

## Things to know for the first Ichthyology lecture exam

The first exam will cover lecture material up to and including the 28 September lecture. This includes chapters 1-4 and 13, 14, and 16 in Moyle and Cech. Topics presented **only** in the lab will not be on the exam. This is not necessarily a complete list – but it covers the key things you need to know. The exam will be a mix of short answer, matching, fill in the blank, short essay, and drawing/interpreting figures from class.

- 1) Famous ichthyologists and what they are known for (see your book and Agassiz handout)
- 2) Physiology: fish form/function groups (you will need to know basic external anatomy for some of these)
  - a. Rover predators, bottom hidiers, etc.
  - b. Know their body shape, mouth type, fin placement and other adaptations
  - c. Know why (functionally) they have these characteristics
- 3) Physiology: Locomotion
  - a. What do high (and low) Reynolds' numbers mean? What fish feature most directly affects Reynolds' number?
  - b. Swimming types/forms (know the names, and general concepts like which ones are for fast swimming vs. maneuverability)
  - c. Adaptations for improved swimming performance
- 4) Physiology: Respiration and circulation
  - a. Know the difficulties of breathing in water, what affects oxygen concentration in water, and the definitions of normoxia, hypoxia, and anoxia
  - b. Be able to describe and explain gill anatomy and physiology
  - c. Know the alternatives to respiration with gills – how and why they work
  - d. Hemoglobin
    - i. What is it and how does it work?
    - ii. Know how to draw hemoglobin saturation curves for different fish (active vs. sluggish, low O<sub>2</sub> environment vs. high O<sub>2</sub> environment)
    - iii. Know how Bohr and Root effects affect hemoglobin binding of oxygen
  - e. Anatomy of the heart and blood cell types and functions
  - f. Factors affecting heart rate and blood flow
  - g. Adaptations for low oxygen environments or for high oxygen demands by fish
  - h. Know the common gill ailments covered in class and what causes them
- 5) For some topics, I presented real world examples or demonstrated how scientists measure or quantify the variable – know these examples and methods (e.g., measuring respiration or swimming performance)
- 6) Diversity:
  - a. With what groups did certain features arise and why were they important?
  - b. Understand what is meant by the “arms race” in terms of fish evolution
  - c. Know the special developments and adaptations of the hagfish and lamprey
  - d. Know the special developments and adaptations of the:
    - i. Sarcopterygii (Coelacanthiformes, and Dipnomorpha)
    - ii. Actinopterygii (Chondrostei: Polyteriformes, Acipenseriformes; Neopterygii: Lepisosteiformes, Amiiformes)