A12.18 FLUORESCENT IMPLANTABLE ELASTOMER TAGS FOR THE MEASUREMENT OF OXYGEN WITHIN INSECTS

WEDNESDAY 5 JULY, 2017 **POSTER SESSION**

ANNE B ROBERTSON (UNIVERSITY OF BRITISH COLUMBIA, CANADA), PHILIP G D MATTHEWS (UNIVERSITY OF BRITISH COLUMBIA, CANADA)

@ ANNARO@ZOOLOGY.UBC.CA

Monitoring oxygen partial pressure (PO_2) within an organism provides essential information for understanding oxygen uptake and numerous other aspects of respiratory physiology. However, in vivo measurements using current implantable O_2 probes are limited by the small size of many organisms; This study sought to develop fluorescent implantable elastomer tags (FIETs) as an alternative method for accurate measurement of PO_2 within small semi-transparent organisms. The FIETs were designed with an O_2 -permeable matrix and a fluorescent, ratiometric dye system: the fluorescence of an indicator dye (emission 650nm) is quenched in the presence of O_2, whereas the fluorescence of a reference dye (emission 530nm) does not change. A custom microfluidic chip produced highly uniform batches of spherical FIETs, with FIET diameters as small as 67µm. The FIETs response to O_2 was quantified by measuring both dyes' fluorescence intensities across a range of O_2 tensions (0-20.26 kPa) using an inverted fluorescence microscope. Our results show a linear relationship between the fluorescence ratios and PO_2 (R^2 =0.963), although over time photobleaching causes an apparent drift in the PO_2 signal. Next, we will demonstrate the FIETs' use in a biological context and observe whether auto-fluorescence interferes with their accuracy.

A12.23 HIGH COST OF CALCIFICATION AND UNEXPECTED INTRACELLULAR ADAPTATIONS IN MARINE MUSSELS LIVING AT EXTREMELY LOW SALINITY IN THE BALTIC SEA

WEDNESDAY 5 JULY, 2017 **POSTER SESSION**

TRYSTAN SANDERS (GEOMAR, GERMANY), JÖRN THOMSEN (GEOMAR, GERMANY), JENNIFER NASCIMENTO SCHULZE (GEOMAR, GERMANY), LARA SCHMITTMANN (GEOMAR, GERMANY), CHRISTIAN BOCK (ALFRED WEGENER INSTITUTE, GERMANY), FRANK MELZNER (GEOMAR, GERMANY)

@ TSANDERS@GEOMAR.DE

The steep salinity gradient from 30psu to 6psu in the Western Baltic Sea provides an excellent system to investigate adaptation to low salinity in marine calcifying invertebrates. Climatic models predict a desalination of the Baltic Sea over the next 100 years and a shifting of the salinity gradient further west increasing the osmotic stress on marine organisms, such as the blue mussel, already living at the edge of their environmental tolerance range. Metabolomic analysis using ^{1}H-NMR spectroscopy was used to investigate changes in intracellular organic osmolytes and energy budgets from different populations were measured following long-term acclimation. Results reveal that extremely low salinities (6 psu) do not elicit significant alterations in whole animal oxygen consumption; however the energetic cost of calcification is dramatically increased 2-3 fold. This is mirrored by strongly elevated metabolic rates of mantle tissue, the tissue responsible for shell secretion. Contrary to expectations, intracellular organic osmolyte analysis showed that at the same salinity, low salinity adapted populations maintain lower concentrations of the main osmolytes taurine, glycine and aspartate compared to high salinity adapted populations. Ongoing work focuses on analyzing intracellular inorganic ion concentrations to see if reduced external salinity elicits similar patterns of change as with organic osmolytes. These findings present some potential costs of adapting to life in an extremely dilute environment as well as the ability for marine mussels to drastically change their intracellular environment.

A12.24 TEMPORAL ASSESSMENT OF METABOLIC RATE, AMMONIA DYNAMICS AND ION-STATUS IN COMMON CARP DURING FASTING: OPTIMIZING FASTING PERIOD PRIOR TO TRANSPORT

WEDNESDAY 5 JULY, 2017 **POSTER SESSION**

JYOTSNA SHRIVASTAVA (UNIVERSITY OF ANTWERP, BELGIUM), AMIT KUMAR SINHA (UNIVERSITY OF ANTWERP, BELGIUM), SARAH CANNAERTS (UNIVERSITY OF ANTWERP, BELGIUM), ELINE VERROSTTE (UNIVERSITY OF ANTWERP, BELGIUM), RONNY BLUST (UNIVERSITY OF ANTWERP, BELGIUM), GUDRUN DE BOECK (UNIVERSITY OF ANTWERP, BELGIUM)

@ JYOTSNA.SHRIVASTAVA@UANTWERPEN.BE

The objective of this study was to evaluate an ideal fasting period prior to the fish transportation. For this purpose, common carp *(Cyprinus carpio)* were progressively fasted up to 14 days. Temporal effect of fasting on oxygen consumption rate (MO_2), ammonia excretion rate (J_{amm}), plasma ammonia (T_{amm}), plasma ions, branchial Na^+/K^+-ATPase (NKA) and H^+-ATPase activity, as well as branchial mRNA expression of NKA, H^+-ATPase, Na^+/H^+ exchanger (NHE-3) and Rhesus (Rh) glycoproteins were assessed. Results show that MO_2 and J_{amm} were considerably depressed from 4-6 days of fasting onwards. This coincided with the onset of higher resting plasma T_{amm} from day 6 onwards, possibly because in fasted fish the basal expression levels of Rhcg-a and Rhcg-b were only maintained up to 6 and 8 days respectively, after which a down-regulation was recorded. Plasma [Na^+] and [Cl^-] were temporarily reduced during 4-8 days of fasting, while an augmented [K^+] was evident. The transcript level of NHE-3 was raised in 12-14 days fasted fish, which along with up-regulation in Na^+/K^+-ATPase activity and mRNA expression facilitated the recovery of [Na^+] to control level. First signs of energy store depletion in liver, especially glycogen, were recorded from day 8 onwards. Overall, these data suggest that the beneficial reduction of metabolic rate (MO_2 and J_{amm}) started at 6 days of fasting. Interestingly, at this time fish were still able to regulate ammonia transport efficiently, and did not compromise their energy stores yet. Therefore, we propose 6 days as an ideal fasting period before transport.