The role of alternative isoforms as an evolutionary strategy for mitigating potential conflicts between osmoregulation and other physiological systems

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Dietary uptake of many nutrients is coupled to the movement of ions, and thus there is substantial potential for interactions between environmental salinity and nutrient acquisition in fish. These conflicts are likely to be particularly acute for euryhaline fish species that move between freshwater and seawater environments. For example, the major route of dietary nitrogen uptake is via a proton-coupled di- and tripeptide intestinal transporter (PepT1). We have examined peptide uptake in a euryhaline teleost, *Fundulus heteroclitus*, acclimated to either fresh- or seawater. We found that these fish possess two distinct genes coding for PepT1, with both isoforms expressed in freshwater and only one in seawater. These isoforms have distinct proton dependence, suggesting that they are optimized to function under the differing conditions found in the gut in freshwater and seawater fish. In addition, the abundance of both of these isoforms is regulated by feeding and fasting, which may play a role in changes in nutrient assimilation efficiency. The presence of multiple isoforms with distinct properties represents an important strategy for the evolution of euryhalinity.