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## **Effect of aerial O<sub>2</sub> partial pressure on bimodal gas exchange and air-breathing behaviour in *Trichogaster leeri***

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### **Abstract:**

The effects of experimental alterations of aerial O<sub>2</sub> partial pressure ( $P_{O_2,air}$ ) on bimodal gas exchange and airbreathing behaviour were investigated in the aquatic airbreathing fish *Trichogaster leeri* in normoxic water. Fish responded to increasing  $P_{O_2,air}$  by decreasing air-breathing frequency, increasing aerial O<sub>2</sub> consumption rate ( $V_{O_2}$ ), increasing mean O<sub>2</sub> uptake per breath ( $V_{O_2}/breath$ ) and decreasing aquatic  $V_{O_2}$  to maintain a constant total  $V_{O_2}$ . The rate of oxygen uptake from the air-breathing organ (ABO) during apnoea ( $V_{O_2,ap}$ ) was derived on a breath-bybreath basis from  $V_{O_2}/breath$  and apnoea duration.  $V_{O_2,ap}$  and estimates of ABO volume were used to calculate the  $P_{O_2}$  in the ABO at the end of apnoea. This increased with increasing  $P_{O_2,air}$ , suggesting that ABO- $P_{O_2}$  is not regulated at a constant level by internal chemoreceptors. Furthermore, mean  $V_{O_2,ap}$  increased with increasing  $P_{O_2,air}$ , indicating that the observed increase in  $V_{O_2}/breath$  with increasing  $P_{O_2,air}$  was facilitated not only by an increase in apnoea duration but also by an increase in the air–blood  $P_{O_2}$  gradient.

Key-words: Fish, respiration, air-breathing, bimodal gas exchange, aerial O<sub>2</sub>, air-breathing organ, O<sub>2</sub> chemoreceptor