

Figure S1. Explanation of the sequence of protocols used to measure individual variation in intrinsic metabolic phenotype and in sublethal tolerance of warming and hypoxia in the pacu *Piaractus mesopotamicus*, to permit investigation of correlations in tolerance and the dependence of tolerance on metabolic phenotype.

Pit Tagging

Individuals were PIT-tagged for individual recognition and then recovered for at least 96 h

Swim Test at 26 °C

Pacu were submitted to a swim performance test (Swim test) in a Steffensen-type swim tunnel respirometer, to measure traits of respiratory metabolism: standard metabolic rate (SMR_{swim}), active metabolic rate (AMR) and absolute aerobic scope (AAS). This test also established the swimming speed for their critical thermal maximum for aerobic swimming (CTS_{max}) protocol. Animals were then recovered at least 96 h.

Tolerance of warming

This was measured with two protocols. In the critical thermal maximum (CT_{max}), groups of three animals were warmed in a tub, in steps of 1 °C every 30 min until loss of equilibrium as the endpoint. In the critical thermal maximum for aerobic swimming (CTS_{max}), individuals were warmed at the same rate while swimming aerobically in the swim tunnel respirometer, with fatigue as the endpoint. In the CTS_{max} , the maximum rate of oxygen uptake during warming ($\dot{M}O_{2max}$) was also measured. In order to avoid an effect of treatment history on tolerance, 50 % of individuals were submitted to the CT_{max} first and 50% to the CTS_{max} first, with at least 96 h recovery prior to the second test.

Tolerance of progressive hypoxia

All animals were recovered for at least four weeks from the measures of warming tolerance. Respirometry in static chambers was then used to obtain a second estimate of individual SMR (SMR_{static}) over 36h. After this, individuals were exposed to progressive hypoxia by closed respirometry in the chambers, to estimate two traits of tolerance. The critical saturation for regulation of their SMR_{static} (S_{crit}) and their regulation index (RI).

Figure S2. Mean (\pm SE) rates oxygen uptake ($\text{mmol} \cdot \text{h}^{-1} \cdot \text{fish}^{-1}$) in $n = 24$ pacu during exposure to a critical temperature for fatigue from aerobic swimming (CTS_{max}) protocol (Panel A) or to progressive hypoxia (Panel B). In Panel B, the horizontal dotted line is mean standard metabolic rate ($\text{SMR}_{\text{static}}$), as measured over 36h prior to hypoxia. In the CTS_{max} protocol, mean (\pm SD) fish mass was $81 \pm 24\text{g}$ whereas approximately four weeks later, in the static respirometers, it was $106 \pm 29\text{g}$.

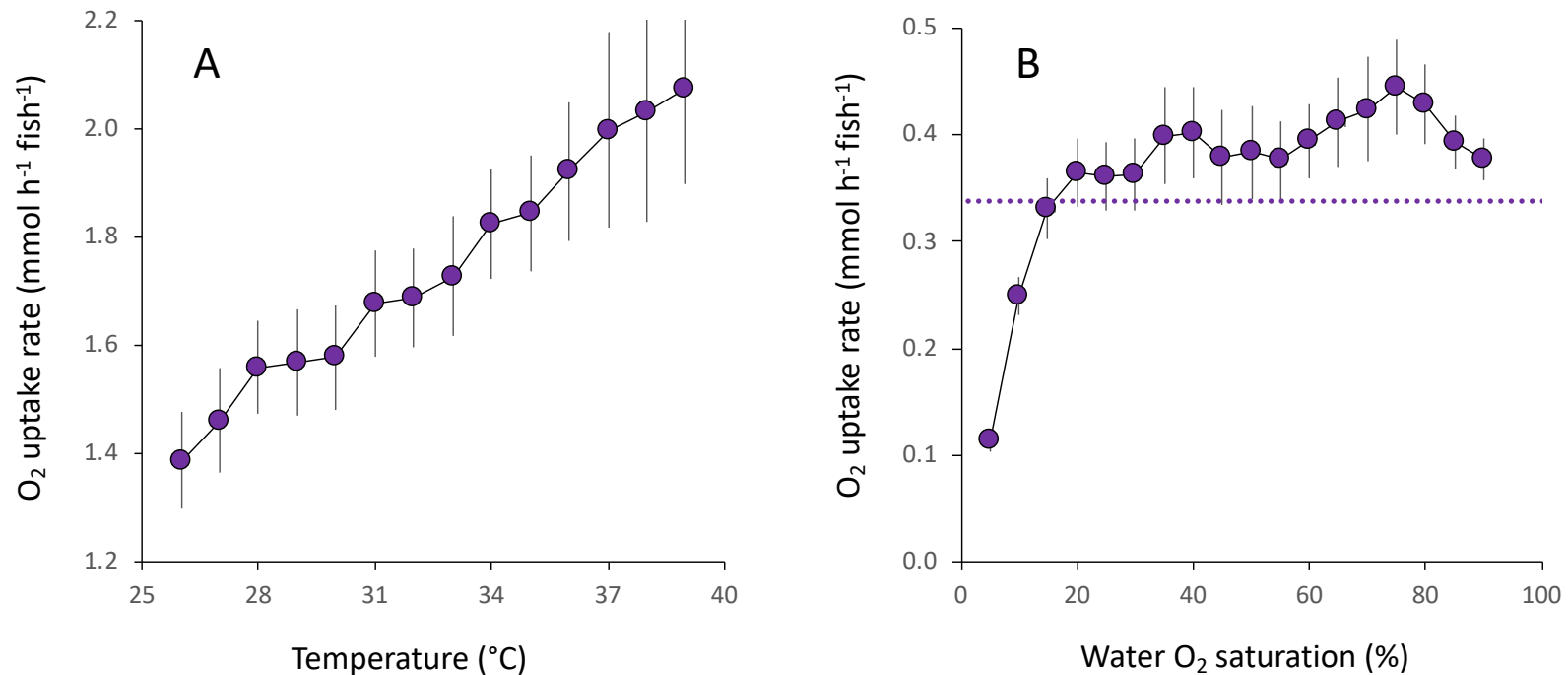
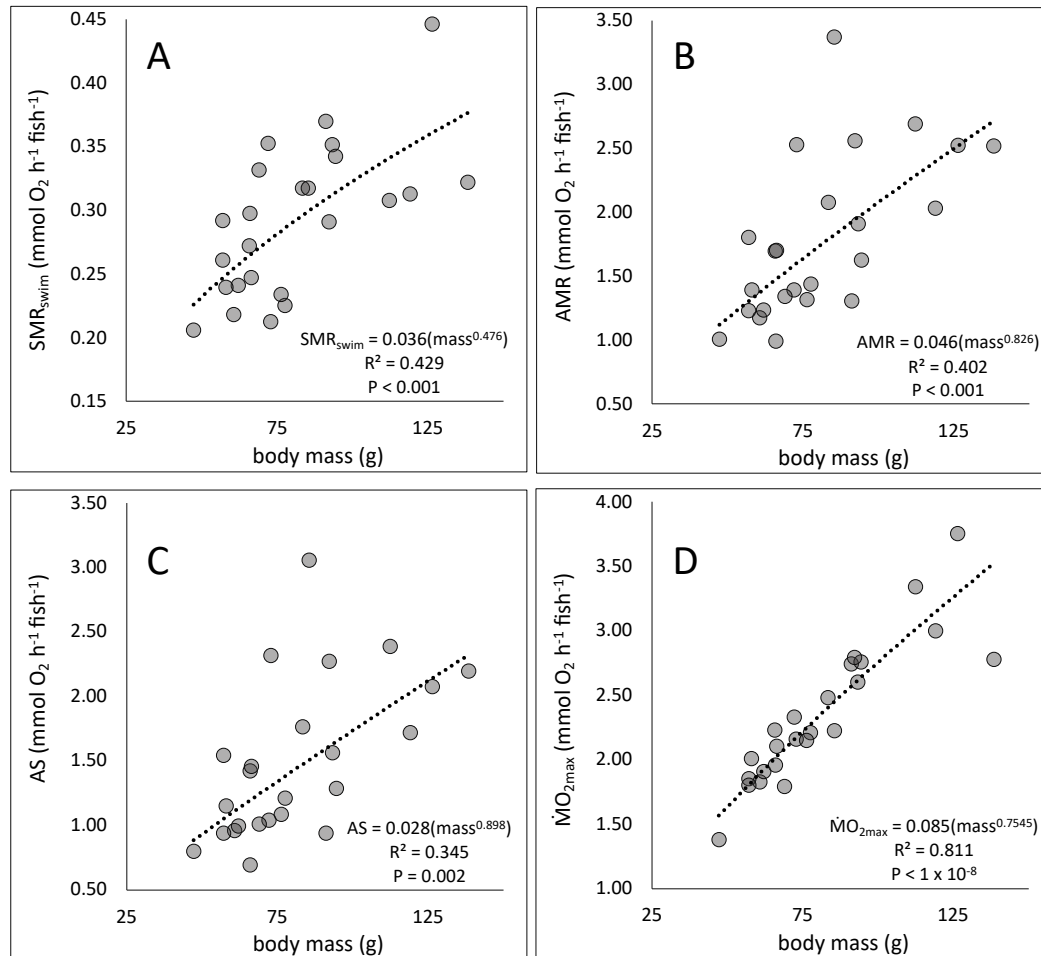


Figure S3. Power function regressions of mass-independent rate of oxygen uptake ($\text{mmol} \cdot \text{h}^{-1} \cdot \text{fish}^{-1}$) against log mass (g) for $n = 24$ pacu, for four metabolic traits measured in a swim tunnel respirometer, namely an estimate standard metabolic rate (SMR_{swim} , panel A), active metabolic rate (AMR, panel B), absolute aerobic scope (AAS, panel C), and maximum oxygen uptake rate achieved during the critical temperature for fatigue from aerobic swimming (CTS_{max}) protocol ($\dot{\text{M}}\text{O}_{2\text{max}}$, panel D). Then, the same regression against mass for SMR as measured in static respirometers ($\text{SMR}_{\text{static}}$, panel E). In the swim tunnel, mean (\pm SD) fish mass was $81 \pm 24\text{g}$ whereas approximately four weeks later, in the static respirometers, it was $106 \pm 29\text{g}$. Panel F shows the significant correlation of residuals for SMR_{swim} (calculated for a mass of 80g) and $\text{SMR}_{\text{static}}$ (calculated for a mass of 100g), the dotted red line indicates a 1:1 slope.

Swimming Respirometry



Static Respirometry

