A9.6 PLASTIC RESPONSES TO DIEL THERMAL VARIATION IN JUVENILE GREEN STURGEON, *ACIPENSER MEDIROSTRIS*

WEDNESDAY 4 JULY, 2018 **11:45**

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Human-induced thermal variability can disrupt energy balance and performance in ectotherms; however, phenotypic plasticity may act as a safeguard. Ectotherm performance can be maintained in thermally heterogeneous habitats by reducing the thermal sensitivity of physiological processes and concomitant performance. We examined the capacity of juvenile green sturgeon (*Acipenser medirostris*) to respond to daily thermal variation. Juveniles (47 days post-hatch) were exposed to either stable (15 ± 0.5°C) or variable (narrowly variable: 13-17°C day^{-1} or widely variable 11-21°C day^{-1}) thermoperiod treatments, with equivalent mean temperatures (15 ± 0.5°C), for 21 days. Growth (specific growth rate, % body mass day^{-1}), upper thermal tolerance (critical thermal maxima) and the thermal sensitivity of swimming performance (critical swimming speed, U_{crit}) were assessed in fish from all treatments. Accelerated growth was observed in fish maintained under widely variable temperatures compared to narrowly variable and stable temperatures. No significant variation in critical thermal maxima was observed between thermoperiod treatments, suggesting all treatment groups acclimated to the mean temperature. Swimming performance of sturgeon in the widely variable treatment was insensitive to temperature and U_{crit} was maintained across a widened thermal breadth. In combination, these findings suggest juvenile *A. medirostris* are resilient to daily thermal fluctuations, within the temperature range tested here.

A9.7 WILD BOAR COMPENSATE LACK OF UNCOUPLING PROTEIN WITH MUSCLE-BASED NONSHIVERING THERMOGENESIS

WEDNESDAY 4 JULY, 2018 **12:00**

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While it is well understood how small placental mammals are able to maintain an optimal body temperature even in cold environments by using nonshivering thermogenesis (NST) via the uncoupling protein 1 (UCP1) in brown adipose tissue (BAT), only ~20% of endothermic species actually possess BAT. Recently, a second mechanism of NST in muscle has been found in laboratory mice that could also play a role in thermoregulation in species lacking BAT and UCP1-mediated NST. The mechanism is based on the activity of an ATPase pump in the sarcoplasmatic reticulum (SERCA1a). Under normal conditions SERCA1a is involved in muscle contraction via transport of Ca^{2+}-ions, but can be uncoupled by the protein sarcolipin, resulting in increased ATP-hydrolysis and heat production in muscle through SERCA1a activity without muscle contraction. To establish whether SERCA1a and sarcolipin are involved in thermoregulation of species lacking BAT, we temporarily removed new-born wild boars that naturally lack BAT and the UCP1-dependent NST, from their mothers within the first 24 hours after birth and again four days later to sample muscle tissue for analysis of SERCA activity as well as gene expression of SERCA1a and sarcolipin. Furthermore, we measured body temperature regulation, shivering and energy expenditure of piglets during mild cold-exposure. Taken together, our data suggest that SERCA1a and sarcolipin are involved in thermoregulation of juvenile wild boars and suggest that muscle NST is the primary mechanism of heat production during cold-exposure in large mammals lacking BAT.

A9.8 COMPARATIVE SENSITIVITY OF *CRASSOSTREA ANGULATA* AND *CRASSOSTREA GIGAS* EMBRYO-LARVAL DEVELOPMENT TO AS UNDER VARYING SALINITY AND TEMPERATURE

WEDNESDAY 4 JULY, 2018 **12:15**

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Oysters embryonic development is the most vulnerable stage to climate change related stressors (salinity and temperature shifts) and to pollutants (arsenic), and therefore represents the most important bottleneck that define populations' survival in a changing environment. Considering this, the present study assessed the impacts induced on embryo-larval development of two important oyster species, *Crassostrea angulata* and *Crassostrea gigas* under the eminent threat of climate change and increase of pollution worldwide. For this, embryotoxicity was evaluated under different salinity (20, 26 and 33), temperature (20, 24 and 28ºC) and arsenic (As) (0, 30, 60, 120, 240, 480, 960 and 1920 µg. As L^{-1}) combined exposures.

In *C. angulata*, embryo-larval development was successful at a narrower range of both salinity and temperature (optimum salinity 26, and 24ºC), compared to *C. gigas* (20-32 salinity, 20-28ºC). Overall, As induced higher embryotoxicity to *C. angulata* (EC50=39 µg. L^{-1}), with EC50 values at least an order of magnitude lower than those determined for *C. gigas* (EC50=451 µg. L^{-1}) at standard salinity and temperature.

As toxicity (EC50) was influenced by both salinity and temperature in both species, but salinity had a greater influence on embryos' sensitivity to As. This pattern was mostly noticed for *C. gigas*, with lower salinity inducing higher sensitivity to As. The present findings suggest that *C. angulate* populations are likely to become more vulnerable under near future predictions for temperature rise, salinity shifts and arsenic pollution.