**Abstract**

Many facultative air-breathing fishes augment their supply by utilizing a modified swim - bladder to breathe air. However, there is no direct evidence for the involvement of air bladder in the respiratory functions of any Indian air-breathing fish. Therefore, the present investigation was undertaken to study the environment-induced changes in the bimodal gas exchange and blood characteristics of *Mystuspunctatus*.

Fish is a facultative air-breather. The air bladder extracts 27% of Оxygenfrom air under bimodal conditions. One-hour air exposure increased the air bladder Оxygenconsumption to 39%. 96 h starvation increased the gill respiration (70.5%) 35°C exposure increased the airbladder uptake to 34.18%. 96 h hypoxic exposure increased the gill respiration to 70.19%. Except blood glucose, RBC, Hb, Ht, О capacity, MCV, MCHC and MCH are more in male fishes than the females. One hr air- exposure decreased the, RBC, Hb, Ht, Оxygen capacity and blood glucose. Air exposure stress increased the MCV, MCHC and MCH. Present study demonstrates that environmental stress has pronounced effect on the bimodal exchange and hematology of *Mystuspunctatus*.