

Hot! Hot! Hot! The hottest fish on earth lives at mammalian metabolic rates.

Wood Chris M., University of British Columbia
Brix Kevin V., University of British Columbia
De Boeck Gudrun, University of Antwerp (presenting author)
Bergman Harold L., University of Wyoming
Bianchini Adalto, Universidade Federal do Rio Grande
Bianchini Lucas, Universidade Federal do Rio Grande
Maina John N., University of Johannesburg
Johannsson Ora E., University of British Columbia
Kavembe Geraldine D., South Eastern Kenya University
Michael B. Papah, University of Delaware
Kisipan M. Letura, Egerton University
Ojoo Rodi O., University of Nairobi

The Magadi tilapia, *Alcolapia grahami*, a small cichlid fish of Lake Magadi, Kenya lives in a soda lake, one of the most challenging aquatic environments on earth. Lake Magadi is characterized by high pH (up to 10.0), extreme alkalinity ($> 300 \text{ mmol L}^{-1}$), high temperature ($> 40^\circ\text{C}$), high levels of reactive O_2 species ($> 8 \mu\text{mol L}^{-1}$), unusual water chemistry with salinity close to 60% seawater, and large daily fluctuations in oxygen levels (severe hypoxia to hyperoxia). In contrast to most fishes which live at temperatures substantially lower than the $36 - 40^\circ\text{C}$ of mammals and birds, an isolated population (South West Hot Springs, SWHS) of Magadi tilapia thrives in fast flowing hot springs with daytime highs of 43°C and night-time lows of 32°C . Another population (Fish Springs Lagoon, FSL) lives in a lagoon with fairly stable daily temperatures ($33 - 36^\circ\text{C}$). The upper critical temperatures (Ct_{max}) of both populations are very high; moreover the SWHS tilapia exhibit the highest Ct_{max} (45.6°C) ever recorded for a fish. Routine rates of oxygen consumption (MO_2) measured on site, together with MO_2 and swimming performance at 25 , 32 , and 39°C in the laboratory, showed that the SWHS tilapia exhibited the greatest metabolic performance ever recorded in a fish. These rates were in the basal range of a small mammal of comparable size, and were all far higher than in the FSL fish. The SWHS tilapia represents a bellwether organism for global warming.

keywords: temperature tolerance, respirometry, critical swimming speed, aerobic scope

Contact: gudrun.deboeck@uantwerp.be