QCL WATER SCIENCE

MARE

Marine and Environmental Sciences Centre

Respiration in Stress Biology

Our laboratory has been working with stress biology for more than 10 years, addressing aquaculture improvement, climate change, pollution, and bioinvasions. Hypothesis have been tested in a vast array of organisms, from rotifers to sharks.

In a recent project, regarding crab bioinvasions, respirometry was added as a physiological proxy of stress, in addition to other well-established individual and sub-cellular endpoints related to behaviour, bioenergetics, detoxification, and oxidative stress.

Bioinvasions are modulated by organismal acclimation and plasticity to their surrounding environment, integrating both underlying coping mechanisms and species interaction. In this project, our goal was to investigate native and invaders plasticity to pollution.

Experimental Set-up

To address this goal, we measured a range of individual and sub-cellular parameters on native and invasive crabs exposed to a new generation pesticide, under controlled hydrological parameters (temperature, salinity, and pH).

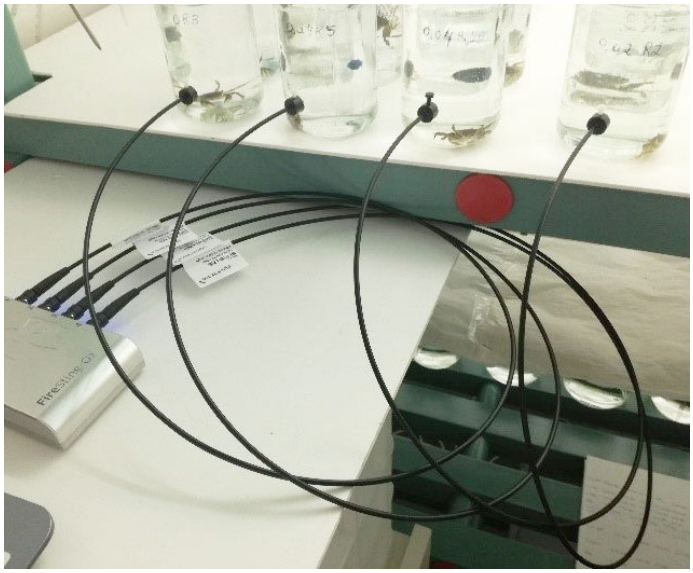

Fig. 1 4 channel oxygen meter FireSting oxygen meter connected to a PC, with optical fibres connected via adapters to experimental chambers (sealed glass container with crab) for contactless read-out of integrated oxygen sensor spots

Respiration rate, as an organismal-level measurement, was assessed using PyroScience sensor technology. The employed setup encompassed a FireSting 4 channel oxygen meter, optical fibres with integrated lens and oxygen sensor spots.

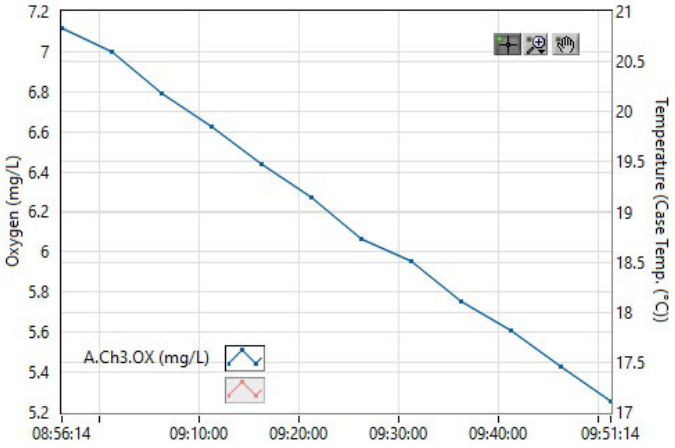

Fig. 2 Exemplary individual measurement output. Recordings were performed every 5 minutes during 1 hour

Conclusion from Data and Application

The obtained data, deriving from the high standard technological set-up and experimental design, showed that both native and invasive species' oxygen consumption was affected under pollution stress, in different ways.

Despite pesticide presence in the seawater media, read-out signal was not affected and strong in all measurements (>100). This technology allows to work with different species, life stages, sizes, and metabolic rates, while minimising organismal manipulation and handling stress.

The software is user-friendly and the calibration process meticulous but very straightforward.

Lénia Rato, Sara C. Novais, Marco F. L. Lemos

FOR MORE INFORMATION CONTACT:
QCL, Riverside, Forest Row Business Park, Forest Row, East Sussex, RH18 5DW
qclscientific.com info@qclscientific.com 01342 820820

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