

****PLEASE ANSWER THE QUESTIONS BRIEFLY AND ORDERLY:**

1. What is the function of Hox genes in animals? If the DNA sequences called homeoboxes, which help homeotic genes direct development, are common to flies and mice, then why aren't these animals more alike? (10%)
2. What is homology? (5%)
3. How can heterochrony cause the evolution of body form by altering allometric growth? (5%)
4. Reconstruction of the phylogeny from the embryo development and body plan. (10%)
5. Describe the evolution of the mammalian jaw and ear bones. (5%)
6. Why is blood quality considered as a type of connective tissue? (5%)
7. Explain why a hummingbird at rest must use a greater proportion of its energy budget for temperature regulation on a cool day than a resting cow does? (5%)
8. A slight decrease in blood pH causes the pacemaker to speed up. What is the control mechanism? (10%)
9. Discuss MHC polymorphism as an evolutionary adaptation and why the loss of polymorphism at the MHC may impact the health and survival of this species. (10%)
10. Why is ammonia safe as the main nitrogenous waste for most aquatic animals? What role does the liver play in the body's processing of nitrogenous waste? (10%)
11. What are somites? (5%)
12. What is the function of the myelin sheath? (5%)
13. How does the sarcoplasmic reticulum help regulate muscle contraction? (5%)
14. What is the ultimate cause for altruistic behavior among kin? (5%)
15. An aquarium population of guppies has reached a stable population size. We decide to add twice as much guppy food per day to the aquarium, but this turns out to have no effect on population size. What is the most likely explanation for this observation? (5%)