

# UNIVERSITETET I OSLO

DET MATEMATISK-NATURVITENSKAPELIGE FAKULTET

Exam in MBV 4310 (Comparative and Ecological Physiology)

Day: Friday 6 November 2009

Time for exam: 09.00 – 12.00

The exam includes two pages

Allowed aids: calculator

Number of questions: 5

**Please answer each of the 4 questions on separate sheets of paper**

*Check that the set of questions is complete before you start*

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1) Describe the anatomy (preferentially with a drawing) and function of teleost (bony fish) gills. What physical factors in the respiratory medium lie behind the make-up of gills.

2) What changes allow a trout to increase its oxygen uptake 8 times and a human to increase the oxygen uptake 20 times when going from rest to exercise?

3) Vision, invertebrates

- a. Describe the ommatidium of insect compound eyes.
- b. Describe the different filters found in compound eyes.
- c. Discuss the possible function of these filters.

4)

a. Compare the problems associated with water and NaCl balance for a bony fish in seawater and in fresh water. Describe how the water and salt balance are maintained in bony fish in the two different media.

b. How does a marine elasmobranch (e.g. a shark) maintain water and salt balance?

5) The "catch" phenomenon is described in the textbook, and it was also examined by one group in Drøbak, studying the anterior byssus retractor muscle in blue mussels (*Mytilus edulis*).

a) In what state are the myosin cross bridges under "catch"?

- b) Is the  $\text{Ca}^{2+}$  level in cytosol during “catch” higher or lower than during a normal short contraction.
- c) What condition in vertebrate skeletal muscle resembles "catch"?
- d) What advantages does "catch" provide to a mussel?