

UNIVERSITETET I OSLO

Det matematisk-naturvitenskapelige fakultet

Exam in MBV4320 Advanced Physiology and Cell Biology

Day of exam: Friday 18.february

Exam hours: 09.00 – 12.00

This examination paper consists of 2page(s).

Appendices:None

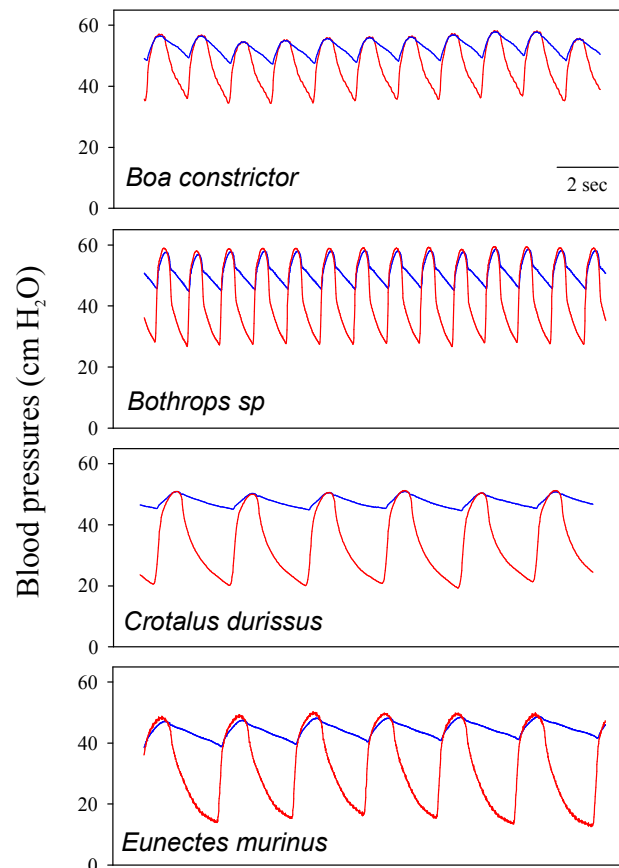
Permitted materials: None

Make sure that your copy of this examination paper is complete before answering.

NB!!! Please start answering each question on a new sheet of paper!!

1. What results from experimental studies support the idea that the membrane potential in the vomeronasal neurones is set by a balance between the current of the sodium pump and the I_h ?
2. What is the definition of ionotropic and metabotropic receptors?
3. Muscle physiology
 - a. Describe a possible signalling pathway between muscle activity and fibre type.
 - b. What are the differences in the activity pattern of the motoneurones to slow and fast muscles?
4. We have a simple cell model that contains negatively charged, cell membrane impermeable macromolecules. The cell is placed in a solution with A^+ and B^- ions that can enter the cell and they are allowed to come to an electrochemical steady state distribution across the water permeable cell membrane that do not contains any active transport systems.
 - a. What type of forces determines the distribution of the diffusible ions?
 - b. Give three different effects the impermeable anions may have on this simple cell system.
5. What are the physiological and behavioural effects of severe chronic stress in fish?
6. Describe the mechanisms for reducing the cytosolic Ca^{2+} -level back to normal after a transient elevation.
7. How does adenosine promote anoxic survival?

8. The figure below shows the blood pressure in the pulmonary (bottom trace) and the systemic circulation (upper trace) in four species of snakes.
- Why is the systolic pressure the same in both circulations?
 - Why is the diastolic pressure much lower in the pulmonary circulation?



Questions in cell biology. NB! Answer three of the four questions (9-12).

- What is "critical concentration" of actin in connection with actin polymerization? Explain "treadmilling" by means of critical concentrations.
- Present a model for the formation of endocytic vesicles by clathrin-dependent endocytosis.
- Present a model for the fusion between vesicles (involved in membrane traffic) and target membranes. Cues: rab-proteins, SNARE-proteins, GEF, GDI etc.
- The biological function of NO is often connected to guanylate cyclase. Explain how activation of this enzyme can lead to smooth muscle relaxation