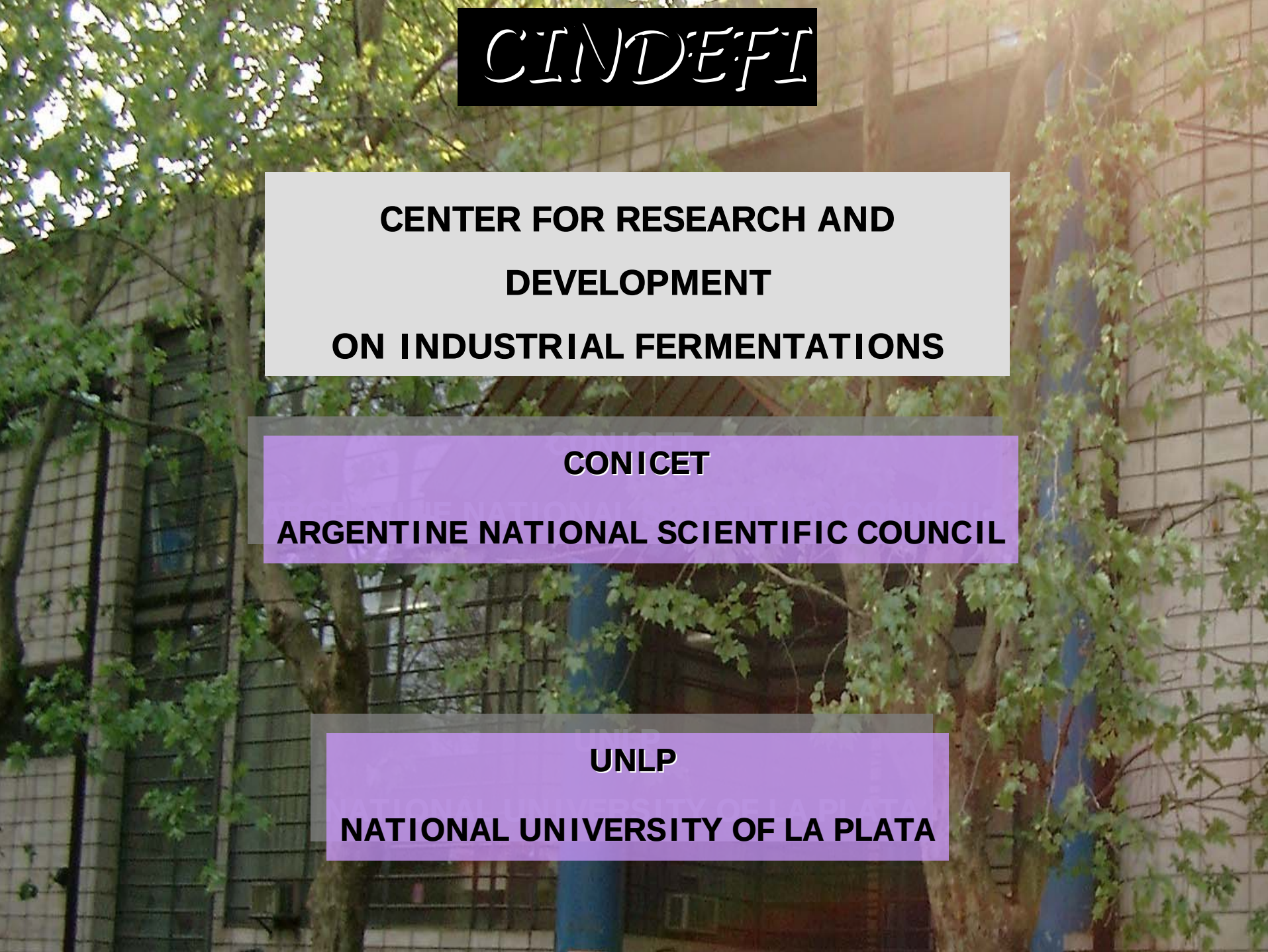
CINDEFI
CENTER FOR RESEARCH AND
DEVELOPMENT
ON INDUSTRIAL FERMENTATIONS
CONICET
ARGENTINE NATIONAL SCIENTIFIC COUNCIL
UNLP
NATIONAL UNIVERSITY OF LA PLATA

# CINDEFI

**Founded in 1973 by Prof. Rodolfo Ertola, pioneer of the development of Applied Microbiology in Latin America countries.**

**Director: Prof. Dr. Edgardo Donati**

**Vice-Director: Prof. Dr. Roque Hours**

**Advisory Council:**

**Prof. Dr. Osvaldo Yantorno**

**Prof. Dr. Carlos Mignone**

**Dr. Eugenia Rodriguez**

**Dr. Irma Morelli**

# CINDEFI

**Staff**

**Researchers (from CONICET, CIC-PBA, UNLP): 16**

**Doctoral Students (Fellows from CONICET, ANPCyT, CIC-PBA, UNLP): 37**

**Undergraduated students: 15**

**Supporting Technicians: 13**

**Administrative Staff: 3**

# Aims:

**Development of scientific investigations in Biotechnology, particularly in fermentation processes of national interest.**

**Collaboration with other institutions dedicated to the knowledge, research, development, technology and economy of biotechnological processes.**

**Generation of human resources either as scientists as well as professionals and technicians.**

**Promotion of scientific relationships with local and foreign governments and/or institutions dedicated to the research of common interest.**

# Research areas

**Bacterial Lixiviation. Bioremediation of heavy metals.**
**Prof. Dr. Edgardo Donati**

**Biological fixation of nitrogen. Metabolism of nitrogen fixing bacteria.**
**Dr. José Boiardi**

**Cellular Microbiology, functional genomics and process technology applied to the design and production of bacterial vaccines.**
**Dr. María Rodríguez**

**Development of micro- and nano-devices based on biomolecules for biotechnological purposes.**
**Dr. Guillermo Castro**

# Research lines

**Expression of antigens in biofilm cultures. Microbial molecular characterization by FTIR.**
**Prof. Dr. Osvaldo Yantorno**

**Hydrocarbon Bioremediation.**
**Dr. Irma Morelli**

**Metabolic flux analysis.**
**Prof. Dr. Carlos Mignone**

**Microbial enzymes.**
**Prof. Dr. Roque Hours**

# Microbial Enzymes

## Aims

Screening of native microorganisms, particularly filamentous fungi, potentially producers of novel enzymes.

Isolation, purification and characterization of microbial enzymes.

Cloning and expression of microbial enzymes.

Process design for enzyme production. Development of processes at laboratory and pilot plant scales in batch, fed batch and continuous cultures. Metabolic analysis of bioprocesses.

Application of microbial enzymes in traditional and novel bioprocesses.

# Microbial Enzymes

**Sub-line 1: Fungal keratinases. Bioconversion of bovine hair waste.**

**- Screening of filamentous fungi from hair-containing soils and from a local Culture Collection (Spegazzini Institute – UNLP).**

**- Isolation and identification of non-pathogenic keratinase producing fungi able to degrade bovine hair (*Trichophyton ajeloii* and *Paecilomyces lillacinus*).**

**- Isolation, purification and characterization of keratinases.**

**- Liquid and solid state cultures for keratinase production using bovine hair waste as a sole nitrogen and carbon and energy source.**

**- Study of the mechanism of enzymatic degradation of keratin in bovine hair waste.**

**- Application of keratinases for bioconversion of bovine hair waste at laboratory and pilot scales.**

# Microbial Enzymes

## Sub-line 2: Fungal Chitinases. Biocontrol of nematodes.

- Screening of filamentous fungi from native soils contaminated with nematode eggs.

- Isolation and identification of non-pathogenic chitinase producing fungus able to destroy nematode eggs (*Paecilomyces lillacinus*).

- Isolation, purification and characterization of chitinases.

- Study of the mechanism of fungal colonization and destruction of nematode eggs.

- Application of *P. lillacinus* for biocontrol of horticultural nematodes of economic interest (e.g. tomato and red pepper).

# Microbial Enzymes

## Sub-line 3:Fungal Rhamnosidases. Bioconversion of flavonoids.

**Screening of filamentous fungi potentially producers alkaline glicosidases (i.e. rhamnosidases) from native alkaline soils.**

**Isolation and identification of non-pathogenic rhamnosidases producing fungi able to degrade natural flavonoids (*Acremonium murorum* and *Acrostalagmus luteo-albus*).**

**Isolation, purification and biochemical characterization of alkaline rhamnosidases.**

**Liquid and solid state cultures for rhamnosidase production.**

**Application of alkaline rhamnosidases for bioconversion of natural flavonoids. Production of rhamnose.**

**Cloning and over expression of fungal rhamnosidases in eukaryotic systems.**

# Microbial Enzymes

## Sub-line 4: Hydrolytic enzymes from *Aspergillus kawachii*

**Screening of novel enzymes with potential application to industrial bioprocesses from *A. kawachii*.**

**Studies on*: Pectin esterase, Acidic polygalacturonases, Pectin lyase, Inulinase***

**Isolation, purification and biochemical characterization of enzymes.**

**Liquid (and solid state) cultures for enzyme production using synthetic and complex (natural) media.**

**Application of enzymes for bioconversion of agricultural materials (food production and waste biorecycling).**

**Cloning and over expression of enzymes in yeast (*S. cerevisiae* and *P. pastoris*).**

# Microbial Enzymes

## Sub-line 5: Polygalacturonase (Protopectinase SE) from *Geotrichum klebahnii*

**Role of PPase-SE in *G. klebahnii* metabolism.**

**Production of PPase-SE in fed batch cultures using different feeding strategies.**

**Studies on the mechanism of enzyme activity onto lemon protopectin. Enzyme / solid substrate interaction: characterization and quantification on enzyme adsorption.**

**Application of PPase-SE for pectin extraction and plant tissue maceration (production of a single cell food ingredient from sour orange with a high content of antioxidants: vitamin C and flavonoids).**

**Scale up of the production of PPase-SE in liquid cultures.**

# Microbial Enzymes

**Previous and present collaboration with academic/research institutions:**

**Argentine**

**University of Buenos Aires.**

**National University of Quilmes.**

**National University of Entre Rios.**

**National University of Misiones.**

**National University of Salta.**

**Foreign**

**Autonomous University of Cohauilla (Mexico).**

**National University of Colombia (Medellin – Colombia).**

# Microbial Enzymes

**Previous and present collaboration with academic/research Japanese institutions:**

**Japan International Cooperation Agency (JICA)**

**Attendance to JICA training courses in the field of Biotechnology**

**-Dr. Roque Hours, Biotechnology utilizing higher plants and microorganisms, 1991.**

**-Dr. Sebastian Cavalitto, Gene manipulation for Agriculture, 1995.**

**-Dr. Carina Apartin, Bioindustries, 1995.**

**-Ms.Sc. Carolina Vita, Bioindustries, 1999.**

**-Ms.Sc. Lorena Rojas, Bioindustries, 2004.**

**-Ms.Sc. Ivana Cavello, Technical Support for SME Promotion I Biotechnology 2008.**

**-Ms.Sc. Giselle Kikot, Technical Support for SME Promotion I Biotechnology, 2009.**

# Microbial Enzymes

**Previous and present collaboration with academic/research Japanese institutions:**

**Technical Cooperation with the Government of Japan (JICA).**

**Emeritus Professor Takuo Sakai**

**1.- July 28 to September 03, 1994. Subject: Studies on production of microbial protopectinases and their utilization for the enzymatic extraction of pectic substances from juice industry wastes.**

**2.- September 28 to October 18, 1995. Subject: Studies on the use of by-products and wastes from the citrus juice industry by biotechnological procedures: production of pectin, glycosides and their derivates.**

**3.- September 01 to September 30, 1996. Subject: Same as in 2.**

# Microbial Enzymes

## Previous collaboration with academic/research Japanese institutions:

**Japan Society for the Promotion of Science (JSPS)**

**Dr. Roque Hours, 1993 – 1994. Subject: Studies on microbial protopectinases. Center for Research and Development of Bioresources, Pref. University of Osaka. Host Scientist: Emeritus Prof. Takuo Sakai.**

**Dr. Roque Hours: Visiting researcher at Center for Research and Development of Bioresources, Pref. University of Osaka (1995) and Kinki University (1997). Host Scientist: Emeritus Prof. Takuo Sakai.**

CINDEFI
CONICET
U N L P

# DOUMO ARIGATOU GOZAIMASU