BSCS Honor Portfolio – Quarter 2

As an honor student, you are expected to work more independently and to complete various additional assignments. The schedule of due dates is in the table below. If an assignment is late, you will lose point each school day. You may not turn in an assignment beyond a week after the due date. Each assignment will be graded and returned to your portfolio folder, kept in the classroom.

* All assignments should be typed, double-spaced (with the exception of the very neat handwritten notes from web activities).
* Pay attention to your depth and clarity of responses, organization, and neatness.

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| **Assignment** | **Due Date** |
| **Ecology** 1. **Case Study** - The Effects of Coyote Removal in Texas | Part I-III  Monday Nov 18th |
| Part IV-V  Monday Nov 25th |
| **Biochemistry and Digestion**  **2. Article** response – *Atherosclerosis: a New View* | Monday Dec 9th |
| **3**. **Case Study -** Of Cannibals and Calories | Thursday Dec 19th |
| **4. Genome book Chapter 10** (*Stress*) | Monday Jan 13th |
| 1 page **reflection on the quarter** (typed, 2.0-spaced, size 12):   1. How is the quarter going? 2. What do you need to work on? 3. What have you enjoyed most and why? 4. What have you enjoyed least and why? 5. Do you think that this quarter’s honor credit work is or is not challenging enough? Explain. 6. What did you think about the Genome book chapter? 7. What did you learn that was new about ecology and energy? about biochemistry? | Tuesday Jan 21st |

**1. The Effects of Coyote Removal in Texas: A Case Study in Conservation Biology***This case study is included at the back of this packet. Type your answers into a separate document. Use complete sentences on questions that ask you to explain something.*

**2. Article response:** *Atherosclerosis: A New View*

Read the article and write a 1-1.5 page, typed (double-spaced) thoughtful response. To earn full credit, you will include each of the following. Organize each point into a separate paragraph.

* Summarize all of the key concepts presented here in 1-2 paragraphs (5-10 sentences). Be sure to use your own words and to include ALL major points!
* Copy down an interesting quote (use quotation marks) and explain why it resonated with you/ why you thought it was so interesting.
* Explain the connections between this article and the Biochemistry Unit.
* Discuss the relevance of the subject matter – why is this information important to know?

**3. Of Cannibals and Calories***This is in a separate packet. You should answer the questions from part A, B, and analysis questions on a separate sheet of paper. Please type your responses and hand-draw graphs.*

* 1. You will need a handout, BSCS Textbook pages 343-347 (for the reading “Factors Influencing Performance”), 4 sheets of graph paper, and 2 different color highlighters
  2. First, read the introduction, then complete the following for Part A:
     + Complete the Process and Procedures #1-3.
     + For #2, take notes on any observations you make as you look over the party members. You should write down trends or patterns you notice.
     + You will complete the activity individually, rather than as a team as the directions state.
  3. Complete the following for Part B:
     + Complete all parts of the Process and Procedures, #1-9, recording answers in complete sentences. Number your responses, as they are on the handout. When instructed to “discuss” questions with a team, you are to type your answers.
     + For #6-8, make sure you create a data table as the instructions state.
  4. Analysis Questions: Answer questions 1-6, in complete sentences and so that the question is understood.

**4. Chapter 10: *Stress*.** Ridley, Matt. Genome: The Autobiography of a Species in 23 Chapters. New York: Harper Collins Publishers. 1999. Pp 147-160.

As you carefully read Chapter 10 in the book Genome, type your answers to the questions below **(in your own words! If you copy sentences straight from the book, the question will be marked wrong and you will receive no points for it – also, do not simply “change the sentence phrasing or wording slightly” – your answer should “sound like you”, not a textbook or Matt Ridley!** You must type out the questions as well as the answers. Remember to keep a dictionary handy (or Google…) in case you don’t know a word in the reading and need to look it up. *Skip pages 150 (Starting with the paragraph that starts “The question…”) to 154 (ending with the paragraph that ends “…at the beck and call of the behavioural.”). This section contains complex stuff. If you are interested, go ahead and read it! There are no questions on this section, but you can try to read it anyway to challenge yourself!*

# From what molecule to humans make steroids and what are some functions of these resulting steroids? (P 148)

1. What are some of the functions of cortisol? (P 148-149)
2. In no more than 4 sentences, describe why you are more likely to get sick when you are under stress (in as much detail as you feel confident that you understand). (P 149-150)
3. Describe the study of the young male baboon introduced to a new troop and how this relates to humans. (P 154-155)
4. How does testosterone affect the immune system? Discuss one of the pieces of evidence that the author describes. (P 157)
5. Describe sexual selection, including why a male with a large tail, loud song, or some other large, colorful “ornament” may win out. (P 158)

**The Effects of Coyote Removal in Texas: A Case Study in Conservation Biology[[1]](#footnote-1)**

**Part I: Introduction**

The plains of West Texas are part of a semi-arid ecosystem dominated by a mixture of shortgrass prairies and chaparral. The primary producers in the prairies include species of grasses and other herbaceous flowering plants (forbs). The chaparral is dominated by a variety of shrubs including mesquite and yucca intermixed with grasses and forbs. The low-level predators, scavengers, and herbivores in this system include jackrabbits, cottontails, ground squirrels, and other rodents (three species of rats, and seven species of mice). The mammalian mesopredators in this system are badgers, bobcats, skunks, and grey fox. The top-level predator is the coyote.

Humans often eliminate coyotes and other top order predators from natural communities. Removal is generally aimed at increasing game populations, and protecting livestock, pets, and small children. Previous studies indicate that the effect of removing coyotes varies depending on the type of community from which they have been removed.

You have received a request for proposals from the Nature Conservancy. The Conservancy wants to determine the effects of coyote removal in West Texas.

Factual questions, in response to above reading:

1. How many different mouse and rat species live in this ecosystem?

2. Assuming that these rodents eat plants, which of the following terms would describe rodents? Select all that apply.

a.) producers b.) consumers c.) autotrophs

d.) primary consumers e.) secondary consumers f.) primary trophic level

g.) secondary trophic level h.) heterotrophs i.) herbivores

3. Which of the following terms would describe mesopredators? Select all that apply.

a.) producers b.) consumers c.) autotrophs

d.) secondary consumers e.) tertiary consumers f.) secondary trophic level

g.) tertiary trophic level h.) heterotrophs i.) herbivores

4. Provide two examples of autotrophic species within this ecosystem.

5. Draw a possible food chain for this ecosystem. (You do not need to type this one.)

Open-ended questions:

6. What is the research question that you are trying to answer? Phrase the question as specifically as possible. (For example: “How do coyotes affect ecosystems?” is not acceptable.)

**Part II: Experimental Design**

Congratulations! Your proposal has been funded. Your final design includes four 5,000-hectare (ha) sites: two control and two treatment/experimental sites. See figure 1, below. The communities in the control sites are similar to those in the treatment sites. All coyotes will be removed from the treatment sites and from a 5-kilometer (km) border around the sites. There will be no experimental manipulation in the control sties. You will monitor the animal community on all sites for one year prior to treatment and two years following coyote removal.



Open-ended questions:

10. How do you think that the absence of coyotes will affect the mesopredators? Explain.

11. How do you think that the absence of coyotes will affect the rodents? Explain.

**Part III: Mesopredators**

After monitoring the mesopredator populations for three years, you plotted the total abundance of badgers, bobcats, skunk, and fox found on the treatment and control sites each year, as shown below in Figure 2. Use these data to interpret the impact of coyote removal on the community of small mammalian predators.



Figure 2:

Observation questions:

12. In what (approximate) month and year were coyotes removed?

13. On the control sites, what is the greatest number of mesopredators per km ever observed?

14. On the treatment sites, what is the greatest number of mesopredators per km ever observed?

15. Which of the following statements is/are directly supported by Figure 2? Select as many as apply.

a.) In the absence of coyotes, mesopredator populations generally increase.

b.) In the absence of coyotes, the skunk population generally increases.

c.) Coyote removal doesn’t seem to have an effect on mesopredator population sizes.

Open-ended questions:

16. Based upon the data in Figure 2, what do you predict might have happened to the rodent populations?

**Part IV: Rodent Population Size**

You decide to analyze the data on rodent population next. As a measure of population size, you decide to compare the rodent biomass in grams per hectare in the treatment and control areas over the three years of the study. This data is available in Figure 3.



Figure 3:

Observation questions:

17. The graph above measures rodent biomass. What does this mean? Select one

a.) The total mass of all mouse and rat organisms.

b.) The average mass of a single rodent organism.

c.) The total number of all mouse and rat species.

d.) The total number of mouse and rat organisms.

18. Before treatment, what was the approximate rodent biomass *in kg* per *10 hectares*?

19. After treatment, what was the peak rodent biomass in kg per 10 hectares?

20. By the Winter of 1991, how did rodent biomass compare to the Winter of 1989?

Open-ended questions:

21. Does the data in Figure 3 support your hypothesis regarding rodent population? Explain why or why not.

22. Propose a **detailed** possible explanation for the data in Figure 2. Be sure that your explanation addresses both the peak of rodent biomass (Fall 1990), as well as the general increase in rodent biomass in 1991 as compared to 1989.

**Part V: Rodent Diversity**

When you look at the population size of individual rodent species, you realize that the Ord’s kangaroo rat seems to be doing particularly well in treatment areas, whereas other rodent species are not doing so well in treatment areas. Examine Figure 4, in order to compare the rodent diversity in the control and treatment areas before and after coyote removal.



Figure 4:

Observational questions:

23. Based upon the graph complete the following data chart. Recreate the chart in your answer.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Spring 1989 | Spring 1990 | Spring 1991 | Winter 1991 |
| Rodent diversity in control site (coyotes present) |  |  |  |  |
| Rodent diversity in treatment site (coyotes absent) |  |  |  |  |

Open-ended questions:

24. Why do you think that the kangaroo rat might increase so much in population size in the absence of coyotes?

25. Why might the increase in the kangaroo rat population lead to a decrease in the population size of other rodent species?

26. Propose one possible cause for the *decline* in rodent diversity in the control areas after treatment begins.

27. Use the reverse side to discuss ***three*** possible consequences regarding the health of West Texas ecosystem, as a result of an excessive number of kangaroo rats and not many other rodent species. Be as specific as possible, by proposing hypothetical and logical consequences. Show original thinking. This answer requires the most extensive answer – need multiple paragraphs!

1. Adapted from a case study written by Margaret Carroll, Department of Biology at Framingham State College [↑](#footnote-ref-1)