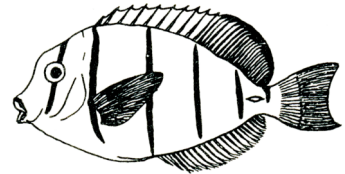


Research Paper

Go to the Aquarium. Walk around and select one fish species to research. Choose your animal carefully so you can provide the required information. See skylinecollege.edu/case for more information. (100 points)



1. Title page (1)
2. **Six** (no more and no less) content pages. The text should consist of a student-worded analysis of your research during long hours in a library and at the Aquarium.
 - a. The scientific name, the family, and the common name. (3)
 - b. Evolution and phylogeny. Discuss supporting evidence. (5)
 - c. Identify the animal's range on the accompanying map and describe its habitat. (4)
 - d. Water temperature in the animal's range, vegetation present. (5)
 - e. Animal's niche. Describe your fish's feeding. Is it an attacker, ambusher, picker, prober, sucker, grazer, or grubber? (10)
 - f. Describe the adaptive advantage of your fish's coloration. Is it an advertiser, cryptic, or does it change color? (5)
 - g. Is this animal endangered? Why/why not? (5)
 - h. Note anatomical differences between your fish and a "typical" fish (see the figure). Describe in your paper how these adaptations are useful to your fish. Does your fish have a lateral line? What is the function of the lateral line? (10)
 - i. Quantitative analysis (for example: genetics, survivorship, population trends). (10)
 - j. Part of the secret of speed of fish such as marlin and mako sharks is in the high aspect ratio of the caudal (tail) fin. A fast fin is designed to minimize disturbance of the water and therefore minimize resistance. ①Calculate the aspect ratio of the caudal fin of your fish. ②How would you modify the caudal fin to make your fish faster? (6)

Your fish	Caudal fin height (h), cm	Caudal fin length (L), cm	Caudal fin width (w), cm	Aspect ratio = $\frac{h^2}{L \times w}$
① Your fish				
② Your fish modified				

- k. The swimming speed (V, cm/sec) can be equated to the length (L, in cm) and frequency of the tail movement (f, in beats/sec) by the following formula:

$$V = \frac{1}{4} [L(3f-4)]$$

Add your fish to the data table below and calculate V for each fish. (6) □

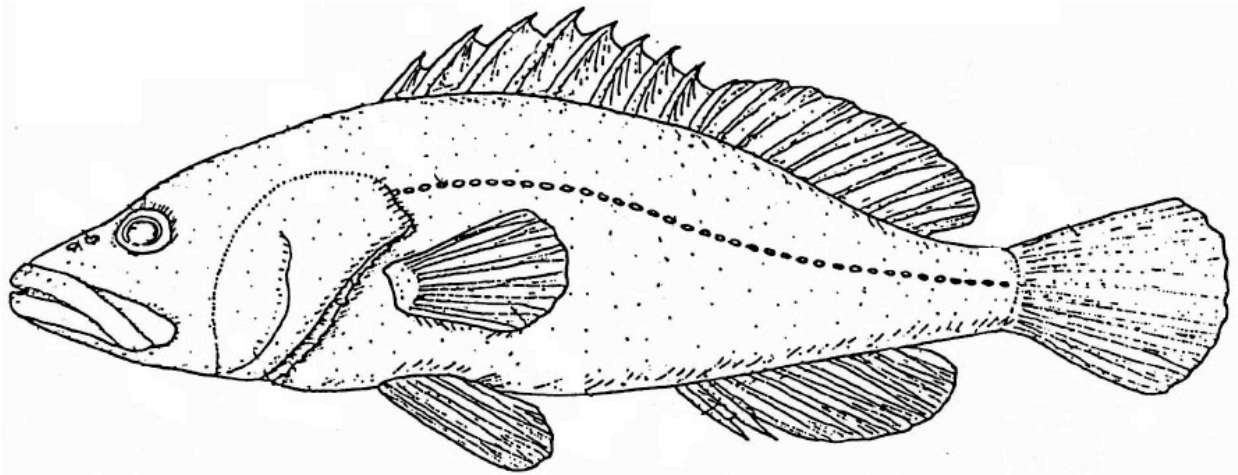
Species	f	L	V
Goby (<i>Gobinus minutus</i>)	12	5	
Wahoo (<i>Acanthocybium solandri</i>)	12	183	
Your fish			

- l. Approximately how many times its own length does a goby travel per second? A wahoo? If these ratios were constant, a 6 meter great white shark would travel in excess of 120 mph! However, the shark's large mass creates drag. This introduces the aspect of fineness ratio. The fineness ratio is the ratio of the length of the body (L) to the average of the maximum height and breadth. In designing airplanes, the optimum fineness ratio is 2.5. ①Determine the fineness ratio of your fish. ②Consider your calculations in j, k, and l—what anatomical changes would make your fish faster? (6)

	Your fish	length of body (L) in cm	maximum height (h) in cm	maximum breadth (b) in cm	Fineness = $\frac{L}{(H + b)}$
①	Your fish				
②	Your fish modified				

3. Literature cited page*. Include 5 references in correct format. (10) You must use at least 3 journal articles; all references may *not* be books and websites. References must be cited somewhere in the content. Do not include references prior to 1980.
4. Three figures on three separate pages.
 - a. Each figure must have a legend.
 - b. Refer to each figure in the body of the text.
 - c. Figures can include (one) photograph or picture of the animal; chemical formulae; metabolic pathways; phylogenetic tree; Punnett squares; calculations; graphs. (9)
5. Typed, double spaced.
6. Select an animal by the third week of the semester. The animal should have recent research and should be of interest to you. Discuss possible topics with the instructor.
7. General form: (5)

Attach this page to your report.
 Followed all directions explicitly with no exceptions.
 Presentation is neat and orderly throughout.
 Spelling and grammar are flawless.



Typical fish. Note the position of the pectoral and pelvic fins.

* In text citations are noted with a number in parentheses corresponding to the number of the reference in your Literature Cited page.