2k brief Environmental MiP
https://wiki.oroboros.at/index.php/O2k-Publications:_RONS:_Oxidative_stress
High-resolution respirometry: oxidative stress, brain, fish

OROBOROS INSTRUMENTS

Electron transfer and ROS production in brain mitochondria of intertidal and subtidal triplefin fish (*Tripterygiidae*)

Jules B. L. Devaux[1] · Chris P. Hedges[1] · Nigel Birch[1] · Neill Herbert[2] · Gillian M. C. Renshaw[3] · Anthony J. R. Hickey[1]

Succinate-supported respiration but not ROS production is suppressed post anoxia reoxygenation (AR) in hypoxia-tolerant triplefin fishes.

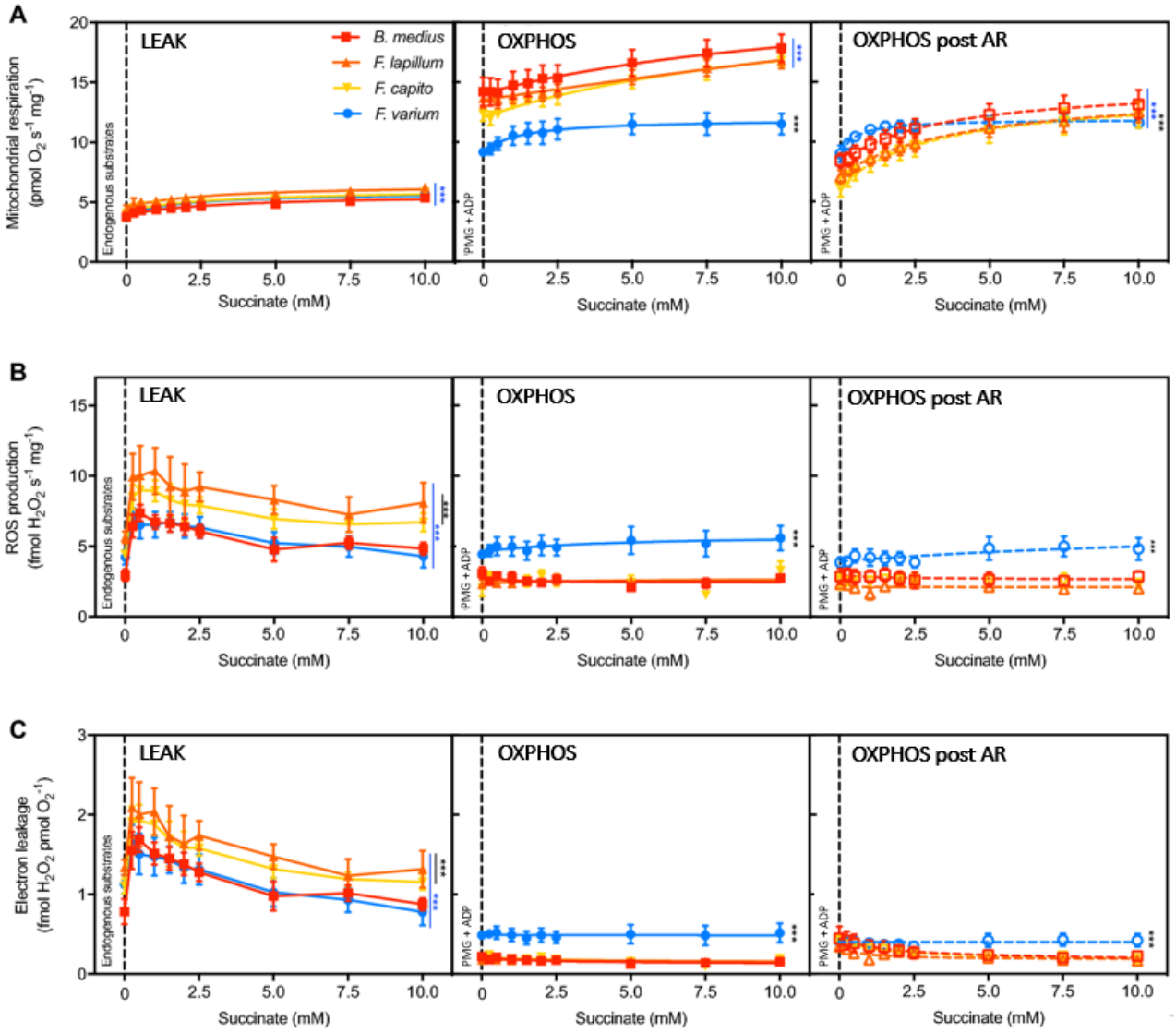

Figure 1. Mitochondrial respiration (**A**), ROS production (**B**), and electron leakage (**C**) were assessed on permeabilized brain in LEAK (endogenous substrates, no ADP nor other substrates added), OXPHOS controls (additional ADP and pyruvate, malate and glutamate - PMG) and OXPHOS post an event of anoxia reoxygenation ("post-AR") with graded succinate. Data are presented as the means of six individuals ± SEM. Warmer colors represent species with a greater hypoxia tolerance. Statistical difference is shown in black for the difference between species within a state, and blue for the difference between state within the same species, as *** for $P < 0.001$

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Dependence of reactive oxygen species production and electron leakage on oxygen tension (PO_2)

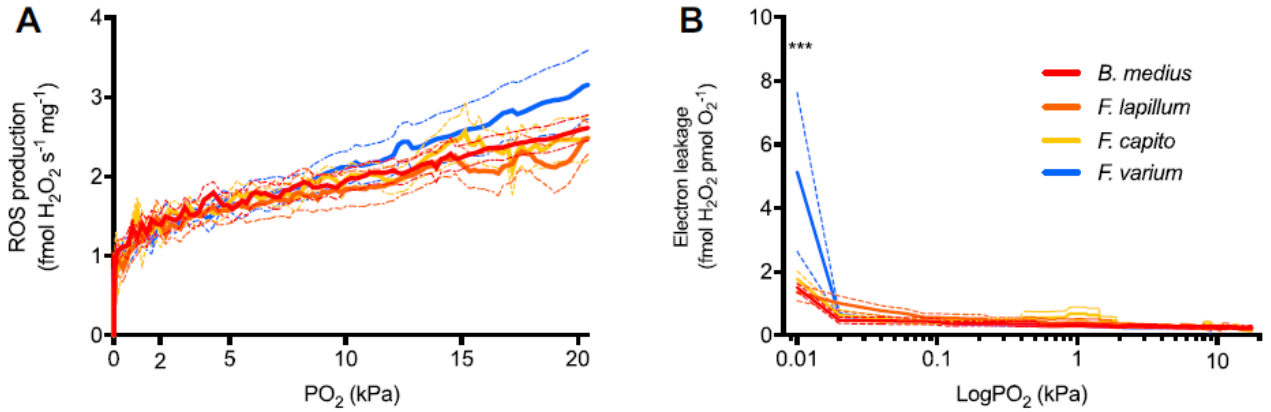

Figure 2. In permeabilized brain of four triplefin fish species with various degrees of hypoxia tolerance **(A)** ROS production and **(B)** electron leakage were assessed at decreasing PO_2 to anoxia. Data are presented as mean ± SEM of six individuals of the rock-pool species *B. medius* (red), the intertidal species *F. lapillum* (orange) and *F. capito* (yellow), and the subtidal species. *F. varium* (blue). In **B**, PO_2 was logged to appreciate the increase in electron leakage near anoxia. Data are presented as mean ± SEM (plain and dashed line, respectively).

Intertidal fish species may experience a broad range of oxygen concentrations. Diminished ROS production in intertidal triplefins compared to subtidal species appear to be a strategy against oxidative stress. While the net ROS production was similar across species at lower PO_2, the electron leakage approaching anoxia was lower in the intertidal species, indicating a tighter management of electrons in mitochondrial respiration. The ability of intertidal species to tolerate hypoxia, may be mediated by the partial suppression of succinate oxidation and associated succinate overload.

Reference: Devaux JBL, Hedges CP, Birch N, Herbert N, Renshaw GMC, Hickey AJR (2023) Electron transfer and ROS production in brain mitochondria of intertidal and subtidal triplefin fish (*Tripterygiidae*). https://doi.org/10.1007/s00360-023-01495-4

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