

Master Research Projects 2016

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Project 1 - Characterization of a New Radical Copper Oxidase

Areas: Biochemistry/Enzymology/Microbiology/Biotechnology

Galactose oxidases belong to the emerging family of copper radical oxidases. This family of enzymes catalyzes the oxidation of primary alcohols or aldehydes with reduction of dioxygen to hydrogen peroxide. They are interesting both from a fundamental and applied point of view. Copper radical oxidases utilize an unusual free radical-coupled copper complex in their active sites, a chemistry that remains to be fully elucidated. On the other hand these enzymes supply the hydrogen peroxide, a co-substrate for lignolytic peroxidase reactions, and are considered key players in the environmentally important process of biomass degradation. The characterization of the galactose oxidase from *Arthrobacter siccitolerans* (the first from bacterial origin) will contribute to the clarification of fundamental details of the catalytic mechanism of radical oxidases, related with the mechanism of dioxygen activation and reduction. Furthermore, it will allow the evaluation of its potential in synergistic reactions with bacterial peroxidases, as a biotechnological tool for the depolymerization of ligninocellulosic material, a valuable renewable source of new bioproducts, materials and biofuels. Bacterial peroxidases that belong to a novel heme peroxidase family, Dye-decolourising peroxidases, were recently characterized in our laboratory (Mendes et al. Appl Microbiol Biotechnol. 2014, 98, 2053-2065, Mendes et al. 2015 Arch Biochem Biophys. 574, 99-107, Mendes et al 2015 Cat. Sci. Technol. 5: 5196-5207.)