BEHAVIORAL OSMOREGULATION IN *FUNDULUS HETEROCLITUS*

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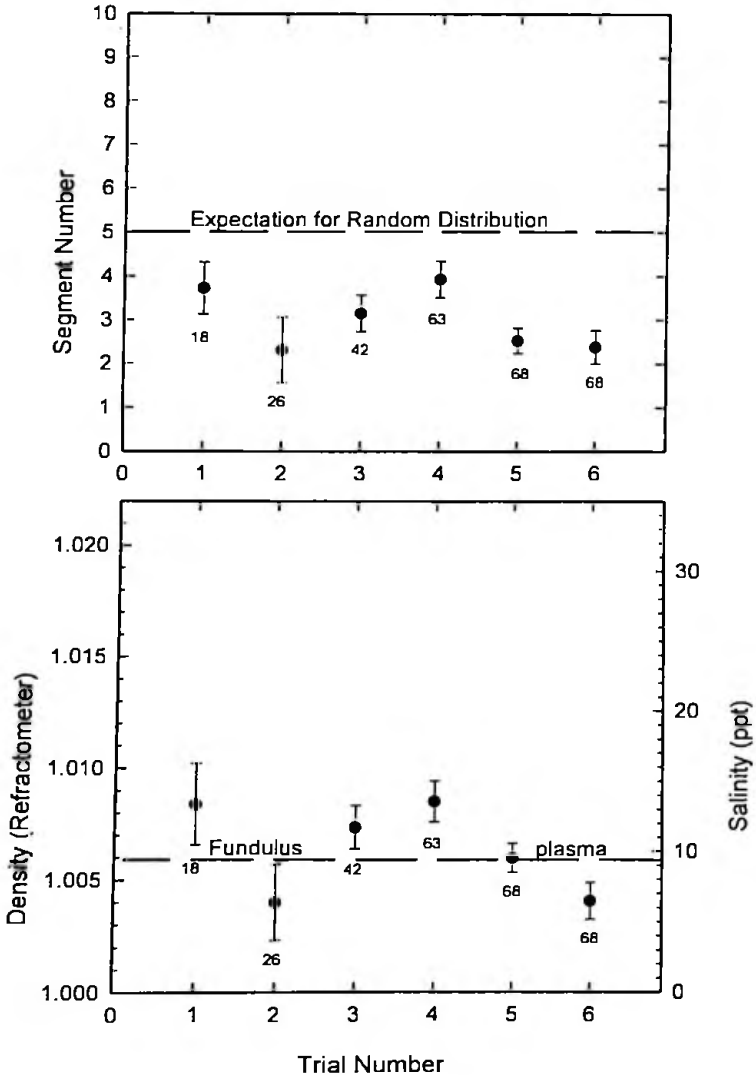
Killifish, *Fundulus heteroclitus*, can survive indefinitely in fresh or salt water. Observations (Kidder and Collier, unpublished) of fish clustering at the mouth of a fresh stream suggested that these fish might be seeking water matching their plasma osmolarity. Salinity vs. fish abundance in Northeast Creek at various tide stages is consistent with this "behavioral osmoregulation" prediction. Since there are several alternative explanations for this clustering (food, temperature, mating) an experiment was conducted in which these other variables could be eliminated.



A salinity gradient was produced along an open trough (44" x 3.5" x 1.5" deep) by metering fresh and salt water into 11 chambers (#'s 0 to 10) mixed by vigorous aeration before flowing transversely into and across the trough to a long spillway. The gradient was stable and nearly linear with distance. Despite attempts to cool the fresh water (B. H. Water Co.), it was as much as 3°C above the salt water on warm days. Two or three fish were introduced and observed every 10 - 15 minutes. After each reading, the salinity at the recorded positions was measured by refractometry, disturbing the fish which thus had to make a new choice.

The results of 6 such trials are summarized in the graphs (mean ± SE for N observations); the values are clearly different from a random distribution (top), and cluster around the average osmolarity of *Fundulus* blood (bottom, Zadunaisky *et al.* 1994, J. Memb. Biol. 143:207). Both laboratory and field observations therefore suggest that while *Fundulus* is capable of osmoregulation over a wide range of salinities, it minimizes its osmotic work by actively seeking iso-osmotic water.