Determining how echinoderms respond to a high CO_2 world

Coleen Suckling (University of Rhode Island-Kingston Campus)

Project Location:
University of Rhode Island-Kingston

Project Description:
Our oceans are absorbing anthropogenic CO_2 and this process disturbs the chemical balance of seawater, removing vital carbonate ions required to scaffold calcium carbonate structures in many marine invertebrates (coined Ocean Acidification). Consequently, calcifying organisms are predicted to struggle under a future climate of high-CO_2. For populations to persist, organisms must be able to successfully develop and reproduce. Considering the timescales over which climate change is occurring, marine organisms will experience changes across years and decades. Consequently, during this time, animals will be developing, maturing and populating future generations. Few studies have considered these adult conditioning methodologies, and fewer have incorporated responses across several generations, a vital step in understanding how animals will cope and persist under a future climate.

Here is a unique opportunity to address these information gaps by measuring the reproductive success of first and second generation (F1 and F2 respectively) sea urchins bred under year 2100 CO_2 conditions. Coleen Suckling currently has histological slides of the gonad tissue of these urchins and this project will digitally record and archive these slides using light microscopy and digital imagery. Then these slides will be subject to image analysis (using Fuji, also known as ImageJ) to determine the reproductive stage of the animals (e.g. mature or spent) and to identify how nutrient loading and reproductive effort (i.e. egg size and numbers) are being prioritised. This project will contribute new information to this research field and will be applied to collaborative reproductive kinetics work with the University of Bangor's (UK) School of Ocean Sciences faculty and research students. Furthermore gonad and skeletal samples will also be similarly assessed from starfish exposed to a RI C-AIM climate change project to determine how energy is prioritised between calcification and reproductive effort.

In addition there will be general animal husbandry duties of various marine organisms within the Bay Campus Aquarium linked to various research projects within the field of aquaculture and climate change research (e.g. RI C-AIM funded projects). There will also be some general preliminary experimental trials to potentially be involved in and some general laboratory duties (e.g. assisting in equipment sourcing and processing) which provide an opportunity to expand general research and laboratory experience and skill sets.

This is an exciting opportunity to gain hands on experience with active C-AIM projects and facilities, to become familiarized with complex research issues and research tools. The student will work within the RI C-AIM's project community and their active projects which fall into several of their foci which include: i) Assessing biological and ecosystem impacts; ii) predicting ecosystem response through integration, and iii) visualization and imaging.

*This project involves **both field & lab/computer work***

Required/preferred skills for student applicant:

Reliable, driven, problem solving and enthusiastic students are strongly encouraged to apply.

Any skills of microscope photography, image processing/analysis, aquarium and/or husbandry skills would be beneficial but full training will be provided where required to expand and exercise the student's skill sets.

Student transportation needed for project?

Yes

The student would need to be able to periodically visit the Bay campus aquarium in order to conduct animal husbandry duties.