**Abstract**

The ability of fish colonize a large variation of biotopes is integrally related with the striking molecular and functional differentiation in their enzyme systems. *Clariasgariepinus* is an ideal model for investigating molecular adaptations in enzyme systems to extreme environmental conditions. The fish is an air breathing fish with branched gill filaments, thick gill rods, and fused secondary lamellae, all indicating that the fish is poorly adapted for water breathing life. Generally, for fishes, air exposure involves many biochemical changes like respiratory acidosis, alkalosis, ammonia excretion and blood pressure changes. Increasing vascular resistance and collapse of gills due tom gravity is also a serious problem. Similarly, forced submersion induces bradycardia, slowing of heart rate and decrease of blood oxygen level. A number of enzyme systems and molecular mechanisms mediate these defense strategies.

In *Clariasgariepinus*, 9 h air-exposure and 24 h submersion unfolds many enzymatic hanges. Protein synthesis in heart, liver, kidney, brain, muscle, stomach and eyeballs is severely altered the acid phosphatase content of stomach and eyeballs increased significantly (P<0.05). All other organs registered depression. The alkaline phosphatase activity of gills, art, liver, kidney, brain, muscle and stomach exhibited suppression. Significant cumulations (P<0.05) of Na K" ATPase in the gills, kidney and eyeballs were recorded. Ca dependent ATPase increased in the heart, muscle, stomach and eyeballs. The

ATPase is elevated only in the eyeballs.Since stress induced anoxia in the cells, the aerobic energy input is severely impaired gesting drastic reductions in the various forms of the cell work. In the present work, lies on brain in particular, but also on liver cells, have documented reductions in severalkey processes that drive ATP utilization, transmembrane ion leakage, electrical activity, and protein synthesis. In the language of the field, these have been referred to respectively as channel arrest, spike arrest and transnational arrest (Hochachka*et al*., 1996). The molecular implications of these enzyme modulations are discussed.