UNIVERSITÀ di VERONA

Scuola di Dottorato
di **SCIENZE NATURALI ED INGEGNERISTICHE**

Corso di Dottorato in Biotecnologie

"Metabolic strategies boosting functionalities of lactic acid bacteria"

January 24th, 2020 - h. 9.30

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Abstract

Lactic acid bacteria (LAB) are a heterogeneous group of microorganisms used as starter, adjunct and/or probiotic cultures in the production of many fermented and functional foods.

The industrial potential of LAB, however, is much wider and many strains have been exploited, or are currently being investigated, as microbial cell factories for the production of different high-value biochemicals (e.g. food ingredients, nutraceuticals, pharmaceutical precursors, biofuels).

The incoming of molecular biology tools in the 1980s led research towards metabolic engineering strategies, based on DNA manipulation, in order to improve metabolic production and fitness of LAB. Moreover, the recent development of omics approaches and high-throughput technologies contributed to understanding the metabolic features and regulation pathways of LAB, improving their application in food industry, and allowing a more specific engineering of the strains.

However, due to limitations on the use of Genetically Modified Microorganisms (GMMs), the natural metabolic strategies have been re-evaluated. The latter approaches are mainly based on: a. evolutionary engineering, b. metabolic shift. The experimental evolution of strains, generally, entails the prolonged cultivation of a microorganism in controlled conditions for hundreds to thousands of generations. The evolutionary events due to specific selective forces lead to the formation of an "optimal phenotype" with desired features. In the laboratory-evolved strains, the number of mutated genes and the type of mutation can be identified by genome re-sequencing and comparison with parental strain.

Recently several authors demonstrated that in some LAB the shift from anaerobic fermentative metabolism to aerobic respiration may result in several physiological advantages, including increase in biomass, production of ROS-scavenging enzymes, and robustness to oxidative, long-term starvation and freeze-drying stresses. Aerobic cultivation, moreover, alters the central carbon metabolism, at the pyruvate node, and several important metabolites (e.g. acetate, acetoin, diacetyl) may be accumulated. The use of potential respirative strains may improve organoleptic and nutritional quality of fermented foods (i.e. prevention of oxidative processes and production of desirable aroma compounds).

Some data demonstrated that natural metabolic strategies may be more efficient than those based on DNA manipulation, and may be a winning tool for the formulation of starter and probiotic cultures.

The lecture will take place **at 9.30 – Room Verde – Cà Vignal – Strada Le Grazie, 15**

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For each hour of seminar, 1 CFU (provided for the specific activities of PhD Program in Biotechnology) will be recognized to students attending the event.