

Evaluation of Antarctic Bacteria as Potential Producers of Cellulolytic Enzymes of Industrial Interest

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Abstract : The industry in general is very interested in improving and optimizing industrial processes in order to reduce the costs involved in obtaining raw materials and production. Thus, an interesting and cost-effective alternative is the incorporation of bioactive metabolites in such processes, being an example of this enzymes which catalyze efficiently a large number of enzymatic reactions of industrial and biotechnological interest. In the search for new sources of these active metabolites, Antarctica is one of the least explored places on our planet where the most drastic cold conditions, salinity, UVA-UVB and liquid water available are present, features that have shaped all life in this very harsh environment, especially bacteria that live in different Antarctic ecosystems, which have had to develop different strategies to adapt to these conditions, producing unique biochemical strategies. In this work the production of cellulolytic enzymes of seven bacterial strains isolated from marine sediments at different sites in the Antarctic was evaluated. Isolation of the strains was performed using serial dilutions in the culture medium at M115°C. The identification of the strains was performed using universal primers (27F and 1492R). The enzyme activity assays were performed on R2A medium, carboxy methyl cellulose (CMC) was added as substrate. Degradation of the substrate was revealed by adding Lugol. The results show that four of the tested strains produce enzymes which degrade CMC substrate. The molecular identifications, showed that these bacteria belong to the genus *Streptomyces* and *Pseudoalteromonas*, being *Streptomyces* strain who showed the highest activity. Only some bacteria in marine sediments have the ability to produce these enzymes, perhaps due to their greater adaptability to degrade at temperatures bordering zero degrees Celsius, some algae that are abundant in this environment and have cellulose as the main structure. The discovery of new enzymes adapted to cold is of great industrial interest, especially for paper, textiles, detergents, biofuels, food and agriculture. These enzymes represent 8% of industrial demand worldwide and is expected to increase their demand in the coming years. Mainly in the paper and food industry are required in extraction processes starch, protein and juices, as well as the animal feed industry where treating vegetables and grains helps improve the nutritional value of the food, all this clearly puts Antarctic microorganisms and their enzymes specifically as a potential contribution to industry and the novel biotechnological applications.

Keywords : antarctic, bacteria, biotechnological, cellulolytic enzymes

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