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Ontogeny of Feeding-Ecological Morphology in the Sympatric Sunfishes, *Lepomis macrochirus* and *Lepomis microlophus*

Nathaniel Zbasnik

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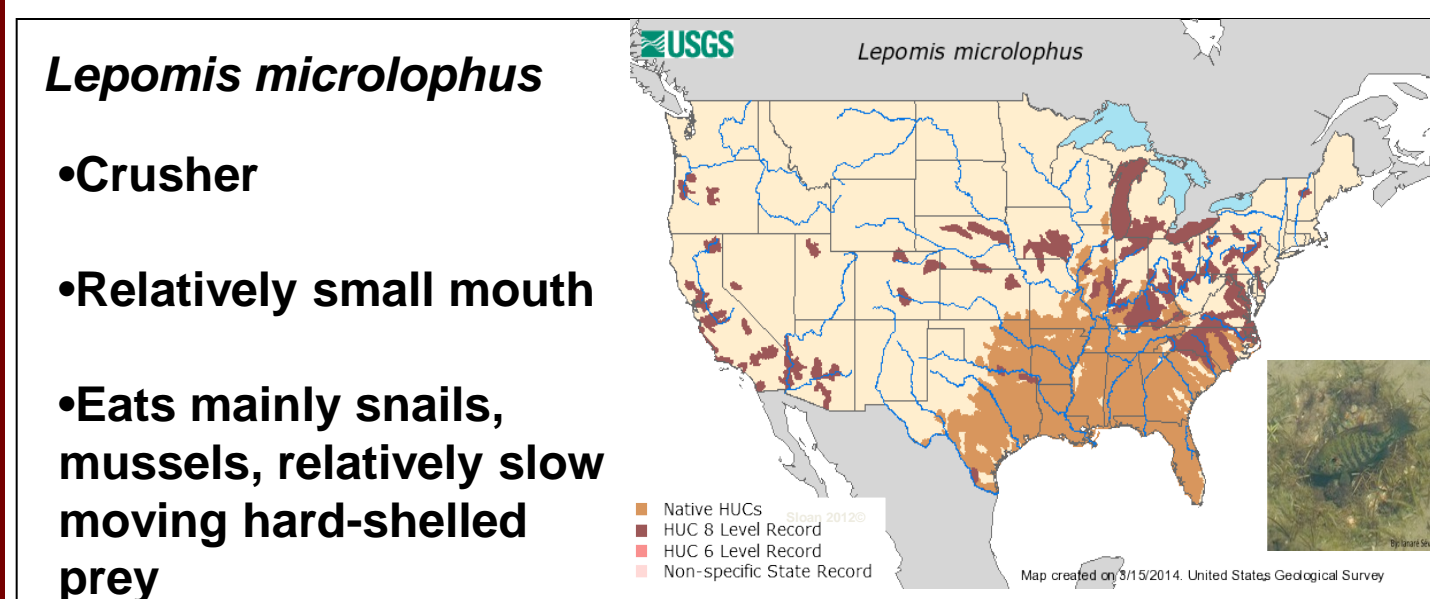
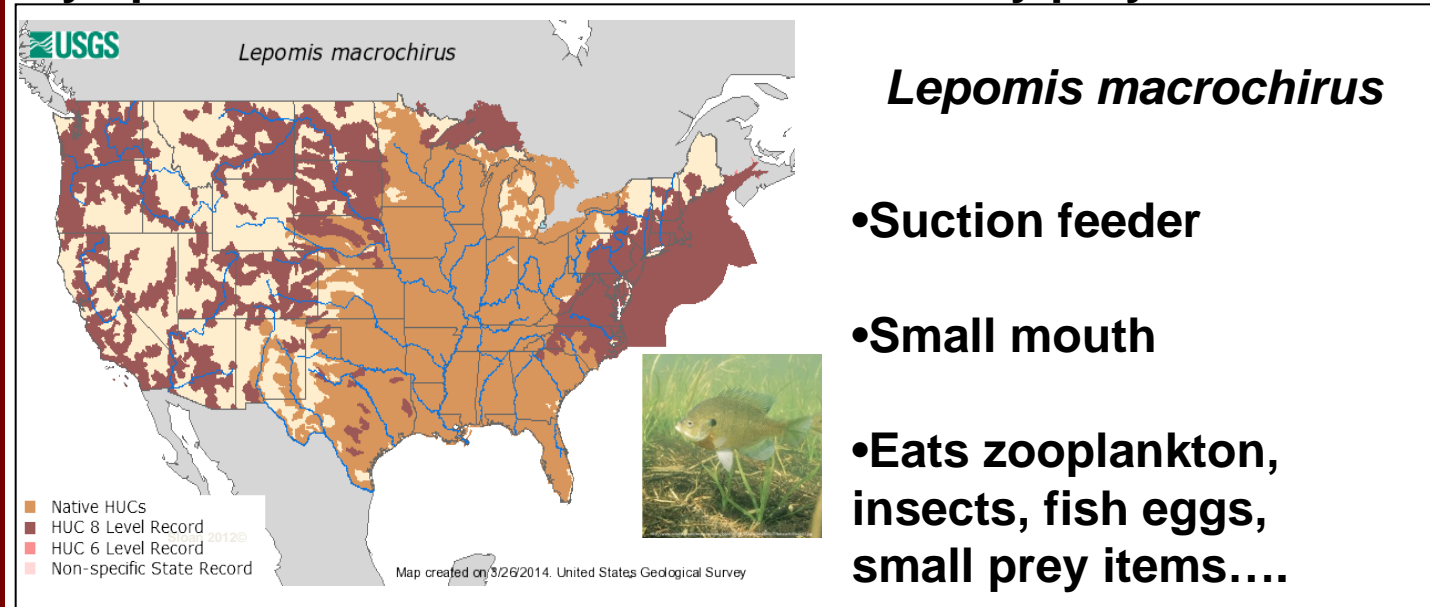
Ontogeny of Feeding-Ecological Morphology in the Sympatric Sunfishes, *Lepomis macrochirus* and *Lepomis microlophus*

Nathaniel Zbasnik

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Background and Rationale

- Sympatric species maintain divergent food habits (feeding ecology) in order to release each other from competing for limited food resources (1, 2).
- Two congeners coexist in North American lakes: suction-feeding bluegill, *Lepomis macrochirus* feeds primarily on soft, elusive, and planktonic prey whereas durophagous redear, *Lepomis microlophus* eats hard-shelled invertebrates such as clams (1, 2).
- Is ecological divergence consistent with functional or biomechanical divergence in these sympatric fishes?
- This study compares growth trajectories of feeding biomechanics that underlie feeding performance in sympatric Florida sunfishes with the dietary prey items.



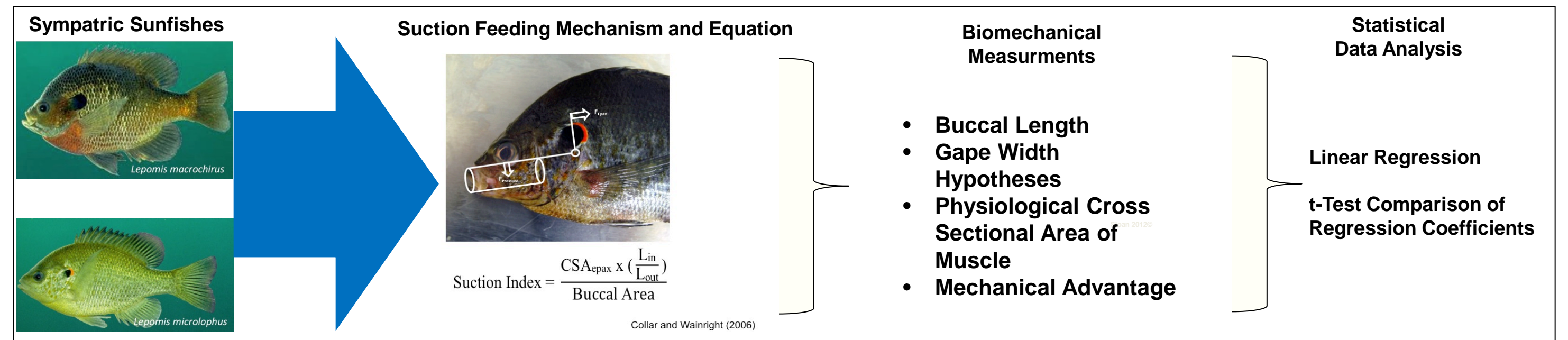
Research Question

Is ecological divergence consistent with functional or biomechanical divergence in sympatric fishes?

Hypothesis

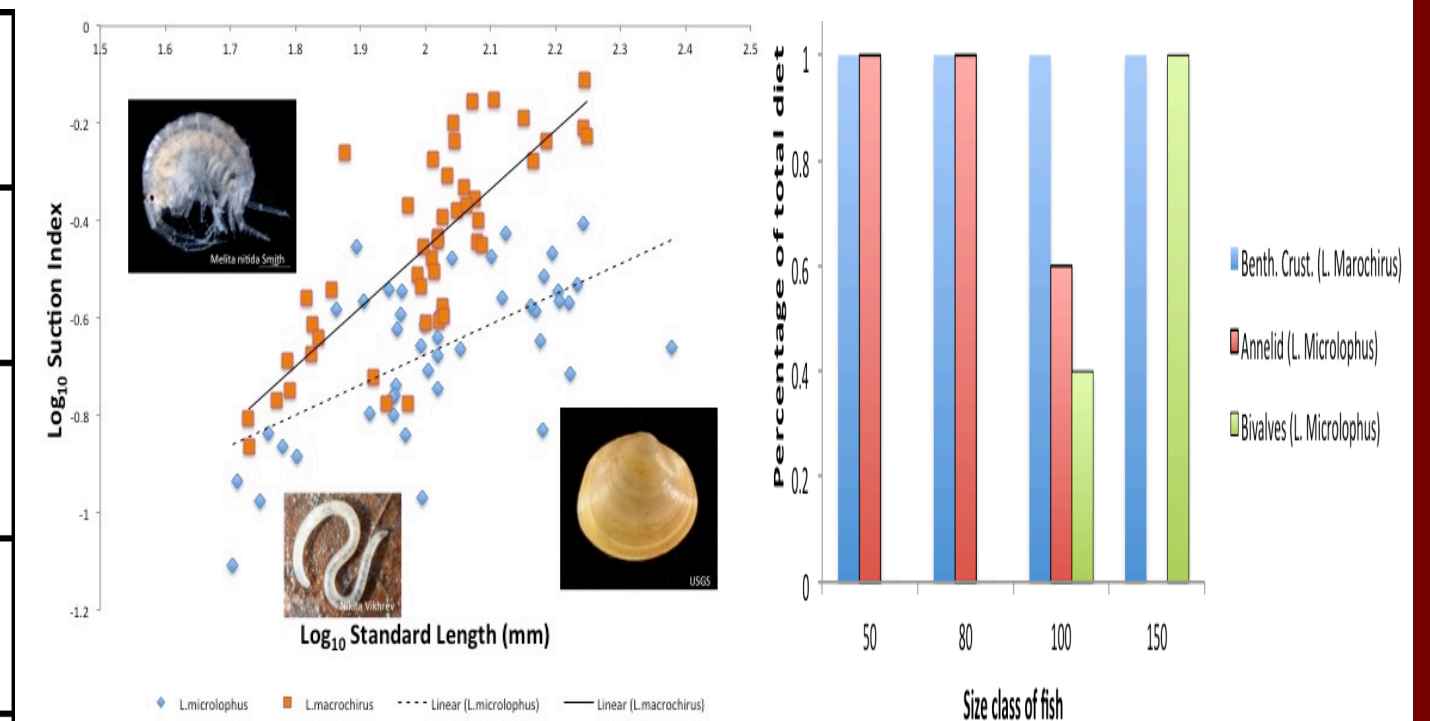
The ecological divergences is consistent with the functional or biomechanical divergence in these sympatric fish.

Experimental Design



Results and Discussion

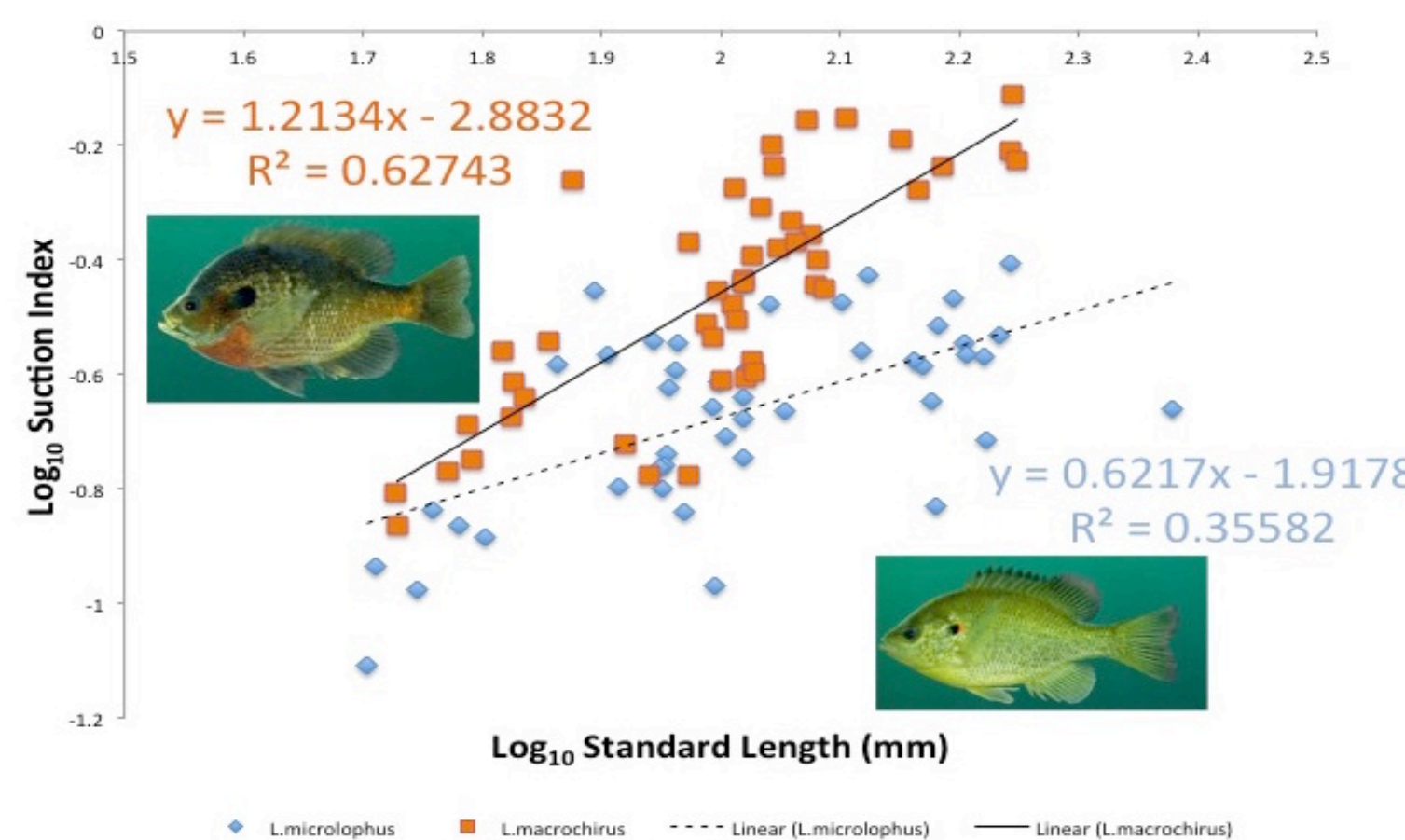
Muscle Type	Line of best fit (L. Mac.)	Line of best fit (L. Mic)	R ² (L. Mac.)	R ² (L. Mic.)
In Lever of Opening (mm)	Y= 0.5948x - 0.8465	Y= 0.1839x - 0.0004	0.29713	0.04235
In Lever of Closing (mm)	Y= 0.7866x - 0.9179	Y= 0.6563x - 0.645	0.62928	0.53134
CSA Vertical	Y= 1.0837x - 1.2434	Y= 1.1049x - 1.2635	0.84368	0.92369
Buccal Length	Y= 1.0837x - 1.2434	Y= 1.1049x - 1.2635	0.84368	0.92369



- In both sympatric species, SI and its morphological determinants scaled positively with body size.
- SI growth rate in the late juvenile- to adult-stage fish was about three times faster in bluegill than in redear sunfish.
- Within the range of body size examined, *Lepomis macrochirus* has higher suction-feeding capability than *L. microlophus*.
- The dietary prey items for the *L. macrochirus* did not change throughout its adolescent to adult life.
- While the *L. microlophus* started to transition from annelid-like prey over to harder prey items like bivalves upon reaching a length of 100 mm.

Conclusion and the Big Picture

- Upon metamorphosis, the feeding mechanism develops divergent forms in these sympatric *Lepomis*, which correlated with the development of divergent food habits (feeding ecology).
- This study suggests that the divergence in growth rate of functional morphological traits contributes to the formation of organismal and ecological diversity in coexisting fishes.



NORTHROP GRUMMAN

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Citations:
1) Wainwright P, Carroll A, Collar D, Day S, Higham T, Holzman R, (2007) Suction feeding mechanics, performance, and diversity in fishes. Integr. Comp. Biol. 47 (1): 96-106.
2) Casey J. Fisher Huckins 1997. Functional linkages among morphology, feeding performance, diet, and competitive ability in molluscivorous sunfish. Ecology 78:2401-2414.