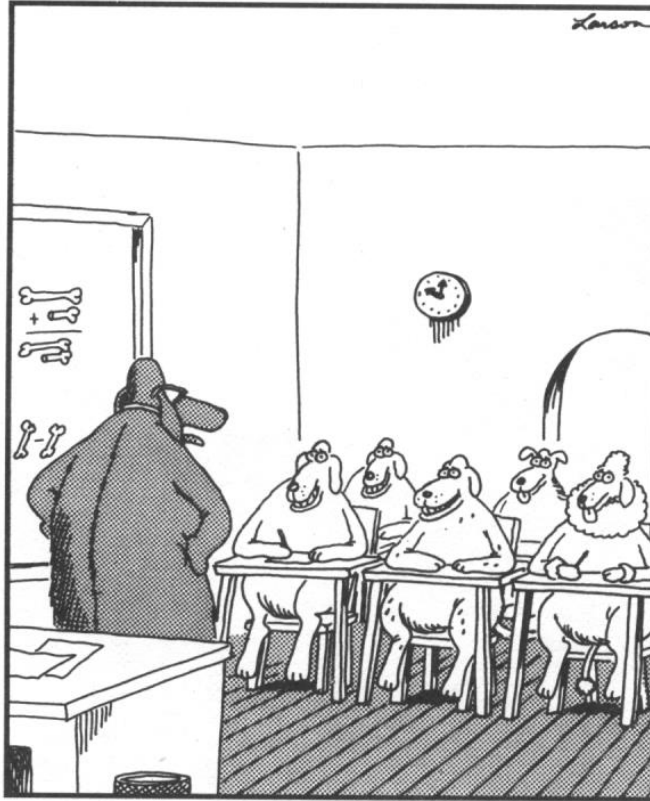


**AP Biology Summer Assignment**  
Mrs. Ouellette  
Room 243



"Well, here we go again. ... Did anyone here *not* eat his or her homework on the way to school?"

Read **EVERYTHING** in this packet  
before leaving for the summer!

**AP Biology Summer Assignment**

Licking Heights High School

Mrs. Ouellette

couellette@lhschools.org

Use this checklist and recommended timeline to help you stay on top of your AP Biology summer assignment!

	<b>Item</b>	<b>Completed</b>
<b>1</b>	Sign up for Mrs. O's Remind roster <a href="https://www.remind.com/">https://www.remind.com/</a>	
<b>2</b>	Send Mrs. O an e-mail of introduction <a href="mailto:couellette@lhschools.org">couellette@lhschools.org</a>	
<b>3</b>	Watch Bozeman Podcast: <i>Natural Selection</i> <a href="http://www.bozemanscience.com/001-natural-selection">http://www.bozemanscience.com/001-natural-selection</a>	
<b>4</b>	Watch Bozeman Podcast: <i>Animal Behavior</i> <a href="http://www.bozemanscience.com/animal-behavior">http://www.bozemanscience.com/animal-behavior</a>	
<b>5</b>	Complete Chapter 51 Behavior reading guide <b>*Reading Quiz on August 16<sup>th</sup></b>	
<b>6</b>	Research your animal on the Columbus Zoo website <a href="https://www.columbuszoo.org/guide/">https://www.columbuszoo.org/guide/</a>	
<b>7</b>	Collect observational data at the Columbus Zoo	
<b>8</b>	Photo documentation of trip to Columbus Zoo	
<b>9</b>	Create ethograms using collected data	
<b>10</b>	Write analysis paper	

**\*Shaded rows indicate things that MUST be turned in to Mrs. O on the first day of school.**

# **FINAL DUE DATE: August 15<sup>th</sup>, 2018**

This document outlines the particulars that you will need to fulfill during the summer. I have provided a convenient checklist with recommended due dates to help keep you on track. If you have any questions PLEASE come see me before the end of the school year!

**You MUST do the following before leaving for the summer!**

- Add yourself to my Remind101 roster
  - You will need to text the following information to the Remind101 site.
    - <https://www.remind.com/>
    - To: **81010**
    - Message: **@fda37k**
- Send me an e-mail introducing yourself
  - My e-mail is [couellette@lhschools.org](mailto:couellette@lhschools.org)
  - The title of your e-mail should be “**AP Biology, first and last name**”
  - Tell me something about yourself. If you are already a student of mine, tell me something I don’t know yet!
  - Tell me what you are most excited about for AP Biology.

**PART I: READING ASSIGNMENT**

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Before you take your trip to the zoo (see Part II) you will want to read over Chapter 51 (Animal Behavior) in your textbook. This will give you some background concerning the types of behavior patterns you might be observing.

**I will expect you to integrate knowledge from this reading into your analysis in Part II of this project.**

A reading guide follows at the end of this packet for chapter 51. You will also be directed to watch two Bozeman podcasts ([Natural Selection](#) & [Animal Behavior](#)) as you read. Please answer every question thoroughly as you will have a reading quiz on the first day of school that will be reflective of these concepts.

In order to access the textbook you may choose to:

- Check out a textbook from our school library prior to leaving for summer vacation
  - You are responsible for this book if it becomes lost or damaged.
- Purchase a used copy of the textbook through Amazon
  - Campbell Biology, 9<sup>th</sup> edition (ISBN: 9780321558237)
  - They can be super cheap right now if you act fast!

**PLEASE NOTE**

- You are responsible for getting access to the textbook!
- You are responsible for having all parts of this assignment completed on the first day of school!
- No excuses will be accepted as to why the assignment is not completed.
- **The reading quiz on the second day of school will be the first quiz grade that you will receive in your AP Biology class!**

## **PART II: ANIMAL BEHAVIOR STUDY**

The study of animal behavior, or ethology, is important for understanding how members of a population interact with one another and how different species behaviors compare. The study of animal behavior also provides opportunities for learning about the process of doing science, as well as developing basic skills of observation, description, and quantification.

In order to complete this assignment you will need to visit the Columbus Zoo. The following are your major objectives:

1. Select an animal to observe for a period of at least one hour.
2. Record your observations over the course of each hour using at least one of the methods discussed on the following page.
3. Read and take notes of any displayed information about the animals you are observing while at the zoo.
4. Compile your data into an ethogram (a graph and/or table summarizing the observed behaviors).
5. Write a paper in which you analyze the data you have collected.

The following are links to the Columbus Zoo website that can help you to plan your trip and collect information about your animal.

**Columbus Zoo Website**  
<https://columbuszoo.org/>

**Columbus Zoo Animal Guide**  
<https://www.columbuszoo.org/guide/index.html>

You are going to have to observe the animal you choose for at least one hour. Be sure to ask yourself the following questions before setting off on your trip.

- **What interests me about this animal?**
- **What questions do I have about this animal?**
- **Would I like to spend time observing this animal? Why or why not?**
- **What kind of sampling methods would be most appropriate for this animal?**
- **Is this animal my choice for a research subject?**

### **PLEASE NOTE**

- If you are unable to visit the Columbus Zoo, you may visit another location with animals that you can observe. A local farm, dog park, wildlife preserve, or any other location that allows you to observe a population of animals of the same species will work.
- You must submit photo documentation that you were actually at your location. YOUR FACE must be in the picture.
- You must submit all of your observational data that you collected along with your formal assignment.

## Behavioral Patterns

There are two types of behavior patterns that you may observe.

- a. **Behavioral Event:** An event is a behavior pattern with relatively short duration and can be numerically quantified in terms of the frequency of occurrence. For example, the number of times an elephant trumpets in 1 minute is a measure of a behavioral event.
- b. **Behavioral State:** States are behavior patterns of relatively longer duration. They can be characterized quantitatively by measuring the duration or proportion of time spent doing the activity. For example, the proportion of time a baboon spends grooming another individual during a one-hour interval is an example of a behavioral state.

## Behavioral Sampling Methods

You must choose at least one of the following types of sampling methods while observing your animals. Collecting more than one type of data can give you a better picture of what is going on so it may be useful to partner up with another student who is interested in observing the same animal as you.

- **Focal-Animal Sampling:** All of the actions performed by one animal are recorded during a specific time period. For example, all of the activities of animal A are recorded for 5 minutes. The activities of the other animals in the group are not recorded. When the time period is up, the observer moves on to animal B to record that animal's activities. This continues until all of the animals in the group have been observed for the specified time period.
- **Instantaneous Sampling:** The observer records the behavior of one individual in a group at predetermined time intervals. This sampling methods records states, rather than events. For example, the state of animal A is recorded every minute over the course of one hour.
- **Continuous Sampling:** The observer simply records all of the activity (states & events) that occurs while the animals are being watched. This sampling method is very helpful in recording social interaction between two or more animals in a group. An example of this sampling method would be to record when chases, fights, feeding bouts, nursing bouts, etc., occur during the period of observation.
- **Scan Sampling:** Scan sampling is very similar to instantaneous sampling. In scan sampling the behavior of all the individuals in a group of animals are recorded at predetermined time intervals. As with instantaneous sampling, states are recorded instead of events. An example of scan sampling would be to observe a group of animals and record the behavior of each animal in the group at one minute intervals for your one-hour interval.

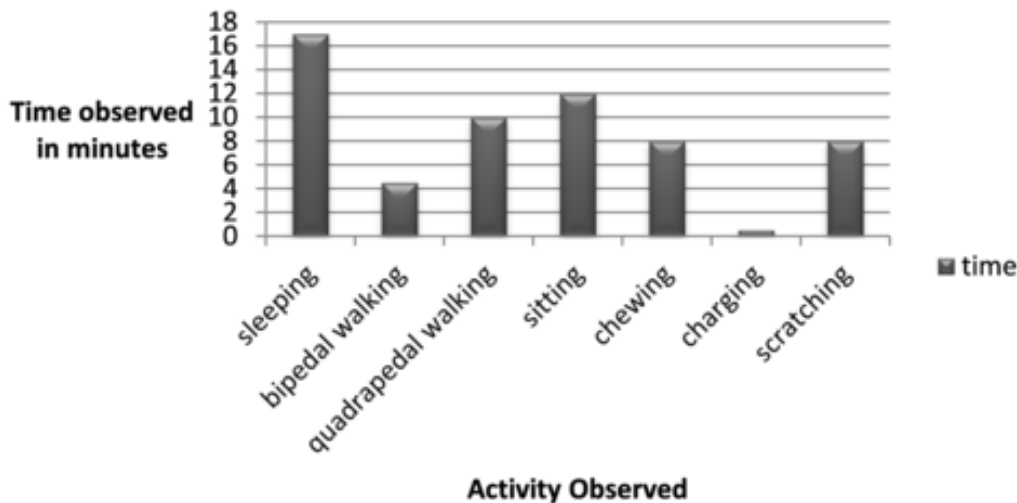
### PLEASE NOTE

- You are responsible for developing a table to organize and collect all your data during your visit to the zoo.
- It might be useful to observe your animals for a time prior to deciding what type of sampling would best suit your needs.
- You must submit this hand-written data table with your observations along with photo documentation of your visit.

## Ethograms

An ethogram is a catalog or inventory of behaviors or actions exhibited by an animal. The behaviors in an ethogram are usually defined to be mutually exclusive and objective. The format of your ethogram should correspond to the types of sampling methods that were used. For example, you might need to display the proportion of time spent in various states/events.

**Figure 1: Activities of Observed Gorillas**



Or, after analyzing all of your observational data you may need to categorize and define behaviors.

**Table 1** - Working ethogram of *Rhynchotus rufescens* observed groups.

Category	Description
Aggression Initiator (AGI)	The bird pecks another one when it goes near it, or when the other bird gets near it.
Aggression Receiver (AGR)	Bird is pecked by other birds.
Threat (TT)	The bird points or hurls its head in direction of another bird, and pursues it.
Preening (PR)	The bird grooms its feathers with the beak.
Dust bathing (DB)	The bird walks and makes oblique movements, lowering its body and pecking the soil. It may straighten its body and continue to walk, or it may turn and sit near the pecking soil area. In this position, it continues to peck the soil in front of its chest, always sprinkling the litter material onto its body.
Drinking (DK)	The bird stops in front of the drinker, lowers its beak and pecks the water trough, and drinks.
Scratching (SC)	The bird uses the beak and/or feet to stir the soil or the litter
Eating (ET)	Bird in front of the feeder, lowers its head, and grabs feed particles with its beak.
Displacement (DI)	The bird, keeping the body erect, moves along or around the cage, putting one leg in front of the other and thrusting its body forward (walking or running).
Bristling (BR)	The bird bristles its plumage, shaking its body laterally with half-circular movements.
Stretching (SO)	The bird stretches out the leg and the wing of the right (left) side of body.
Avoidance (AV)	The bird, motionless or in displacement, changes the direction of its movement as another bird approaches, avoiding it.
Mounting (MO)	The bird approaches another bird and places a foot on its back. The other animal crouches, and allows the first animal to climb its back.
Standing (ST)	The bird stands immobile in erect position at least for 5 seconds.
Sitting in immobility (STI)	The bird remains in sitting position at least for 5 seconds.
Sitting in activity (STA)	The bird, in sitting position, scratches the soil or the litter with its beak, or preens its feathers with beak.

### Analysis Paper

Your analysis should consider the “why” behind what you observed and should be written after you have completed your ethograms and researched your animals. You should also integrate applicable content from your Chapter 51 Animal Behavior reading into your analysis. Try to think about how the observed behaviors may help an animal’s fitness and/or how it may help the population as a whole. Ask, “Can the behaviors be explained by”:

- Innate or learned behavior?
- The natural environment they are adapted to?
- The enclosure in which they live at the zoo?
- The social hierarchy within their population?
- Mating strategies within their population?
- Type of parental care?

There is no designated length for your analysis. Scientific writing requires that you be thorough, but succinct. Be sure to support your analysis with data from your ethograms and content from Chapter 51. Do not waste time telling me how passionate you are about saving gorillas, or how much you adore red pandas. This is NOT an English paper, so leave out the fluff and give me the facts. Also, please refrain from using any pronouns.

I will expect that your ethograms are completed in Excel and are integrated into the document you produce. The samples on the previous page are a good indicator of the format I will expect. Use the following checklist to make sure you have formatted everything appropriately:

Graph	Table
<ul style="list-style-type: none"><li>○ Figure 1, 2, 3...</li><li>○ Title</li><li>○ X &amp; Y axis are labeled</li><li>○ Units present when appropriate</li><li>○ Key is present when appropriate</li></ul>	<ul style="list-style-type: none"><li>○ Table 1, 2, 3...</li><li>○ Title</li><li>○ Row &amp; column headings</li></ul>

Any resources that were used to acquire information about your animals must be referenced in a works cited page. We will use MLA format. Refer to the Owl Writing Lab for a review of this process.

### MLA Formatting and Style Guide

<https://owl.english.purdue.edu/owl/resource/747/01/>

#### PLEASE NOTE

- You are responsible for having all parts of this assignment completed on the first day of school!
- No excuses will be accepted as to why the assignment is not completed.
- **This assignment will be the first lab grade that you will receive in your AP Biology class!**

Watch the following Bozeman podcast on [Natural Selection](#) before reading chapter 51.

1. Describe Darwin's major contribution to science.

2. Define the following vocabulary terms below

<b>Term</b>	<b>Definition</b>
Evolution	
Gene pool	
Environment	
Natural selection	
Fitness	
Hardy Weinberg	
Adaptations	

3. Create a concept map using the above terms in the space below. Place vocabulary terms in boxes and connect them with arrows to demonstrate the relationships between terms. **You should include terms/phrases over each arrow to further explain relationships between terms.**



4. Summarize how the process of natural selection has worked on the following two populations of organisms.

<b>Bacteria</b>	<b>Peppered Moth</b>

5. Defend the statement that adaptation is a process. Use the African cichlids from the Rift Valley to support your reasoning.

## AP Biology Summer Assignment

Licking Heights High School

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Use the information included in Chapter 51: Animal Behavior (p.1115-1141) to complete the following reading guide. Bozeman's [Animal Behavior](#) podcast may also be helpful.

### **CONCEPT 51.1: Discrete sensory inputs can stimulate both simple and complex behavior**

1. Behavior is an action carried out by muscles under control of the nervous system in response to a stimulus. Behavioral ecology is concerned with:
  - Proximate cause →
  
  
  - Ultimate cause →
  
2. Describe the relationship between a fixed action pattern and a sign stimulus? Give an example.
  
  
  
  
  
  
  
  
  
  
3. How do various environmental stimuli (position of sun, magnetic field) trigger and provide cues about migration?
  - a. Differentiate between circadian and circannual rhythms.
  
  
  
  
  
  
  
  
  
  
4. Signals are stimuli that cause a change in the behavior of another individual and are the basis of animal communication.
  - a. Discuss the role of visual, chemical, tactile, and auditory communication in the stimulus-response chain of *Drosophila melanogaster* (fruit fly) courtship. (Figure 51.4)





**CONCEPT 51.4: Inclusive fitness can account for the evolution of behavior, including altruism**

1. Natural selection is not perfect. Often there are trade-offs. Discuss how altruism, inclusive fitness, and kin selection illustrate this concept.