

Effect of environmental change on the expression of urea cycle enzymes and nitrogen transporters in the amphibious fish

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The rockskipper blenny, *Andamia tetradactyla*, is an air-breathing fish inhabiting the tropical supratidal zone. In the present study, we investigated nitrogen metabolism of the blenny in relation to terrestriality using molecular and physiological techniques. The blenny kept in the laboratory excreted urea that is about 20% of nitrogen eliminated in the ambient water. When they were continuously kept out of water for 10 hrs, urea but not ammonia concentration increased significantly in the plasma and urine. On the contrary, there were no significant changes in the blenny kept in seawater. During air exposure messenger RNA expressions of the urea cycle enzymes, carbamoyl phosphate synthase III and arginase I, were increased in the liver. Then, ammonia and urea transporters (Rhbg, Rhcg and UT) were cloned and their mRNA expressions were observed in the gill, gill chamber, integument and kidney. Expression of UT mRNA was increased in the kidney but not gills. Although the rockskipper is predominantly ammoniotelic, the fish turned towards ureotelism from ammoniotelism and detoxifies and stores potentially toxic end products of metabolism during air exposure. In addition to the conversion from ammoniotelism to ureotelism, the expression of UT may be account for the urea retention during air exposure.