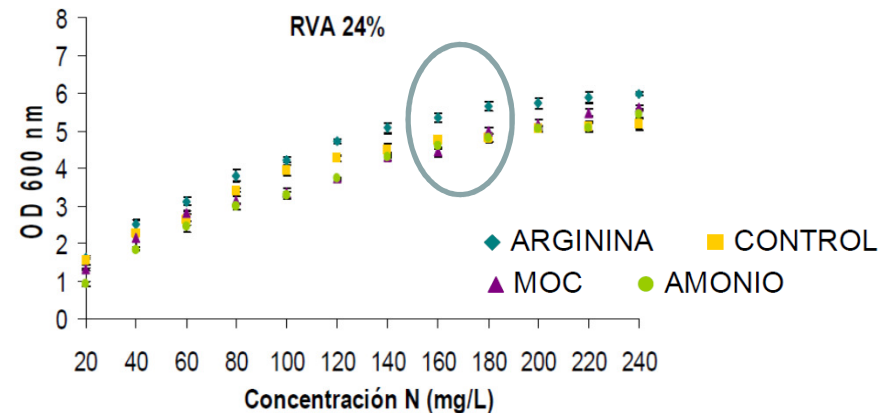
Research Project



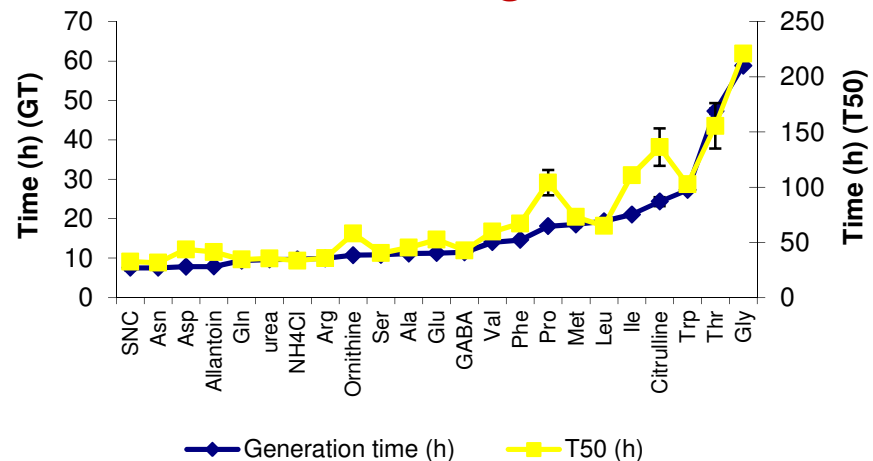
“Good”

“Bad”

## Limiting Nitrogen concentration



## Fermentation and growth kinetics



# Identification of Molecular and Physiological Mechanisms in Wine Yeast that Determine Tolerance to Ethanol and Low T (in collaboration with IATA, Valencia)



Research Project



*URV Researchers: N. Rozès, M. Poblet;*

*IATA Researcher: J.M. Guillamón*

Objectives:



1. **Phenotypic analysis** of the wine yeasts collection, based on their **tolerance to ethanol**: growth, flocculation, resistance to ethanol, etc.
2. To determine the most important **metabolic differences** between different degrees of **ethanol tolerant yeast** during pre-adaptation: metabolomic, lipidomic, and analysis of micro domain (rafts)
3. **Transcriptomic and proteomic** analysis of strains with differential **ethanol pre-adaptation phenotype**

# Physiological and Molecular Mechanisms of Medium Chain Fatty Acids Toxicity in *S. cerevisiae*



Research Project



*URV Researchers: R. Cordero, N. Rozès*

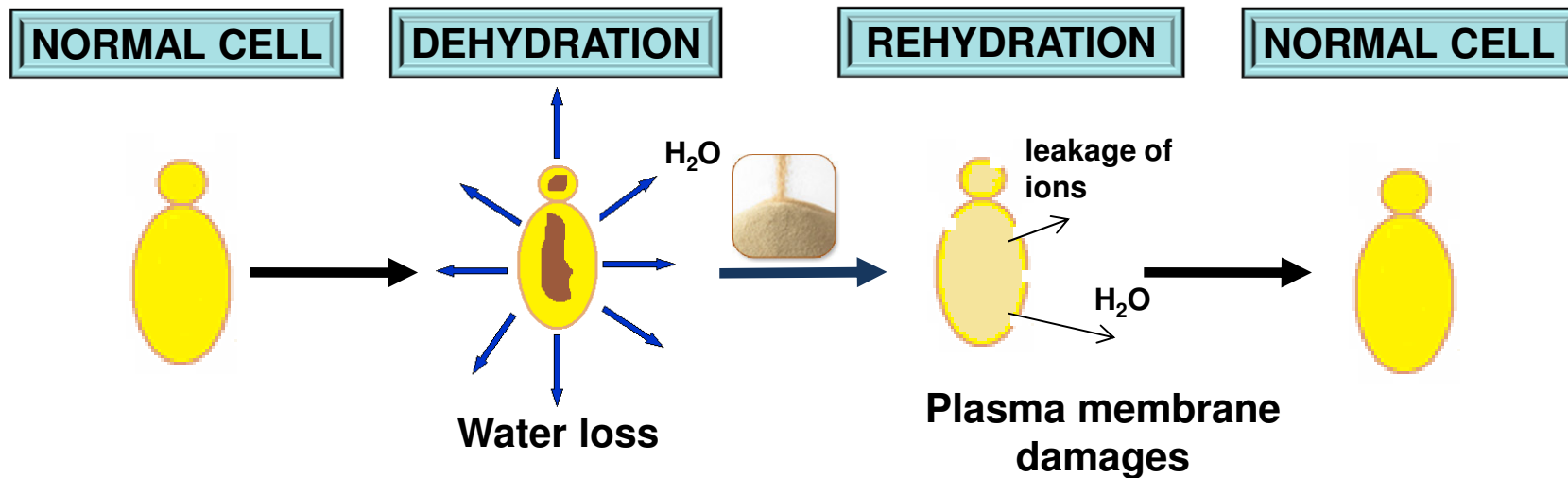


## Objectives:

1. Evaluation of **NIC and MIC** for **fatty acids** (C6, C8, C10, and C12) vs. **pH** in *S. cerevisiae*
2. To study C8 and C10 **inhibition mechanisms** at physiological pH (5.8)
3. Impact of C8 and C10 toxicity in **aromatic compounds** production



# Causes of Yeast Death After Drying and Rehydration Process



Irreversibly Injured Cell

Cell Death Ways



Mechanical Damages

Necrosis

Apoptosis

# Functional Characterization *in vivo* of Essentials *S. cerevisiae*'s Hydrophilins for Desiccation Tolerance



Research Project



*URV Researcher: R. Cordero Otero*

Objectives:

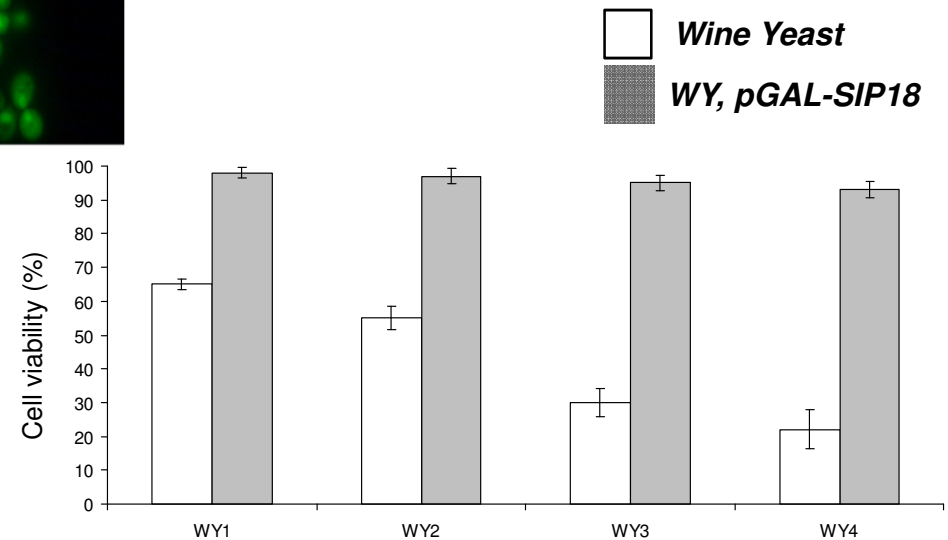
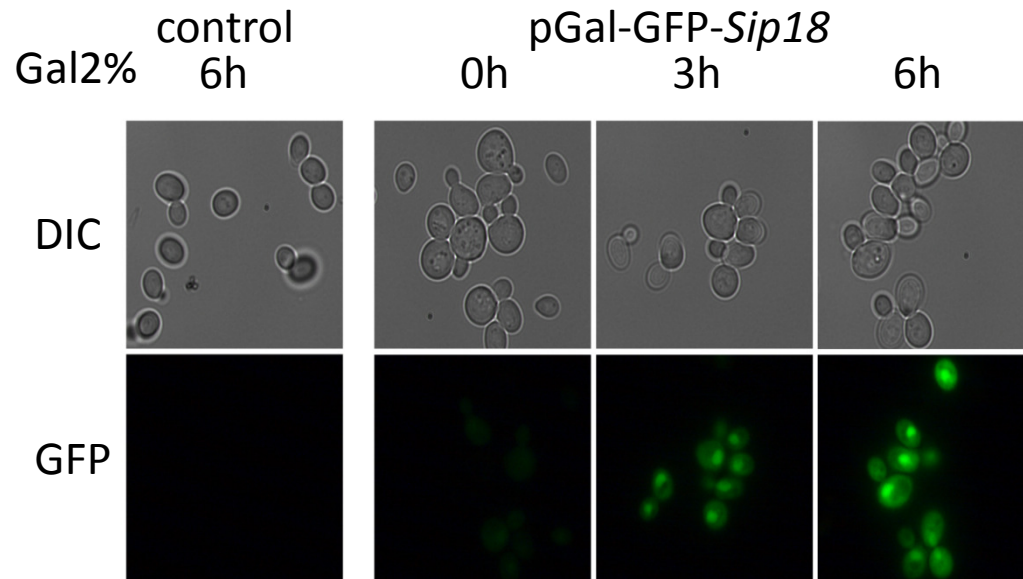


1. To **characterize** the degree of implication of different MAPK **pathways** in the process of **cell-drying** and **-rehydration**
2. To **cytolocalize** and evaluate activity of essential **hydrophilic peptides** during stress imposition
3. To develop **desiccation tolerant strains** for wine fermentations

# Functional Characterization *in vivo* of Essentials *S. cerevisiae*'s Hydrophilins for Desiccation Tolerance



Research Project



# FLOW CYTOMETRY FOR MICROBIOLOGICAL CONTROL IN THE MANUFACTURE OF SPARKLING WINES (Partec, Intellioeno, Vitec, Merck)



Research Project



*URV Researchers: M. Poblet, R. Cordero, N. Rozès*

## Objectives:

1. Monitoring of physiological state of yeast populations during second fermentation
2. Comparison between classical and flow methods (Ex cytometry, etc.)



# Facultat d'Enologia de Tarragona



*“There does not exist a category of science to which one can give the name applied science. There are science and the applications of science, bound together as the fruit of the tree which bears it”.*

Louis Pasteur (1822-1895)

*Thanks For Your Attention*