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The Behavioral Physiology of Labroid Fishes

by

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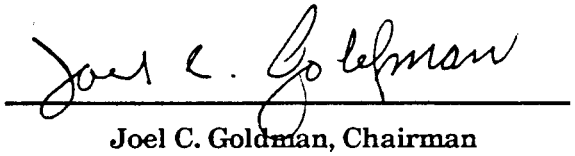

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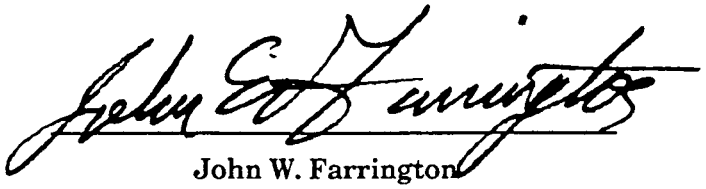

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THE BEHAVIORAL PHYSIOLOGY OF LABROID FISHES

by

Mary Carla Curran

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ABSTRACT

The family Labridae, or wrasses, is one of the most speciose fish families and is exceptional in its wide range of morphological and behavioral diversities. The cunner *Tautogolabrus adspersus* is one of two temperate-dwelling Western North Atlantic representatives of this family, and they are one of the few fishes that remain in New England waters throughout the year. In the winter, the cunner enters a state of "torpor" which has previously been described based solely on behavioral observations. The present study showed that cunner undergo physiological torpor, or hibernation, based on low oxygen consumption rates in winter, contributing to a large Q_{10} value of 8.5. It is thus established as one of the few marine species that is known to hibernate.

Cunner withstood four months of starvation at 4°C. Glycogen, lipid, and protein in the liver decreased during this period, as did the liver/body ratio, but these components did not decrease significantly in the whole-body samples. Since liver components were not exhausted, and body components were not significantly affected, cunner can withstand long periods without eating. Regression analysis predicts that they can live at least 6 months given the rate of decrease of glycogen and lipid reserves, and 9 months based on their protein reserves.

Oxygen consumption rates were monitored continuously over several days to determine diel variations in metabolic rate. The values obtained at night were significantly lower than the daytime values. Cunner did not maintain a diel cycle throughout the year; the length of this cycle varied from approximately 24 hours during warm temperatures to approximately 48 hours at temperatures generally below 8°C. Metabolic rates were more variable at warmer temperatures, which is in agreement with the expected increase in spontaneous activity.

Two tropical labroids, the wrasse *Thalassoma bifasciatum* and the parrotfish *Scarus iserti*, also had significantly higher oxygen consumption rates during the day than at night. Both hibernation and sleep are thought to be energy conserving mechanisms in fishes. The ability of labrids to sleep may have predisposed them to becoming established in temperate waters by surviving cold temperatures through hibernation.

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