

# **Dottorato Nazionale in Scienze Polari-**Università Ca' Foscari di Venezia-Ciclo XXXIV





# Modulation of biological responses in polar organism to environmental multiple stressors Andrea Carli

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## Introduction

Evolutionary adaptation in polar organism has produced distinctive biological pathways, which make them sensitive to quick and fast environmental changes, making them suitable biological models for investigating the synergic effects of physical-chemical stressors in polar

# Aims

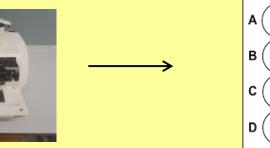
- Characterization of biological responses in artic organisms
- Development of non-lethal tissue sampling
- In-vitro ecotoxicology
- Investigation of sea anemone as unconventional sentinel

### *In-vitro* approaches

### Pedal disk PCTs





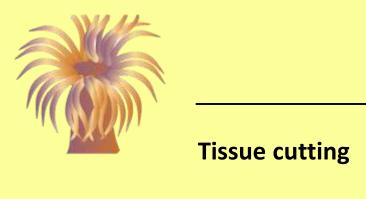


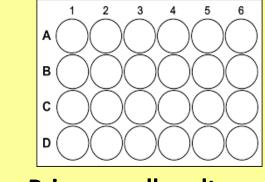
Pedal disk

**Precision cut tissue sices (PCTs)** 

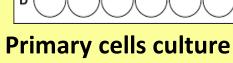
### Primary cells cultures

Vibratome





**Tentacles and pedal disk** 



### Methods

- Tentacles and marginal pedal tissue were sampled without animal sacrifice
- Tentacles cells were dissociated by enzymatic digestion and cultured
- Pedal disk tissue was cut with vibratome and tissue slices were cultured for a few days

### **Preliminary results**



- > Tentacles cells culture show three uncharacterized cells.
- Pedal disk show good results both for cell and PCTs culture.

## *In-vivo* approaches

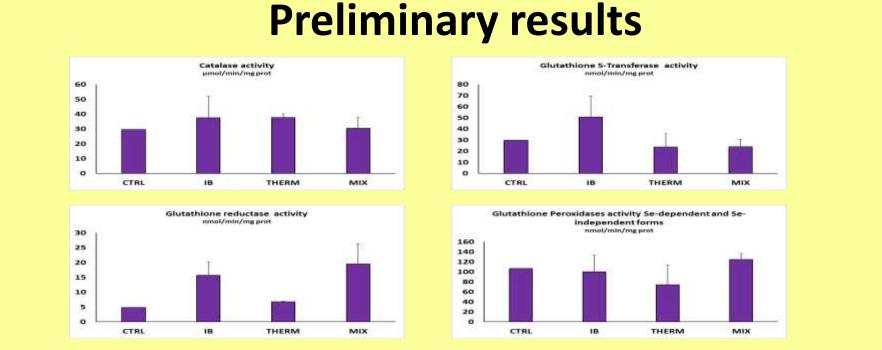
#### **Control (CTRL)**



Multiple stressors (CHEM+TEMP, MIX)

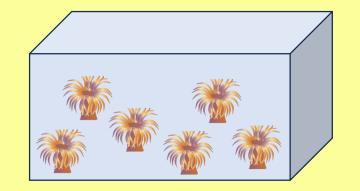
#### Methods

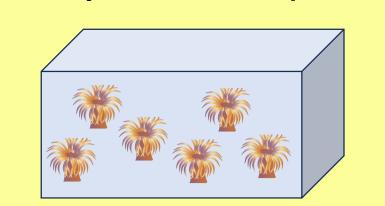
Anemonia viridis were exposed to Ibuprophen 0.5 μg/L, thermal stress (+2 C<sup>o</sup>





#### Thermal +2 C<sup>o</sup> (TEMP)





- temperature) and multiplestress (Ibuprophen and thermal stress).
- After 25 days of exposure, tentacles and basal body were collected.
- Limited responses of single antioxidants were observed in response to different environmental stressors dosed alone or in combination.
- The activities of single antioxidants are higher in tentacles than in basal body.

### **Ongoing activity**

#### In-vivo multiple stressors response in Actinia equina

- Due to his abudance and presence in Kongsfjior (Svalbard) and in Adriatic Sea it represents suitable model for investigating biological adaptation to polar environments.
- Animals will be aclimatated at 4 C° and then will be exposed to emergent contaminants such as pharmaceutical drugs and microplastics
- antioxidant system in terms of functional activities and transcriptomic profile will be evaluated both in tentacles and basal body
- The modulation of MPs ingestion will be evaluated a confocal microscope



#### *In-vitro* multiple stressors responses in Arctic sea anemones

- Three species of sea anemone will be imported alive from Vancuver Aquarium
- In-vitro multiple stressors investigation will be performed in PCTs and primary cell culture obtained from tentacles and pedal disk of these polar species



Arctic crimson anemone

**Rugose anemone** 

White-spotted rose anemone

