## CRITICAL THERMAL MAXIMUM OF THE INTERTIDAL GOBY

### *Bathygobius ramosus*


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**EXTENDED ABSTRACT ONLY - DO NOT CITE**

Temperature is one of the most important environmental factors affecting marine organisms, determining general metabolism and behavioural responses (Mora and Ospína, 2001). Temperature also influences the size and the distribution of populations as well as the structure of communities. Because of the role that temperature plays in the performance of fishes and the dynamics of the aquatic systems, thermal responses as well as studies of the resistance to temperature and thermal limits of organisms are of great interest. This is particularly true in environments where temperature varies extensively, like in the tidal pools. In these places, temperature can drive the organism further of its tolerance limits. The critical thermal maximum (CTM) is the arithmetic mean of the collective thermal points at which locomotory activity becomes disorganised and the animal loses its ability to escape from conditions that will promptly lead to its dead when heated from a previous acclimation temperature at a constant rate just fast enough to allow deep body temperature to follow environmental temperatures, without a significant time lag (Ortubay et al., 1997). In this study we determined the CTM of *Bathygobius ramosus,* a true resident of the tidal zone. CTM was estimated in 10 males (48–75 mm SL) and 10 females (49–64 mm SL) of *Bathygobius ramosus* captured in the tidal pools of Troncones, Guerrero, Mexico (17º47'16" N, 101º44'17" W). Fishes where kept in the laboratory 30 days for acclimation at 30 ± 1 °C and salinity of 34 ± 1. The device to calculate the CTM consisted of four 1–L experimental chambers immersed in a 20–L aquarium equipped with an electronic heater (± 0.1 °C). Temperature in the experimental chambers was gradually increased at a rate of 1 ºC $min^{-1}$. We calculated the CTM only for one acclimation temperature (30 °C) because this is the annual mean temperature in the tidal pools in which *B. ramosus* inhabits. Also, this is the temperature of reproduction of this species in the laboratory. The thermal stress responses (increased activity, initial loss of equilibrium, complete loss of equilibrium and death) where registered according to Becker and Genoway (1979). A *t* test ($\alpha = 0.05$) was performed to determine differences in the thermal responses among males and females. An ANOVA test was carried out to determine differences in the various stress responses in males and females of *B. ramosu*s. Values of temperature of initial loss of equilibrium (CTM), temperature of complete loss of equilibrium (TCLE) and temperature of death (TD) were not significant between sexes (Table 1).

Table 1. Mean values (ºC) and standard deviation (SD) of the CTM, TCLE and DT of 10 males and 10 females of *B. ramosus.*

| | **CTM ºC** | | **TCLE ºC** | | **DT ºC** | |
|---|---|---|---|---|---|---|
| | **Mean** | **SD** | **Mean** | **SD** | **Mean** | **SD** |
| **Males** | 39.6 | 0.3 | 41.69 | 0.46 | 42.80 | 0.26 |
| **Females** | 39.6 | 0.7 | 41.65 | 0.63 | 42.75 | 0.35 |

Significant differences exist between the CTM, TCLE and TD values of organisms ($p< 0.05$). The CTM found in this study (39.6 ºC) is similar to the value reported by Mora and Ospína (2001) for *B. ramosus* in the Gorgona Island (39.7 ºC) based on an acclimation temperature of 27°C. In this case, the temperature of acclimation has not a significant effect on the temperature level at which fish reach their CTM value. The value of the CTM gives *B. ramosus* a wide range of thermal tolerance, that enables this species to withstand rapid changes in environmental temperature, as registered in the tidal pools when the combined effect of a low tide and intense solar radiation can rise dramatically the temperature of the water. Temperature time-series records in the tidal pools of the studied area show that the highest observed value was 38ºC, 1.6 degree lower than the CTM of *B. ramosus*.

## References


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