

BIOL 485 / 585: Ichthyology
Fall 2010
Writing Assignment #1

Provide a detailed response to each question below. The primary basis for these questions is Ferry-Graham and Lauder (2001), which is available on the Blackboard site under October 5. Answering these questions will require a careful reading of Ferry-Graham and Lauder's paper, but you will need to also find, consult, and incorporate other sources, some of which will be found in the Literature Cited section of this paper, and some which you might need to find on your own.

Remember that the "TA Criterion" will apply in grading with respect to clarity and completeness of your response. Do not answer these questions as if you are writing to me; answer these questions as if they have come from your student colleagues in this class who have come to you for help.

All responses must also be in your own words; do not copy and present as your own words passages from any publications or web sites or from any other student in the class. You may certainly work together on this assignment with others in the class, but your work must be uniquely your own.

Each question may be answered independently as a stand-alone response; you do not need to integrate all of the responses together into something like a single essay (in fact, I would prefer that you didn't). However, recognize that each response should be well organized and written clearly; grammar, spelling, and clarity of communication will count in this exercise.

Be sure to answer all sections of each question; in my experience, one of the biggest sources of lost points on this kind of writing assignment is a student's failure to answer all parts of given questions. Proofread your responses carefully!

Title pages of articles must be a photocopy of the original article's title page or the actual .pdf – formatted title page of the article itself as it appeared in publication (not an HTML formatted page or output from an abstract indexing source).

1. Define, in your own words, each of the variables plotted on the vertical axes of the six graphs in Fig. 2 (you should consult the original source of the data in this figure for a detailed discussion of these variables; *turn in the title page of that publication as part of your assignment*). Then, combining information from Fig. 2, Fig. 4B, and the authors' discussion of their own DPIV results, describe the sequence of events that typically occur in the first 100 milliseconds of a bluegill sunfish's feeding strike with respect to muscle action, movement of skull elements, and water movement.

2. Compare the basic feeding mechanics of a bluegill sunfish versus that of a largemouth bass when both are feeding on a fish prey item. This comparison needs to include (but not necessarily in this order):

- comparison of the magnitude of negative buccal pressure generated by adult sunfish during a feeding strike on a fish prey item versus that of a bass feeding on a fish prey item;

- definition, in your own words, of the terms “opening lever ratio,” and “closing lever ratio” as applied to the discussion surrounding Fig. 5; consult the original citation that yielded Fig. 5, particularly focusing on pp. 100 – 101 of that publication (*turn in the title page of that publication as part of your assignment*);

- a discussion of the basic trade-offs experienced by adult sunfish versus bass in their feeding strategies with respect to speed of jaw movement versus force of jaw movement (reading the relevant sections of the Discussion in the publication referred to above as well as Ferry-Graham and Lauder’s discussion of their own Fig. 5 will help here).

3. Discuss why negative buccal pressure generated by a sunfish during a feeding strike is of so much lower magnitude when feeding on earthworm prey as opposed to the more negative pressure generated when feeding on goldfish prey. Find the publication by Higham, Day and Wainwright from 2006 that examined feeding in centrarchid fishes using DPIV (*turn in the title page as part of the assignment*). What prey items did they use in their study to induce feeding? Would you characterize this prey item to be more like earthworm prey or more like goldfish prey from the point of view of a sunfish? (Side note: Figure 1 and its surrounding discussion in the Higham et al. publication will also help you to answer Question #2 above.)

4. Define “inertial” versus “compensatory” suction. Which form of suction, based on data and observations analyzed in Question #2 above, would better characterize sunfish feeding? Which would better characterize bass feeding?

5. Obtain the publication by Mark Westneat from 2004 on levers and linkages in fish feeding mechanisms (*turn in the title page of that publication as part of your assignment*). Indicate where the adult bluegill sunfish and largemouth bass data from Wainwright and Richard 1995 (cited in Ferry-Graham and Lauder) would fit in Westneat’s Table 1 by indicating the taxa from Table 1 that each species would have been closest to in terms of opening as well as closing lever data. The bass data collected by Westneat (2004) differs rather significantly from the data collected by Wainwright and Richard (1995; as cited in Ferry-Graham and Lauder 2001); describe the differences in terms of morphology as well as expected feeding performance in the two samples of bass. Provide a hypothesis as to why these differences might exist, and describe briefly how you could test your hypothesis (what observations could you make? What manipulations could you perform?).

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Fall 2008
Writing Assignment #1 Grading Sheet

Name: _____ Final Score: _____ / 80 points
Int. Score _____ / 111

1. Definitions and Events

Definition: Gape Distance	___ / 2
Definition: Head Angle	___ / 2
Definition: Lower Jaw Angle	___ / 2
Definition: Hyoid Depression	___ / 2
Definition: Opercular Expansion	___ / 2
Definition: Jaw Protrusion	___ / 2
Sequence of Events	
Muscles	___ / 4
Skull Elements	___ / 4
Water Movement	___ / 4
Title Page Turned In (Kinematics of feeding..)	___ / 1
Clarity	___ / 2
Grammar	___ / 2

2. Bluegill versus bass

Negative buccal pressure generated	___ / 2
Opening lever ratio	___ / 5
Closing lever ratio	___ / 5
Trade-offs:	
Bluegill slow, forceful, small prey size	___ / 3
Bass rapid, weak, large prey size	___ / 3
Title page turned in (Predicting patterns of prey use...)	___ / 1
Clarity	___ / 2
Grammar	___ / 2

3. Prey type and motivation

Explanation: lower pressure for worm than goldfish	___ / 3
Title page turned in (The pressures of suction feeding...)	___ / 1
Prey item used in Higham et al. 2006	___ / 2
Characterization of this prey	___ / 4
Clarity	___ / 2
Grammar	___ / 2

4. Suction strategies

Inertial suction definition	___ / 3
Compensatory suction definition	___ / 3
Sunfish as more inertial (evidence: high suction)	___ / 2
Bass as more compensatory (evidence: low suction)	___ / 2
Clarity	___ / 2
Grammar	___ / 2

5. Comparison with Westneat 2004

Title page (Evolution of levers and linkages...)	___ / 1
Taxon proximity – sunfish opening	
Taxon proximity – sunfish closing	
Taxon proximity – bass opening	
Taxon proximity – bass closing	
Comparison with W & R's 1995 bass	
Opening/closing ratios higher	
Slower, more powerful bite	
Hypothesis for why difference might exist	
Clarity of hypothesis	
Testability	
Description of test	
Clarity	
Grammar	