

The Respiratory Challenges Imposed by Gill Remodelling in Fish

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Several species of fish including goldfish and crucian carp, exhibit profound reversible remodelling of the gill in response to changes in ambient temperature or dissolved oxygen levels. Specifically, the lamellae which are typically exposed at temperatures exceeding $\sim 15^{\circ}\text{C}$, may become covered at lower temperatures owing to the infiltration of a mass of cells within the interlamellar regions (termed the interlamellar cell mass or ILCM). The ILCM is highly labile and can be retracted under conditions (e.g. hypoxia, exercise) necessitating a greater functional lamellar surface area. While increasing surface area presumably benefits respiratory gas transfer, the osmorespiratory compromise predicts deleterious consequences on salt and water balance. This talk will focus on the causes and consequences of gill remodelling in fish with specific emphasis on i) the proximate cues promoting morphological adjustments and ii) the consequences of these adjustments on respiratory gas transfer, control of breathing and ionic regulation.