

COMPARISON OF PHYSIOLOGICAL CHARACTERISTICS:
SKIPJACK TUNA (KATSUWONUS PELAMIS) VERSUS OTHER FISHES

By

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ABSTRACT

Data from experiments at the Kewalo Research Facility of the Honolulu Laboratory, NMFS, are now sufficient to confirm that the skipjack tuna (Katsuwonus pelamis) is, indeed, a "high performance" fish. This scombrid has metabolic rates that are minimally $0.5 \text{ mg O}_2 \text{ g}^{-1} \text{ hr}^{-1}$ and three to five times those of nonscombrid fishes swimming at the same speed; unlike the relationships found for typical fishes, the routine metabolic rate of skipjack tuna appears nearly independent of both temperature and body weight. Correlated with the skipjack tuna's high metabolic rate and high level of activity are several adaptations for increased oxygen uptake and transport, a high rate of food intake, and relatively low efficiency in conversion of food to flesh (5% to 10% for a 1 kg fish). The high metabolic rate and an efficient vascular apparatus for retarding heat flow from the muscle make the skipjack tuna the warmest of "warm-bodied" fishes on a per unit weight basis; the excess core temperature of skipjack tuna may exceed 6°C kg^{-1} . While such large excess temperatures may increase the efficiency of muscle operation at low ambient temperatures, large fish living in warm waters run the risk of overheating, especially

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during periods of greatest activity. Consideration of this problem suggests size-dependent limits of upper temperature distribution for skipjack tuna.