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Metabolic response to increasing environmental temperature in the invasive mussel *Limnoperna fortunei*

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Abstract:

Plasticity and variability of morphological and physiological traits are common characteristics that allow invasive species to survive, establish and spread to new environments. In order to study the metabolic response of the invasive mussel *Limnoperna fortunei* (Dunker) (Mytilidae), which has spread through South America and Asia, oxygen consumption was measured under three different acclimation temperatures (18, 22 and 27°C). After an acclimation period of at least 7 days, oxygen consumption was measured and analysed as functions of length and mass. Biochemical composition was also investigated on specimens collected under natural conditions. Environmental scanning electron microscopy determined that the elemental composition and crystalline structure of the shells were normal as described for *L. fortunei* previously. Average oxygen consumption per mussel was $1.63 \pm 0.12 \mu\text{mol O}_2 \text{ h}^{-1}$ for an average ash-free dry weight (AFDW) of $58.7 \pm 3.0 \text{ mg}$. The average standard metabolic rate (SMR) per mussel was 14.94 ± 1.30 , 30.04 ± 3.38 , and $47.10 \pm 3.54 \mu\text{mol O}_2 \text{ g}_{\text{AFDW}}^{-1} \text{ h}^{-1}$, at 18, 22 and 27°C, respectively. Significant higher SMR values were recorded at 27°C than at lower temperatures. This metabolic response allows *L. fortunei* to survive, reproduce and spread across a wide range of habitats, including tropical and subtropical environments in South America.

Keywords: golden mussel, invasive bivalve, metabolism, respiration rate, South America