

1. Physiologists often divide the body composition of an animal into stomach contents (ingesta), water, minerals, protein, and fat. Why would there be interest in fat content, especially because it is thought to be relatively inactive metabolically? (4 points)

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2. Mammalogy as a discipline has undergone changes over time. If one were to generalize the focus of mammalogists in the early 1900's it would be \_\_\_\_\_, while the focus of mammalogists in the late 1900's has expanded to include \_\_\_\_\_. (4 points)

3. Over 150 million years of evolutionary change, from Pelycosauria to Therapsida and Mammalia, one bone in particular underwent gradual change and expansion. What was this bone and where is it located on the body? \_\_\_\_\_. (2 points)

4. Radiotelemetry is a technique that was pioneered in the early 1960's. The approximate accuracy of standard VHF telemetry locations is around \_\_\_\_\_ meters for animal locations. The recent development of GPS radiotelemetry collars gives scientists an approximate accuracy of \_\_\_\_\_ meters for animal locations. (2 points)

5. Antlers begin to grow in April or May in the northern hemisphere, where the deer family (Cervidae) evolved. In experiments in which deer have been moved down to the southern hemisphere, antlers also begin to grow in April or May, but because the seasons are reversed and less food is available, the antlers that are grown are not as large. True or False? \_\_\_\_\_. Why? (4 points)

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6. A scientist studying ecological zoogeography of the bear family (Ursidae) would probably invest significant amounts of time in looking at bone collections maintained by museums. True or False? \_\_\_\_\_. (2 points)

7. What are the major evolutionary trends in dentition in the transition from reptilian to mammalian forms? (4 points)

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8. A mammal undergoing torpor typically has a body temperature that is lower than a mammal undergoing hibernation. True or False? *False* \_\_\_\_\_. Why? (4 points)
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9. Which of the following best describes the most recent hypothesis about the evolution of flight and echolocation in Chiropterans? (2 points)
- (a) Flight evolved as ancestral bats jumped and then glided and eventually flew towards insects returning to branches. Under this scenario echolocation evolved after flight evolved.
  - (b) Ancestral bats evolved echolocation first as a means to locate insects returning to branches in the dark. After echolocation was developed, ancestral bats glided and then eventually flew in their search for food.
  - (c) Echolocation and flight evolved together in ancestral bats. Incremental changes from jumping to gliding to flying were occurring concurrently with the development of echolocation.
  - (d) As a consequence of the diphyletic origin of Chiropterans there are some species in which echolocation evolved first, and then flight. There are other species in which flight evolved first, and echolocation developed.
10. The hormonal control system that has developed in mammals is unique in that it utilizes many hormones that have not been developed or used in other vertebrates. True or False? \_\_\_\_\_. (2 points)



- (d) Terrestrial insectivore Shrew \_\_\_\_\_.
- (e) Coprophagous Rabbit \_\_\_\_\_.
- (f) Omnivorous Bear \_\_\_\_\_.
- (g) Frugivorous

17. It could be argued that a desert mammal faces more challenges than an arctic mammal. What limiting factors could this argument be based on? (4 points)

18. Almost all metatherians have pouches in which the young spend significant amounts of time developing until they are large enough to move about on their own. True or False? \_\_\_\_\_. (2 points)

19. Why do you think we use dental formulae in mammals, but we do not use dental formulae for reptiles? (4 points)

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20. Convergent evolution, or convergence, can be used to explain: (2 points)

- (a) The similarity of deer fawns and moose calves
- (b) The differences between dentition in Felidae and Canidae
- (c) The similarity of marsupial moles and the moles present in North America
- (d) The process by which a wolf pack converges on a deer that it is about to kill

## Mammalogy Midterm Examination, Long-answer portion

If you have any questions or concerns, feel free to contact me either by e-mail or by phone (720-4372) at any hour of the day or night. Good luck.

Due on Thursday, March 25<sup>th</sup> at 12:00 noon.

You are not allowed to either give or receive assistance on this examination, from individuals in the course or individuals outside of the course. By turning in the examination you are implicitly stating that you have neither given nor received assistance in completing the examination.

Some suggestions and guidelines:

You may not hand in your answer in hand-written format.

You must hand in your answer printed from a computer or by email (to rmoen@nrri.umn.edu)

Outline your answer before you begin to type it.

Organization is important for the best answer.

Use paragraphs and sentence structure to improve organization.

Grammar is an important (i.e., gradeable) portion of your answer.

Underline and define important words in your answer.

Edit your answer at least once and preferably more than once before you hand it in.

Answer questions, let the answer sit for hours, and then re-edit the answer.

BACKUP your work !!! Backing up cannot be emphasized enough.

I recommend saving files as versions, e.g., MidTerm\_a.doc, then MidTerm\_b.doc, etc.

You should also back up the file to a floppy disk or CD.

You need to answer 3 of the following questions for this portion of the exam. Select either A or B from couplets 1, 2, and 3. This means that you cannot answer both 1A and 1B, you must choose either 1A or 1B, and likewise for 2A and 2B, and for 3A and 3B.

Each question is worth 20 points. The short-answer portion of the exam will be worth 40 points and will be given at 3:00 on Wednesday March 24<sup>th</sup> in the lecture classroom.

You must limit your answer to each question to 1 single-spaced page, or 2 double-spaced pages (preferred). Your goal is to provide clear, succinct, and organized answers to each question.

## Question 1.

1A. As a scientist you are occasionally called upon to provide information to High School science classes. The most recent request you had was for information on how mammals move while they are going about their daily activities. Identify and describe at least 3 of the modes of locomotion used by mammals. Include examples of species that use the modes of locomotion that you identify in your answer.

1B. A friend of yours wonders whether it is possible to deduce characteristics of the digestive system based on the structure of teeth. You receive in your mailbox one skull (with mandible) that has grinding molars that appear to be evergrowing that is labelled "A". A second skull contains very sharp teeth as well as molars that appear to be able to grind foods also that is labelled "B". Given that information, you believe you are willing and able to make some informed statements about the digestive system of each animal. What would you say? Include examples in your answer.

## Question 2.

2A. What are the basic types of biological rhythms that mammals have? Compare and contrast the different types, with examples. Include at least one example that is not included in the textbook that arises from your experiences or from lecture.

2B. Imagine that you are an animal of the temperate region that is suddenly transported to a new location. You are given 5 wishes by the genie that decided to transport you. Wish number 1 is to choose whether you want to go north to a region such as central Canada or to go south to a dry desert area. After that wish is granted, the genie informs you that you have 4 more wishes that she can grant you, with the restriction that these wishes must be for adaptations that will help you survive. What would you wish for, and why? Don't forget to include examples in your answer.

Question 3.

3A. An invertebrate biologist asks you to compare and contrast the female reproductive systems of prototherian, metatherian, and eutherian mammals. She has studied textbooks and understands the basic anatomical differences, therefore she is really interested in the functional or ecological differences among these groups. You can use anatomical terms freely in your answer without defining them because of her familiarity with anatomical terms. How would you respond? Don't forget to include examples in your answer.

3B. There are 5 different faunal regions identified in the world (terrestrial, ignoring the oceans for now). The number of endemic species in the faunal regions varies for several reasons. Identify some of these reasons and explain how they affect the number of endemic species in a faunal region. Don't forget to include examples in your answer.