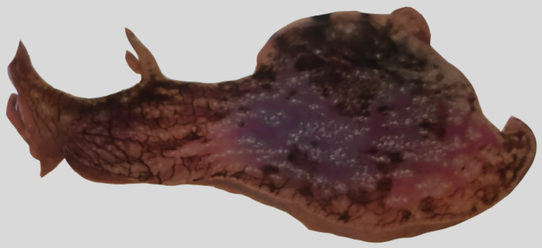
UNIVERSITY OF MIAMI
ROSENSTIEL SCHOOL of MARINE & ATMOSPHERIC SCIENCE

THE EFFECTS OF HYPOXIA ON REFLEX BEHAVIORS IN DIFFERENTLY AGED *APLYSIA CALIFORNICA*



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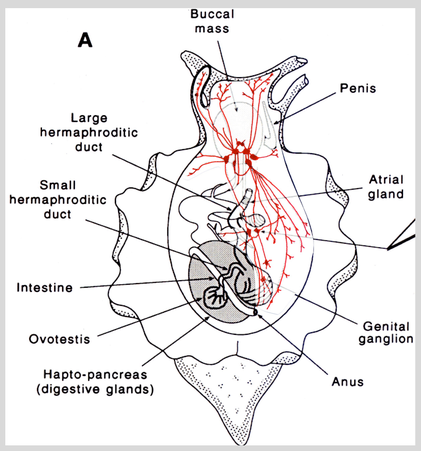
Introduction:

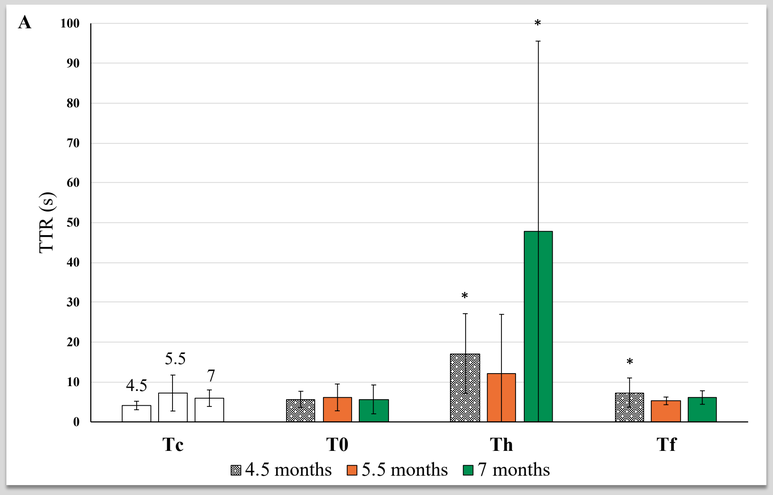
Aplysia californica, a model organism for neurobiology and aging studies, is an intertidal species of gastropod mollusk, frequently exposed to long periods of hypoxia during low tide. This thesis examines the mechanisms that preserve nervous system functions and facilitate rapid recovery from hypoxia in *A. californica*, and whether there is a difference in hypoxia resilience between three different age groups of *A. californica* approaching sexual maturity (4.5, 5.5, and 7-months). Reflexes, such as time to right (TTR) and the tail withdrawal reflex (TWR) were used to measure the effects of hypoxia on *Aplysia*. I hypothesized that the younger age groups of *Aplysia* will be less susceptible to hypoxia, and able to recover more quickly and efficiently from prolonged hypoxia exposure than age groups closer to reaching sexual maturity.

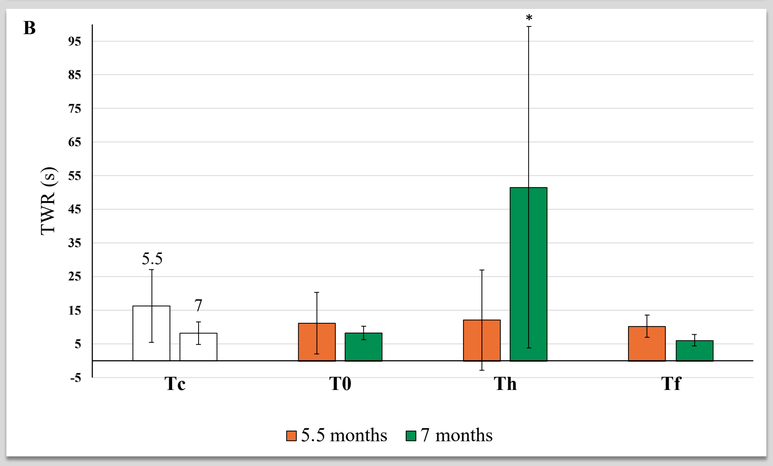
Methods:

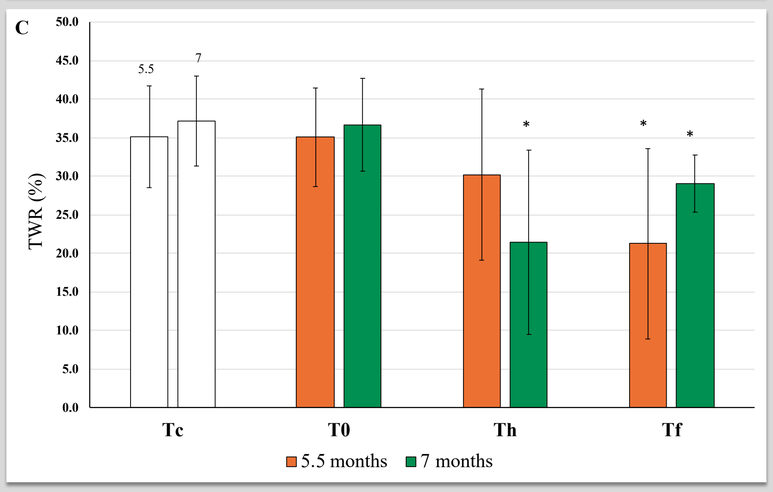


- All experimental and control animals used were lab reared at the National Resource for Aplysia, and all were sexually immature.
- Animals were air-exposed to 6 hours of hypoxia, isolated in plexiglass containers on a lab bench, with observations every hour
- Reflex behaviors (TTR and TWR), were measured prior to, immediately after, and 24 hours after hypoxia exposure.
- Blood TCO_2 and osmolality were analyzed from blood drawn towards the end of hypoxia exposure period

Results:

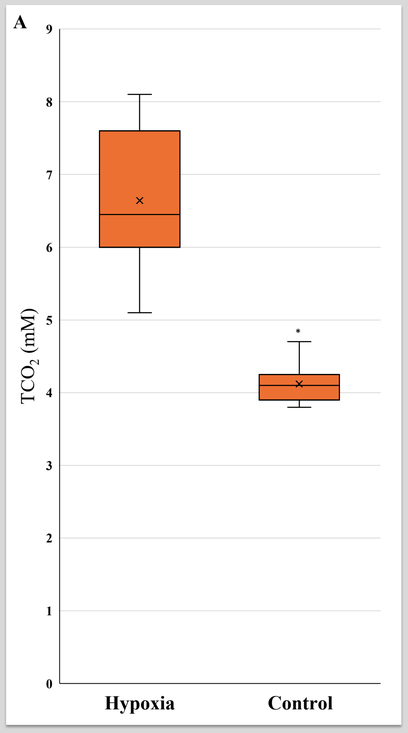


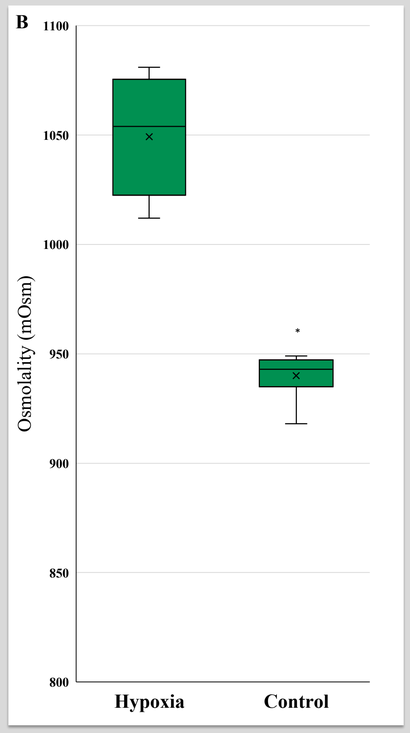




Comparisons in mean TTR (A), TWR (B), and percent tail withdrawal (%) (C) between age groups

- Comparing initial (T_0), post-hypoxic (T_h), and recovery (T_f)
- * denotes significantly different from control animal (T_c)
- Age 7-months T_h data always significantly different than T_c





Mean animal total CO_2 (A) and osmolality (B) in all experimental and control animals

- Both mean TCO_2 and osmolality of experimental, hypoxia-exposed animals of all age groups were significantly different from that of no-hypoxia control animals

Conclusions:

- Age 5.5-month individuals had the highest hypoxia tolerance throughout the experiment, with age 7-month individuals having the lowest tolerance
- All age groups are capable of near-full recovery

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