

BIO 3303 Animal Physiology I
Midterm #1

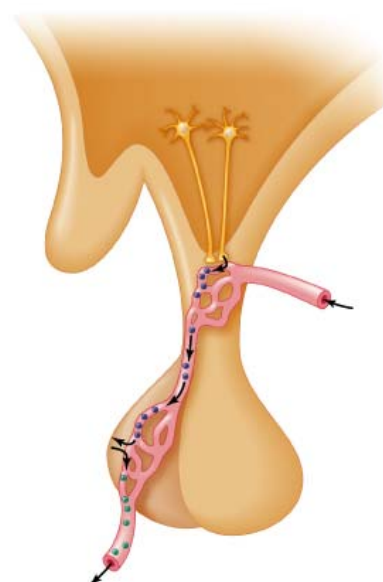
Dr. K.M. Gilmour
October 15th, 2009
80 min

Name: _____

Student #: _____

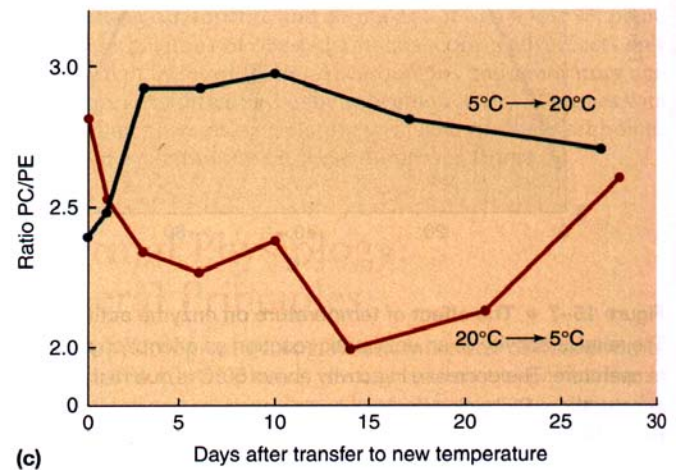
Part A: Answer on the question sheet in the space provided. (1 mark per answer unless otherwise stated; 24 marks in total)

1. Explain why a synaptic potential is a graded potential but an action potential is not. (2 marks)
2. The cerebellum of an eagle would be expected to be larger OR smaller (**select one**) than the cerebellum of a groundhog (after accounting for differences in body size).
3. Sensory information enters the spinal cord via the _____ and is transmitted to the brain via specific or non-specific ascending nerves OR pathways (**select one**).
4. The figure at right illustrates two of the unusual vascular structures of the hypothalamo-hypophyseal complex. Label these two structures and explain their functional significance. (3 marks)



5. The muscarinic cholinergic synapse is a fast OR slow (select one) chemical OR electrical (select one) synapse. As is typical for such synapses, the receptor in the post-synaptic membrane is a ligand-activated transcription factor OR ligand-gated channel OR G-protein coupled receptor (select one). What feature of the muscarinic cholinergic synapse is unusual for its type?

6. The figure at right illustrates changes in the ratio of two membrane phospholipids that occur when rainbow trout are suddenly transferred from water of 5°C to water of 20°C, or vice versa. Changes in this ratio translate into changes in membrane fluidity. These changes represent an example of acclimatization OR adaptation OR acclimation (select one) in an animal that makes use of the strategy of enantiostasis OR homeostasis (select one) with respect to temperature.



7. Distinguish between a neural reflex arc and a first order neuroendocrine feedback loop. (2 marks; you may use a labelled sketch if you wish)

8. Provide an example of a physiological system where the autonomic innervation is dual but **not** antagonistic and reciprocal.

9. Which of the following is a tropic neuropeptide?
 - a. Adrenocorticotrophic hormone (ACTH)
 - b. prolactin-inhibiting hormone (PIH)
 - c. Anti-diuretic hormone (ADH)
 - d. Corticotrophic releasing hormone (CRH)
 - e. Melanocyte-stimulating hormone (MSH)

10. What method of measuring hormone levels was developed by Rosalyn Yalow, an achievement for which she was awarded the 1977 Nobel Prize in Physiology or Medicine?

11. List TWO characteristics that could be used to distinguish an efferent pathway in the somatic nervous system from one in the parasympathetic nervous system. (2 marks)

12. When applied to the heart of a dogfish, which of the following combinations of pharmacological agents would you predict would have the greatest effect in increasing heart rate?
 - a. Atropine applied in combination with caffeine (a compound that inhibits the breakdown of cAMP)
 - b. Physostigmine (an acetylcholinesterase inhibitor) applied in combination with adrenaline
 - c. Muscarine applied in combination with atenolol (a β_1 antagonist)
 - d. Atropine applied in combination with cocaine

Explain your answer.

13. The ganglia of the sympathetic nervous system are typically located in close proximity to the spinal cord. How is this structural feature important to the function of the sympathetic nervous system?

Part B: Answer on the question sheet in the space provided. (20 marks and 20 min)

1. Sammy the salmon is swimming upstream to his mating grounds when to his alarm, a grizzly bear decides that Sammy would make a nice lunch. This emergency situation activates Sammy's stress response systems.
- a. What neural and hormonal pathways are activated? (3 marks)
- b. Contrast and compare the stress hormones that are mobilized with respect to their chemical properties, site of synthesis and mode of synthesis. (4 marks)

- c. Contrast and compare the pathways through which the stress hormones are mobilized. You may use a labelled sketch (but be sure to explain the key points). (5 marks)

- d. Contrast and compare the **modes of action** of the stress hormones. (4 marks)

- e. Explain the physiological significance of the differences noted in parts (b) to (d) above with respect to the “alarm” and “resistance” phases of the stress response. (4 marks)

Bonus: For a bonus mark that, in the spirit of socialism will be applied to the entire class if even one person is successful, pictures of what have been gracing the “Announcements” slides at the start of each lecture? Can you identify at least one of these objects?