A5.12 IDENTIFICATION OF RESPONSIVENESS ACID-BASE MARKERS IN EMBRYONIC TELEOSTS UNDER CO_2-DRIVEN SEAWATER ACIDIFICATION

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Elevated atmospheric CO_2 has lately caused considerable effects on marine ecosystems and leads to shifts of pH value in ocean. For those athletic marine animals, teleosts are well known as strong acid-base regulators that are capable of accumulating HCO_3- in body fluids to fully compensate for CO_2 induced acid-base disturbances. In this study, we monitored developing appearances and transcripts expression profiling involved in acid-base regulation to study the effects of CO_2-driven seawater acidification on two euryhaline medaka sister-species, the freshwater medaka *Oryzias latipes* (Japanese medaka), and the marine medaka *Oryzias melastigma* (Indian medaka). Our results demonstrate that, on one hand, *O. latipes* embryos respond with delayed development during the time window of 2-5 dpf when exposed to a seawater pCO_2 of 0.12 and 0.42 kPa. On the other hands, the growth bottleneck appearance in marine species *O. melastigma* is not significant as O. *latipes*. Moreover, transcripts levels of anion exchanger 1b (AE1a), Na^+/HCO_3-exchanger a (NBCa) and carbonic anhydrase 15 (CA15) were found to be both up-regulated in these two species for controlling of bicarbonate homeostasis during ambient hypercapnia. And the proton secretion pathway is as well achieved via apical Na^+/H^+-exchanger (NHE) in epithelium as this SLC9 protein member is thermodynamically favorable due to high external [Na^+] compared to low intracellular [Na^+] in the marine environment. Consequently, the present study elucidates that HCO_3- and pHi modulations could provide a homeostatic basis in early embryonic teleosts to cope with CO_2-driven seawater acidification.

A5.13 FASTING IN THE 'BIG SPENDER' LAKE MAGADI TILAPIA AFFECTS IONOREGULATION RATHER THAN ENERGY BUDGET

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Lake Magadi, Kenya is one of the most extreme aquatic environments on earth (pH~10, anoxic to hyperoxic, high temperatures). Alcolapia grahami, the only fish surviving in the lake is the only known 100% ureotelic teleost and it shows among the highest aerobic metabolisms seen in fish. For food, they largely depend on available cyanobacteria. This food limitation, combined with their high metabolism, often gives them a skinny appearance. During a 5-day starvation period, metabolic rates actually increased, but urea excretion remained stable leading to a lower nitrogen quotient as expected when devoid of their N-rich food source. Tissue protein levels tended to decrease after a 5-day fast. Fish relied heavily on carbohydrates with lowered plasma glucose, lactate and muscle glycogen. However, fish were not able to maintain ion homeostasis with reduced plasma osmolarity and Na (but not Cl) levels, despite increased expression levels of gill, gut and kidney Na/K ATPase. In contrast, expression of gill and gut urea transporters reduced, as did gill Rhesus glycoprotein Rhbg and Rhcg. Even though Lake Magadi tilapia do not excrete ammonia, it still plays a vital role in protein metabolism. The reduction in gill glutamine synthetase concomitant with the reduction in Rh glycoprotein indicates reduced nitrogen metabolism. Gill pavement cells showed a reduced surface area as they lost the microridges on their surface. As suggested by Wood and co-workers in 2002 (*Physiol. Biochem. Zool.* 75) iono- and acid-base regulation demands a substantial amount of energy in these fish, and was compromised during food deprivation.