

Quiz 1

This quiz covers lectures and readings from "Ecology and Fish Fundamentals" to most of "Eating and not Being Eaten" plus Fish Facts. It counts for 5 points, or 5% of your final grade. Remember, the lowest quiz grade of the semester will be dropped. Answer each question fully but succinctly; complete sentences work best. You will have 15 minutes, so budget your time well. Good luck!

1. 41% of the world's fish species live in freshwater, which accounts for only 0.009% of the world's total water. Describe two reasons for the disparity between the proportion of water that is fresh and the proportion of fish species living in it.

FRESHWATER SYSTEMS ARE ISOLATED FROM ONE ANOTHER, GIVING RISE TO OPPORTUNITY FOR ALLOPATRIC SPECIATION

FRESHWATER SYSTEMS ARE HIGHLY HETEROGENEOUS, PROVIDING VERY DIFFERENT SELECTIVE REGIMES TO DRIVE DIVERGENT SPECIATION.
 also FW more productive

2. Identify one major pro and con for being a regulator and one pro and con for being a conformer? Give an example of each for a selective force of your choosing.

REGULATOR

PRO: CAN LIVE IN MANY ENVIRONMENTS

CON: ENERGETICALLY COSTLY

EX: BONY FISHES' REGULATION OF INTERNAL SALT CONTENT

CONFORMER

PRO: ENERGETICALLY CHEAP

CON: RESTRICTS YOUR ACCESS TO SOME ENVIRONMENTS

EX: SNORKEL TRACKING OF OXYGEN SOLUBILITY

3. Adaptation operates at both the individual and population levels. Briefly contrast adaptation at the respective levels in terms of the processes at work, the speed at which adaptation occurs, and the scope of change possible.

	<u>PROCESS</u>	<u>SPEED</u>	<u>SCOPE</u>
<u>INDIVIDUAL LEVEL</u> PRO	ACCLIMATION	FAST	LIMITED

<u>POPULATION LEVEL</u>	EVOLUTION	SLOW	CREAT
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4. Many northern US lakes maintain three distinctive fish communities in their three vertical layers (epilimnion, thermocline, hypolimnion) throughout the summer, whereas in many southern US lakes, fish only occupy the middle or top two layers during summer. Briefly develop an hypothesis regarding what ecological factors drive this difference.

I THINK IT'S DISSOLVED OXYGEN + TEMP
 I'D OBSERVE D.O. + TEMP + FISH DISTRIBUTION (SPECIES x SPECIES)
 TO TEST MY HYPOTHESIS

5. Lake Malawi (central Africa) has an amazing diversity of haplochromine cichlids, i.e., small members of the family that also includes the more-familiar tilapias. The species differ widely in their mouths, pharyngeal teeth, and coloration, yet study of their phylogeny (evolutionary history) suggests that they all arose from a common ancestor. Hypothesize as to what is driving rapid diversification of the haplochromine cichlids. What sort of data would you collect to support or refute your hypothesis.

DIVERSIFICATION IS DRIVEN BY COMPETITION, SPURRING ADAPTATION TO FILL
 NEW FEEDING NICHE.

I'D OBSERVE FEEDING BEHAVIOR + MAKE INFERENCE ABOUT NICHES
 + TEST MORPHOLOGY.

(COLORATION IS DRIVEN BY NEED TO AVOID PREDATION IN GIVEN HABITATS)

- Extra Credit. Migratory coho salmon populations comprise varying proportions of jack (small, one year at sea) and hooknose (large, 2 years at sea) males. How would each of the following changes in selection pressure modify the percentage of jacks in the population (decrease, increase, or no change): (a) selective harvest of larger fish by ocean-going fishermen, (b) increased productivity in ocean feeding grounds, (c) reduction of refuge habitat on breeding grounds?

HARVEST → INCREASED PROPORTION OF JACKS
 OF LOWER PRODUCTIVITY

PRODUCTIVITY → INCREASED PROPORTION OF JACKS (EARLY COMMITMENT TO
 MATURATION)

REDUCTION OF REFUGE → FEWER JACKS (← LESS REPRODUCTIVE SUCCESS)