

# Master Thesis proposal

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Lab/Institution: Mass Spectrometry - ITQB

**TITLE: Dynamics of circulating asterosaponins during starfish regeneration: evaluation of antimicrobial activity**

## **BACKGROUND**

The potential for regeneration, including the central nervous system, 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 regeneration process of tissues and organs. Studies that have been developed in our laboratory focus on a starfish species common in Portuguese coastal areas and with high regeneration capability, the *Marthasterias glacialis* species. Coelomic fluid, the main intra-tissue communicating medium in echinoderms, contains a variety of asterosaponins, sulfated steroidal oligosaccharides, whose composition was shown to vary during the regeneration process in our previous works. Additionally to promising signaling molecules, a number of other biological activities including antimicrobial and antiviral activities, have been attributed to these compounds. These activities are relevant to protect the animals during the wound healing process and initial arm regrowth.

Current European marine biotech initiatives are strongly focused on identifying novel molecules with significant potential interest for human health. The enormous diversity of marine species has been providing a relevant number of those biocompounds.

R Laires "Tandem Mass Spectrometry - Molecular Characterization" (2013) InTech, ISBN: 978-953-51-1136-8; C Franco et al J Proteomics (2014), 99: 1-25; C Franco et al Proteomics (2013), 13, 686-709 (Review article); F. Pietra "A Secret World: Natural Products of Marine Life" (2013) Birkhäuser, Switzerland, ISBN: 3034875312, 9783034875318

## **OBJECTIVES**

The composition of the coelomic fluid in asterosaponins during the regeneration process in *Marthasterias glacialis* will be characterized by mass spectrometry and HPLC, using protocols already established. Antimicrobial activity of the studied fractions will be evaluated using a diversity of bacterial species.

## **PROJECT DESCRIPTION**

Task 1: Handling of animals, induction of regeneration and collection of coelomic fluid will be made at the Aquário Vasco da Gama (Dafundo, Oeiras).

Task 2: Extraction of asterosaponins will be performed by solid-phase extraction (SPE) according with an already developed protocol.

Task 3: Mass spectrometry and HPLC protocols will be used for the characterization of the detected

**TIMELINE** (use fill tool for the cells)

	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8	Month 9	Month 10
Task 1	■	■	■	■	■	■				
Task 2		■	■	■	■	■	■			
Task 3			■	■	■	■	■	■		
Task 4								■		
Task 5					■	■	■	■		
Task 6								■	■	
Thesis								■	■	■