Biology 111 Closed Book Take-Home Exam #3 – Emergent Properties

There is no time limit on this test, though I have tried to design one that you should be able to complete within 3 hours. There are 5 pages in this test, including this cover sheet. You are not allowed to look at someone else's test, nor use your notes, old tests, the internet, any books, nor are you allowed to discuss the test with anyone until all exams are turned in no later than 9:30am on Monday November 8. **A HARD COPY OF YOUR EXAM IS DUE BY 9:30 am ON MONDAY NOVEMBER 8**. If you turn in your exam late, then you lose a letter grade for each day you are late. You may use a calculator and/or ruler. The **answers to the questions must be typed under each question** unless you draw the answer. If you do not write your answers in the appropriate location, I may not find them.

I have provided you with a "Data Gallery" in the form of figures and tables. You must move the appropriate image from the last two pages and incorporate them into your answers whenever you see the expression, "Use data to support your answer." Do not assume how many of the data images you will use, or not use, and you are allowed to use any data image more than once if you need to, and you can use more than one image per question. Simply placing data near your answer is not sufficient support for your answer. You must explain how the significance of the data and how they support your answer. I have given you sentence limits for each question, so be concise.

There are 0 Quick Recall questions that are multiple choice.

-3 pts if you do not follow this direction.
Please do not write or type your name on any page other than this cover page.
Staple all your pages (INCLUDING THE TEST PAGES) together when finished with the exam.

Name (please print):

Read the pledge and sign if you can do so with honor:

_____

On my honor I have neither given nor received unauthorized information regarding this work, I have followed and will continue to observe all regulations regarding it, and I am unaware of any violation of the Honor Code by others.

How long did this exam take you to complete?

Lab Questions

10 pts.

1) Limit your answers to a maximum of **1 sentences each (only labels for part c)**.

a) How do you calculate the magnification on a light microscope?

b) How long is a typical Chlamydomonas flagellum?

c) Draw a picture of Chlamydomonas with all its flagella intact.

Lecture Questions:

10 pts.

2) Limit your answers to a maximum of **3 sentences for each part**.

a) Provide three examples of genetically identical cells producing different phenotypes under identical environmental conditions. Each example must be accompanied by data to support your answer.

b) How can non-genetic traits be passed on to the next generation and yet not be contradictory to insights from Mendel and Darwin? Support your answer with data.

14 pts.

3) Limit your answers to a maximum of **3 sentences for each part but you may use 4 for part b**.

a) When watching a movie of Dictyostelium cells moving to a common site to form a slug, the wave of moving cells appear to be moving away from the center. Explain this apparent contradiction.

b) Use a figure to explain how individual Dictyostelium cells move unidirectionally to a common site.

c) How did investigators determine what molecule was used to recruit Dictyostelium cells to a central location? Support your answer with data.

9 pts.

4) Limit your answers to a maximum of **3 sentences for each part**.

a) Describe the evidence Kandel used to demonstrate for the fist time that Aplysia was capable of learning.

b) Draw a picture of the experimental design that demonstrated facilitation and capture of learning. (no sentences required, only neatly written labels)

c) What protein is the pivotal molecule in converting short-term memory to long-term memory? Support your answer using a diagram.

16 pts.

5) Limit your answers to a maximum of **3 sentences for each part**.
a) Does a pregnant female have a functional immune system? Support your answer with data.
b) What molecule is the cause of the fastest tissue rejection? Support your answer with data.
c) What cell type is the cause of graft rejection? Support your answer with data.
d) What protects a fetus from its mother's immune system? Support your answer with data.

10 pts.
6) Explain the disposable soma theory of senescence. Support your answer with two different data examples. Limit your answers to a maximum of **4 sentences**.

6 pts.
7) List three concerns society should have about introducing new organisms into an environment? Use data to support at least one of your answers. Limit your answers to a maximum of **3 sentences**.

8 pts.
8) Limit your answers to a maximum of **3 sentences for each part**.
a) Describe the traits that make hemoglobin the ideal molecule for carrying oxygen from your lungs to your tissues. Make sure this answer is different from part b below.
b) Provide three mechanisms that allow hemoglobin to have the property you described above? Support your answer with data.

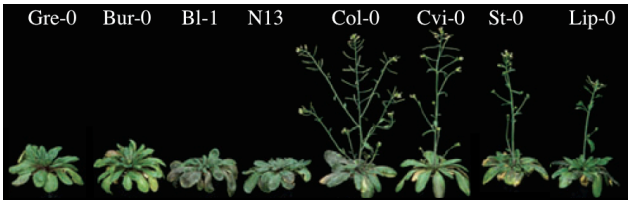
8 pts.
9) Limit your answers to a maximum of **3 sentences for each part**.
a) Describe two common emergent properties used by lambda to "decide" the λ lifestyle. Support your answer with data.
b) Explain how the choice between lystic and lysogenic are mutually exclusive. Support your answer with data.

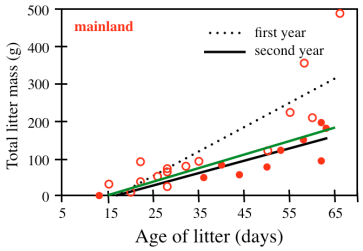
9 pts.
10) Limit your answers to a maximum of **3 sentences for each part**.
a) Describe how a cyanobacterim cell maintains its daily rhythm. Support your answer with data.
b) Briefly explain how two different environmental signals reset circadian rhythms. Support your answer for one of these two signals with data.
c) Do circadian rhythms provide a selective advantage? Support your answer with data.

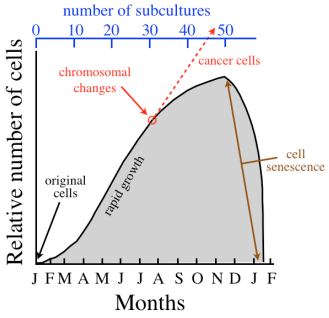
Data Gallery

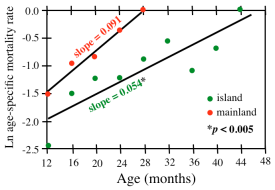
experimental conditions	baby skin transplanted to:		rabbit E skin transplanted to:	
	foster mother A	unrelated rabbit D	foster mother A	unrelated rabbit D
average days graft survived	4.0 *	6.5	6.0 *	7.0

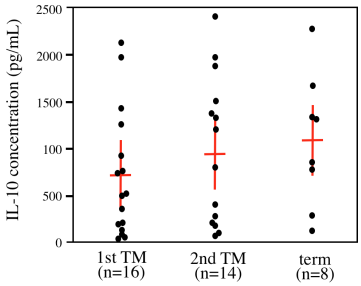
* indicates $p < 0.01$; experiment replicated 5 times

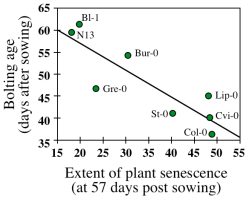


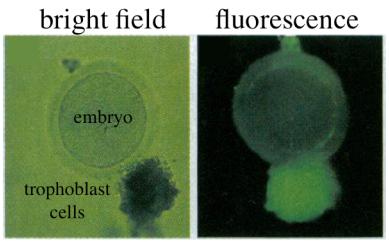


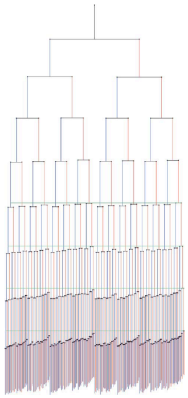


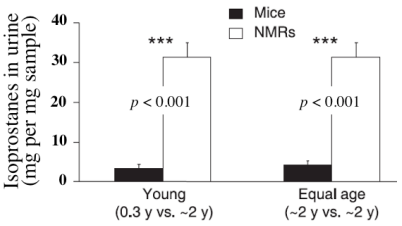


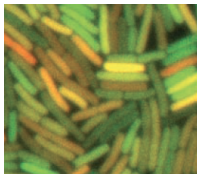


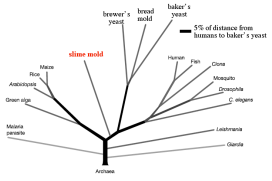


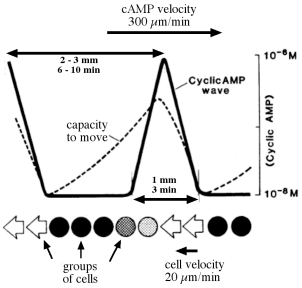


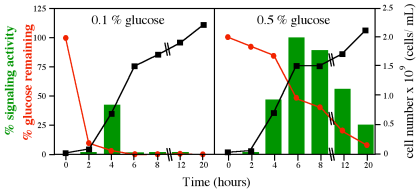


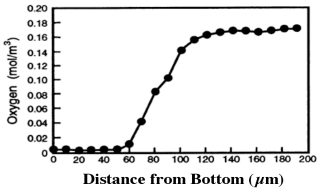


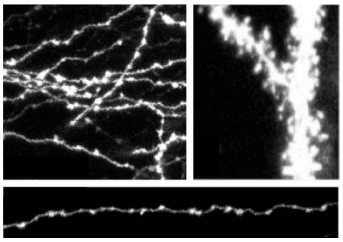


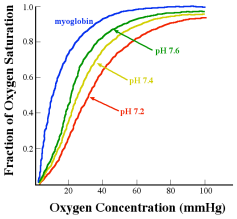


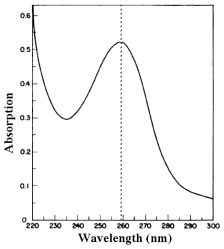


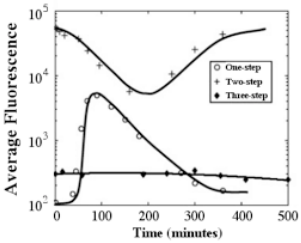


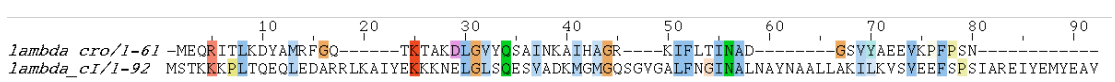
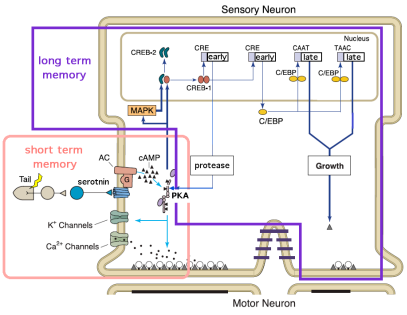
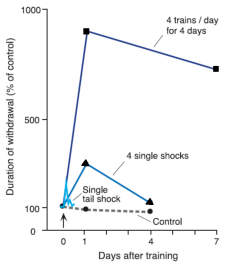
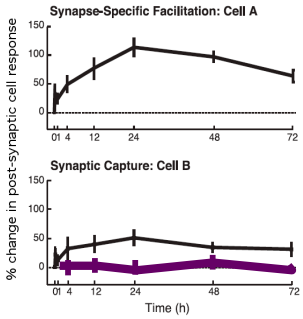
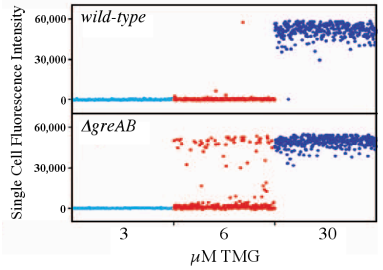
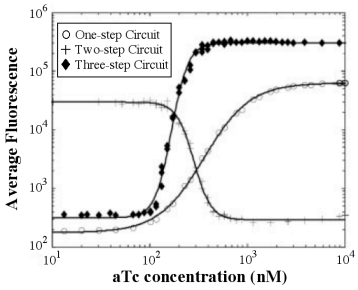
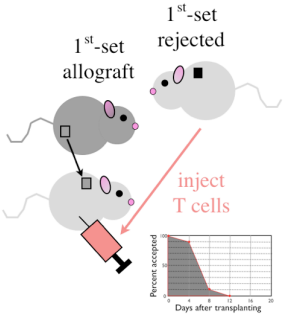
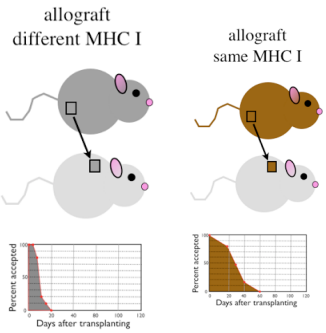
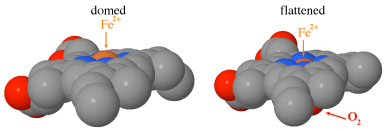
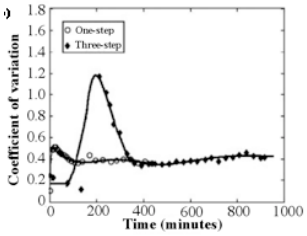
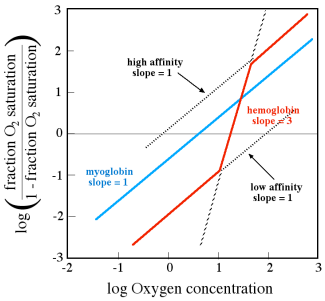
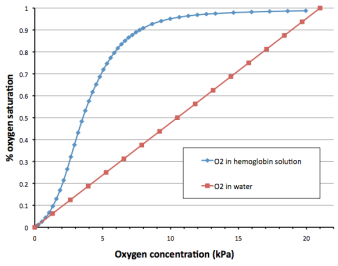
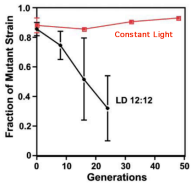
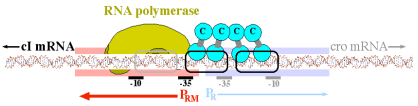
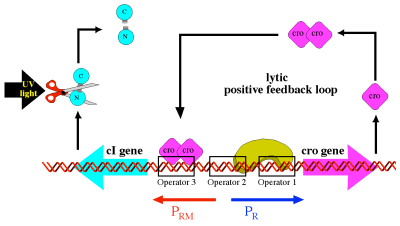
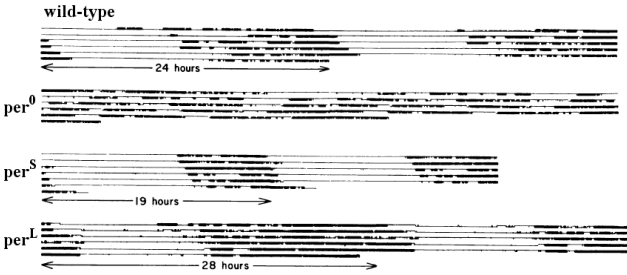
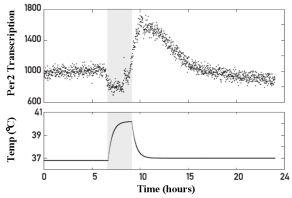
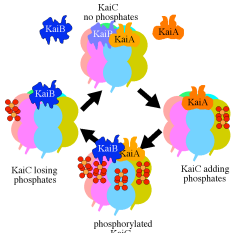
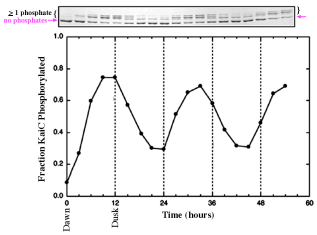
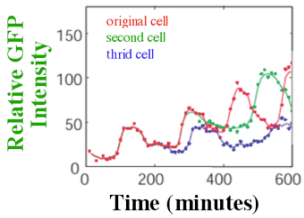
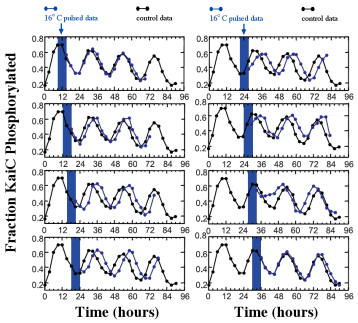












Dr. Campbell's Bio111 Exam #3 – Fall 2010