

Study Guide for Final Exam - Mammalogy 2009

The final exam will mainly cover material since the mid-term, although there will also be some short answer questions from the first half of the course. You should review your study guide for the mid-term. The exam will be two hours long. It will include some essay questions and some short-answer questions.

FINAL EXAM: Friday, December 11, 11:00 am - 1:00 pm, BSW 219

1. Compare and contrast metatherian and eutherian reproductive systems. Include discussion of anatomy, physiology, and reproductive ecology.
2. Describe the basic process of mammalian sex determination. Detail the tissues and the developmental signals involved.
3. Outline the hormonal regulation of the estrous cycle and the hormonal regulation of pregnancy. Describe modifications to the typical progression of mating -> fertilization -> implantation -> development -> parturition. What are the ecological consequences of these modifications?
4. What is echolocation? Detail the major components of echolocation sounds produced by bats. Compare and contrast CF and FM output. Under what conditions is each expected to be useful?
5. Describe the typical progression of sounds made by an echolocating bat during the search, approach, and terminal phases of a single insect capture sequence.
6. What is the problem of self-deafening during echolocation and how have bats solved it? Describe three different solutions.
7. Describe several adaptations in moths to avoid capture by echolocating bats. Describe several adaptations in bats to counter the avoidance strategies of moths.
8. What are some of the ecological advantages and disadvantages to being social?
9. Define and outline different levels of sociality in mammals.
10. List the major ways in which mammals communicate with each other. Give examples.
11. Outline the major mating systems of mammals. Describe conditions that are likely to lead to the evolution of monogamy. Describe conditions that are likely to lead to the evolution of polygyny.
12. *Heterocephalus glaber* is a eusocial mammal. What does this mean? Describe the major features of sociality in this species. According to Jarvis, what ecological factors are thought to promote eusociality?
13. What is meant by r-selection and K-selection? Under what ecological conditions do you expect to find each?
14. What is the difference between exponential and logistic population growth? What factors may limit population size under logistic growth?
15. Snowshoe populations are known to undergo dramatic and regular cycles of population size. What causes this? Discuss specific evidence that supports or refutes different hypotheses.

16. List several factors that may influence community structure. Brown and others have argued that competition is a major factor determining community structure. What is the evidence for this?
17. How do animals minimize competition in ecological communities? Cite examples from desert rodent communities.
18. What is the evidence that geographically isolated communities are structured similarly?
19. Compare and contrast direct and indirect methods for measuring migration. What is F_{ST} and how is it measured in natural populations?
20. Which population genetic forces are likely to cause populations to diverge and which are likely to cause populations to remain genetically cohesive?
21. Diagram and discuss each of the three geographical modes of speciation. Provide a possible mammalian example illustrating each of the three.
22. Patton and Smith argue that selection along ecological gradients in the Andes has not resulted in parapatric speciation of Akodon rodents. What is the basis of their argument?
23. Discuss evidence from the mammalian literature that supports an allopatric model of speciation. Consider specific groups of sister taxa and be explicit.
24. What are the general genetic patterns that characterize reproductive isolation between closely related species? What is Haldane's Rule?
25. What was the great American interchange? Briefly describe the geological and paleontological evidence for the interchange. How did the mammalian fauna of South America change as a result of this event? How did the mammalian fauna of North America change as a result of this event?
26. Describe vicariant and dispersal hypotheses for the distribution of mammal species. In practice, how can we distinguish between them?
27. Describe the breakup of Pangea. How did this geologic pattern affect the evolution of mammalian continental faunas?
28. What is island biogeography? What determines the number of species, at equilibrium, under this model? Does the distribution of mammal species on mountaintops in the Great Basin fit the predictions of this model?