Research projects for MSc theses

Impact of seawater acidification in starfish regeneration – a proteomic approach

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Area of research
Organ/tissue regeneration
Marine ecology
Proteomics

Project summary
The potential for regeneration has its maximum expression in echinoderms. Preliminary studies of regeneration in echinoderms were based on the determination of growth rates and on the morphological, histological and cellular basis of this phenomenon. More recently, some advances have been made in the characterization of the molecular mechanisms involved in the process of regeneration of tissues and organs. Studies that have been developed in our laboratory focus on a star-fish species common in coastal areas of the North Atlantic and with high regeneration capacity, the Asterias rubens. Behavioral assays allowed to observe differences in the regenerative capacity of this species exposed to different seawater pH values. No information on the effects of ocean acidification, inherent to the process of global warming, are available for the pH homeostasis in echinoderms. Understanding the capabilities of acid-base regulation is important because of the dependence of the formation and maintenance of the calcium carbonate skeleton and, consequently the regeneration process of these species.
This information is successfully obtained by analysis of differential proteomes, ie by comparison of protein expression levels between intact and amputated specimens in different environmental conditions. The process of handling sea-stars, including the amputation of the radial nerve and tissue collection were made at the Sven Lowen Marine Station (University of Gothenburg, Sweden). Protocols have also been developed for preparing protein extracts for various tissues.
The intention of the proposed theme is the identification of which metabolic processes are affected by exposure of A. Rubens to seawater with different pHs and the impact of environmental conditions on the regeneration of this species. Will be used differential proteomic approach for the detection of differentially expressed proteins in the coelomic fluid and its subsequent identification by mass spectrometry MS or MALDI-TOF/TOF LC-ESI-MS/MS.

Research project that includes this study: PTDC/MAR/104058/2008
References:
CF Franco; R Santos; AV Coelho Exploring the proteome of an echinoderm nervous system: 2DE of the sea star radial nerve cord and the synaptosomal membranes subproteome, Proteomics (2011) 11(7), 1359-1364

