

Biology 111 Closed Book Take-Home Exam #4 – Homeostasis

There is no time limit on this test, though I have tried to design one that you should be able to complete within 4 hours. There are **6 pages** in the exam, 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 noon on Wednesday December 15th. **A HARD COPY OF YOUR EXAM IS DUE BY NOON ON WEDNESDAY DECEMBER 15.** 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. No need to print the data gallery.

I have provided you with a “Data Gallery” in the form of figures and tables. You must move appropriate images from the Data Gallery 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. You are allowed to use any data image more than once if you need to. 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 4 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 (excluding data gallery 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 **2 sentences for parts a and c.**

- a) Why do some strains of Salmonella produce more spontaneous revertants than others?
- b) Sketch a graph by hand that shows the number of colonies on series of plates in an Ames test if you add increasing amounts of a true mutagen. You must label both axes.

c) Why do cells grow when mutated in the Ames test *instead of stop growing* when mutated?

Lecture Questions:

10 pts.

2) Limit your answers to **a maximum of 3 sentences for parts a and b.**

- a) Explain the chemiosmotic theory. Use data to support your answer.
- b) How can carbon monoxide can kill animals? Support your answer with figures(s).
- c) What molecule is the most abundant carrier of energy in the form of reducing power for use by mitochondria? **Limit your answer to one word.**

12 pts.

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

- a) What insight did Krebs provide to biology? Use data to support your answer.
- b) What do cellular respiration inhibitors have in common? Name two examples.
- c) What do cellular respiration activators have in common? Name two examples.

15 pts.

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

- a) Summarize the 3 biochemically distinct parts of photosynthesis. **Use only one figure to support your answer.**
- b) Explain how these three parts are biochemically interconnected to each other. Use data to support your answer.
- c) Explain how light regulates the ratio of biochemically stored energy during photosynthesis. Support your answer with figure(s).

8 pts.

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

- a) Name two specific allosteric modulators that contribute to the regulation of enzymatic carbon fixation. Use data to support your answer.
- b) Relate paraquat's structure to its toxic function in plants and humans.

8 pts.

6) Explain the connection between trees in Brazil and glaciers melting in Greenland. Limit your answers to **a maximum of 4 sentences total.** Use data to support your answer.

8 pts.

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

- a) What can you conclude about homeostasis of body temperature in the absence of functional hypothalamus? Use data to support your answer.
- b) What is the relationship between the hypothalamic neuron heat stimulation and the animal's breathing rate? Use data to support your answer.

15 pts.

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

- a) Explain how the lipostat works. Use data to support your answer.
- b) What is the normal function of the proteins encoded by *db* and *ob*? Use data to support your answer.

6 pts.

9) Limit your answer to **a maximum of 4 sentences total.**

Provide specific examples of how homeostasis in plants can be regulated on 3 time scales. Use data to support your answer.

Bonus Question (2pts):

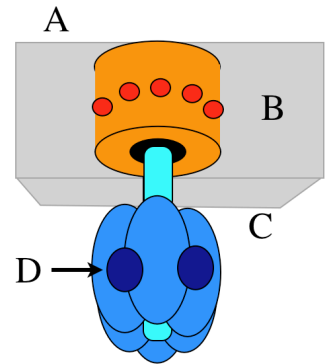
The husband and wife team of botanists who study plant evolution in eastern Washington have a nickname. The answer to this question was presented in class on the day before Thanksgiving break. What is the one word nickname?

“Quick Recall” Questions for 2 points each

Electronically underline the entire statement of the correct answer.

10) Chemiosmosis is the process of using H^+ ions to drive the production of ATP synthesis. Which statement most accurately describes the ion gradient if it were shown in the figure below?

- a) H^+ ions accumulate on the A side of the membrane.
- b) H^+ ions accumulate in the membrane as indicated by B.
- c) H^+ ions accumulate on the C side of the membrane.
- d) H^+ ions exit the ATP synthase through the pores labeled D.
- e) both (b) and (d).
- f) none of the above.



11) During cellular respiration,

- a) food molecules are gradually reduced to extract the energy.
- b) food molecules are gradually oxidized to extract the energy.
- c) electrons are added to metabolites at many steps.
- d) the overall potential energy increases at nearly every step.
- e) only (a) and (c).
- f) none of the above.

12) Carbon fixation

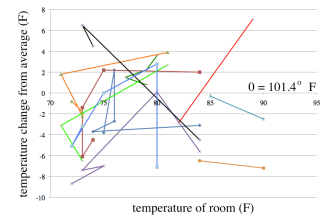
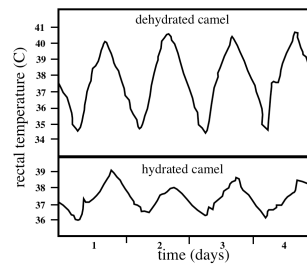
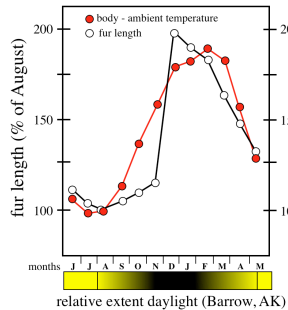
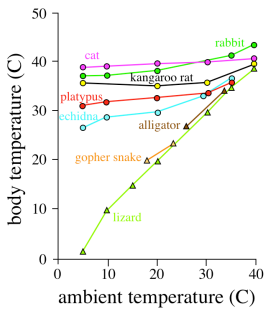
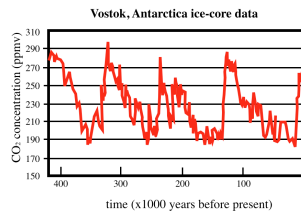
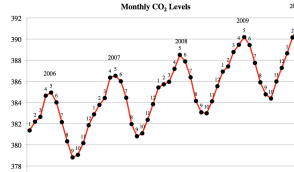
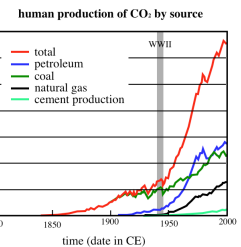
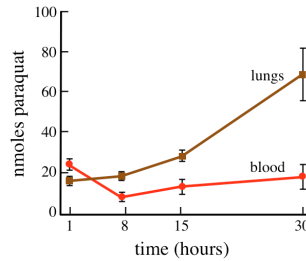
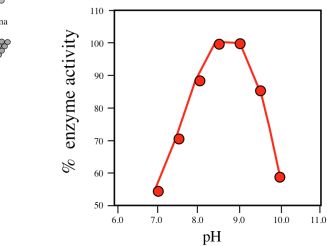
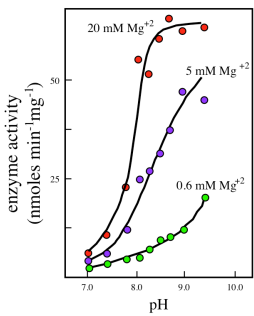
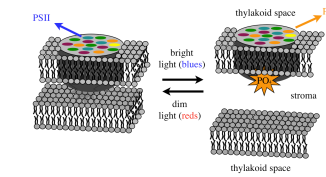
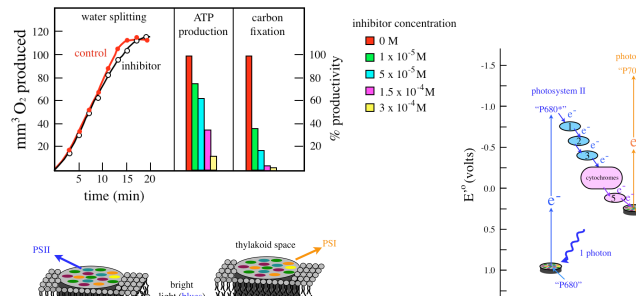
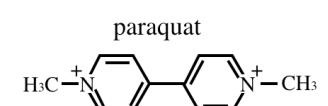
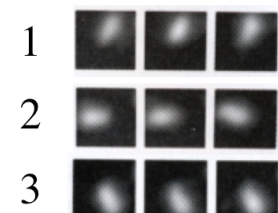
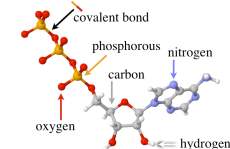
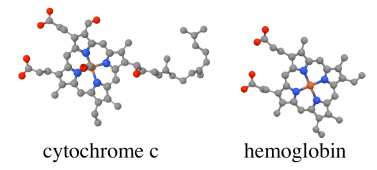
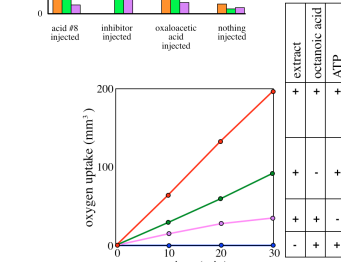
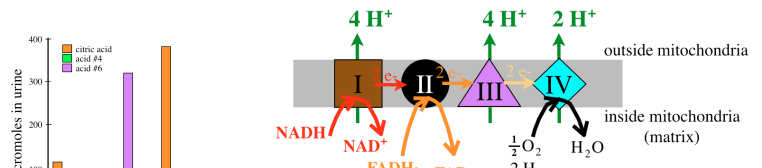
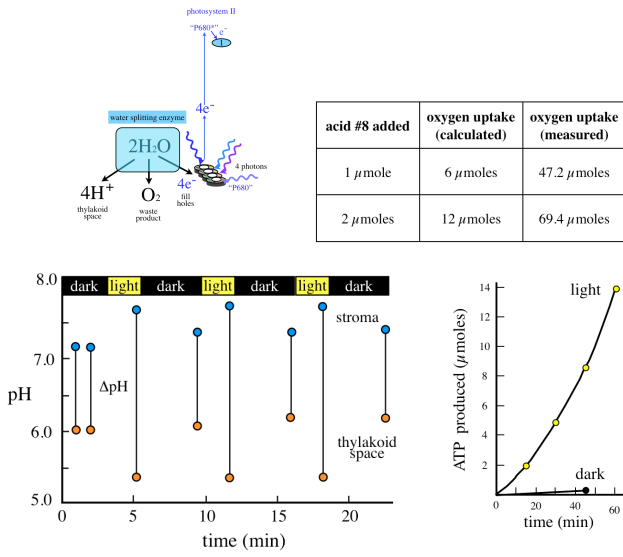
- a) does not happen during photosynthesis.
- b) is the reduction of carbon dioxide.
- c) permits plants to make amino acids and fatty acids.
- d) happens when plants repair damaged cells.
- e) only (b) and (c).
- f) none of the above.

13) Many terms are used to describe energy. Which of the following is true?

- a) Heat of the reaction is the difference in total energy (enthalpy) between reactants and products.
- b) Free energy measures all the energy in a molecule that is available to do work.
- c) Entropy is a form of energy that is used to increase chemical reactions.
- d) The first law of thermodynamics states that energy is created when new covalent bonds are formed.
- e) All of the statements above are correct.
- f) Only (a) and (c) are correct.
- g) Only (a) and (b) are correct.

Dr. Campbell's Bio111 Exam #4 – Fall 2010

Data Gallery



Dr. Campbell's Bio111 Exam #4 – Fall 2010

