

Temperature preference and tolerance of the spotted tilapia and Rio Grande cichlid

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With 2 figures and 6 tables in the text

Abstract

Temperature preference tests were conducted on two species of fishes (Cichlidae), the spotted tilapia, *Tilapia mariae* (BOULENGER) and the Rio Grande cichlid, *Cichlasoma cyanoguttatum* (BAIRD & GIRARD). *T. mariae* is native to the west central coast of Africa while *C. cyanoguttatum* is native to the lower reaches of the Rio Grande drainage in North America. Both of these species are now found in the freshwaters of southern Florida and may have the potential to expand their ranges. The temperature data obtained in this study will be used to help predict the maximum extent of their range expansion.

Fish were acclimated to 15, 20, 25, 30, and 35 °C for five days and then tested for their preferred temperature in a trough with a horizontal temperature gradient. The preferred temperature of *T. mariae* ranged between 25.17 and 33.04 °C and there was no significant difference ($P \geq 0.05$) among the temperatures preferred at acclimation temperatures of 25, 30, and 35 °C. The preferred temperatures, at acclimation temperatures of 15, and 20 °C however, were significantly different ($P \leq 0.05$) from each other and from the temperatures preferred by those fish acclimated to 25, 30, and 35 °C. The preferred temperatures of *C. cyanoguttatum* ranged between 27.23 and 36.75 °C and the preferred temperatures at each acclimation temperature were significantly different ($P \leq 0.05$). No regression equation could be found which adequately explained the relationship between acclimation and preferred temperature for either species.

Finally, thermal bioassays were conducted on both species to determine their ultimate upper and lower lethal temperatures and whether acclimation temperature affected these temperatures. Upper/lower lethal temperatures for *T. mariae* and *C. cyanoguttatum* respectively were 37/11 and 39/7 °C, and acclimation temperature did affect the lethal temperature.

Introduction

One of the most important environmental factors affecting fish distribution is temperature (FRY 1971, MULLER & FRY 1976, STAUFFER et al. 1976, SHRODE et al. 1982). Temperature affects the biology of a fish including its reproductive potential (KELLY 1968, BADENHUIZEN 1969), growth rate (CARLANDER 1977, LEMKE 1977), and respiratory rate (MEUWIS & HEUTS 1957, REYNOLDS 1977).

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