BIO 182 LAB SIGN OFF PAGE — LESSON 12

Name _______________________________

Please staple all of your lab pages for this Lesson together with this page as the top. You will use this page to get your Labs for Lesson 12 signed off by the Biology Learning Center staff. You need to have all of the following steps initialed by a staff member before you can receive your 15 labs points for Lesson 12 and be allowed to take Exam 6.

After you have obtained all of your sign offs for this Lesson, be sure that a BLC staff member indicates on your Lab Card that you have completed all the Labs. Also, keep this sign off page, along with your completed lab worksheets, as proof of your lab completion. If your Lab Card indicates that you have not completed the required Labs for this Lesson and you believe that you have, it is up to you to provide proof that you have indeed completed the Labs. Keep this page!

__________ Lesson 12, Step 3: The World Through Someone Else’s Eyes (in BLC)

__optional_ Lesson 12, Step 4: Feedback Loops (online)
(but fair game for testing!)

__optional_ Lesson 12, Step 5: Comparative Anatomy (in BLC)

__________ Lesson 12, Step 6: Discrimination Test (in BLC)

*BLC Staff: After the student receives his/her last initial on this page, please indicate on his/her Lab Card that s/he has completed all the Lesson 12 labs.
Step 3: In Class Activity – The World Through Someone Else’s Eyes

To complete this activity, please view the online instructions.

1. Briefly describe how a flatworm’s eyespots help them survive. What do eyespots perceive? What is it that flatworms want to know when they use their eyespots? Why do flatworms move away from light?

2. Describe your experience simulating photoreception in flatworms. What were you able to perceive with your eyes closed?

3. Briefly describe how an insect’s compound eye helps it survive. What do you think their eyes perceive?

4. Describe your experience simulating vision in insects. What were you able to perceive with the home-made compound eye? How about the compound eye glasses?

5. Briefly describe how a cephalopod’s eye structure and vision are similar to that of humans and other vertebrates. How do we know cephalopod and vertebrate eyes are not homologous structures, but rather the result of convergent evolution?
6. Briefly describe how a bat uses echolocation. How does echolocation help them survive?

7. Describe your experience in simulating echolocation. Were you able to judge direction and movement like a bat?

When you have completed this activity, please bring your worksheets to the front desk for lab points.

182 12.3:

Step 4: Optional Internet Activity – Feedback Loops
To complete this activity, please view the online instructions.

For each problem, determine if positive or negative feedback is occurring. Circle the word “positive” or “negative” in the question- “Is this a positive or negative feedback loop?”

1. When you become dehydrated, and the osmolality of the blood increases (meaning your blood has more salt and less water), osmoreceptors in the hypothalamus cause the posterior pituitary to secrete anti-diuretic hormone (ADH). ADH acts on the kidney to increase the reabsorption of water, and put the water back into your bloodstream. This helps prevent the osmolality of the blood from increasing even further. If you drink lots of water, ADH production decreases, and the kidneys remove water from the blood, again maintaining the osmolality of the blood. Is this a positive or negative feedback loop?

2. During childbirth, the fetus is pushed against the uterine opening, causing it to stretch. Receptors that detect the stretching send signals to the brain. The brain sends both neural and hormonal signals that increase both the contraction force and the contraction frequency in the smooth muscles of the uterus. This continues until the baby is delivered through the birth canal. Is this a positive or negative feedback loop?

3. An increase of carbon dioxide in the blood leads to a decrease in blood pH. The drop in blood pH is detected by chemoreceptors in the aorta and carotid artery. These receptors send nerve impulses to the respiratory center in the medulla oblongata in the brain, which then stimulates increased breathing. Increased breathing helps remove carbon dioxide from the blood, returning blood pH to normal levels. Is this a positive or negative feedback loop?
4. After eating a meal, your blood glucose level increases. Islet cells in your pancreas detect the rise in blood sugar, and release insulin into the bloodstream. Insulin binds to receptors on cells throughout the body, allowing the cells to take up glucose from the blood. This lowers blood glucose levels back to a normal level. Is this a positive or negative feedback loop?

5. During sexual intercourse, stimulation leads to an increase in arousal and sexual behavior. This in turn leads to increased stimulation, until climax is reached and orgasm takes place. Is this a positive or negative feedback loop?

6. As a follicle develops in the female ovary, it releases estradiol into the blood. Estradiol stimulates the anterior pituitary to secrete luteinizing hormone (LH), which further stimulates the developing follicle and therefore the production of estradiol. This cycle continues until the follicle ruptures, releasing the egg into the fallopian tube. Is this a positive or negative feedback loop?

7. When thyroxine levels in the body are low, the hypothalamus secretes thyrotropin-releasing hormone (TRH). TRH acts on the anterior pituitary causing the secretion of thyroid-stimulating hormone (TSH). TSH, in turn, acts on the thyroid gland, causing secretion of thyroxine. Increased levels of thyroxine act on both the hypothalamus and anterior pituitary, decreasing the release of both TRH and TSH. Is this a positive or negative feedback loop?

8. Here are some examples related to ecosystems and global climate change. Ice caps at the north and south poles are very reflective -- the ice reflects light and heat rather than absorbing it. If global warming occurs, then the increase in temperature will cause polar ice to melt, and the bare dark ground will absorb rather than reflect heat. This additional absorption of heat will further boost the temperature of the earth. Is this a positive or negative feedback loop?

9. Carbon dioxide is considered a "greenhouse gas" since it absorbs heat that would otherwise dissipate out into space. If there is more carbon dioxide in the atmosphere, global temperatures are likely to increase. It is possible that plants will respond to the increased carbon dioxide and increased temperatures with an increase in photosynthesis. Since carbon dioxide is needed for photosynthesis, this could reduce the amount of carbon dioxide in the atmosphere, leading to cooler temperatures. Is this a positive or negative feedback loop?

10. We know that warm water holds less dissolved gas -- that's why a soda pop goes flat when it gets warm. Normally, there is a great deal of dissolved carbon dioxide in cold ocean water. If global warming occurs and global temperatures increase, warmer ocean water will hold less dissolved carbon dioxide. Less dissolved carbon dioxide in the ocean means more carbon dioxide in the atmosphere. Since carbon dioxide is a "greenhouse gas," the increase in atmospheric carbon dioxide will further boost global temperatures, making it even warmer. Is this a positive or negative feedback loop?

When you have completed this activity, you can check your answers on the class website.
Step 5: Optional Lab Activity – Comparative Anatomy
No points, but may be interesting to you

We have two pre-dissected animals, a rat and a bullfrog, in kit # 58. You can look at these animals and compare the organs. You can check out a dissecting kit, with a probe and forceps, at the front desk. This will allow you to slightly move some organs, in order to get better view. Please be careful not to damage the animals if you do use the forceps and probe!

Step 6: In Class Activity – Discrimination Test
To complete this activity, please view the online instructions and information. This lab was created by Robert Wakefield for Bio 201 Anatomy and Physiology I and then modified for Bio 182.

Please get Kit #103 from the gray drawers in the A&P area and bring it to your desk. This kit contains round toothpicks and a small metric ruler.

Which of these areas of the body do you predict will have the smallest receptive fields ("feel" the most)? Which will have the largest ("feel" the least)? Rank your predictions for the following body areas, with 1 being the smallest receptive field and 4 being the largest receptive field.

  ____ Fingertip
  ____ Back of the hand (Posterior)
  ____ Palm of the hand (Anterior)
  ____ Posterior Forearm

Follow the directions on the class website to conduct your two-point discrimination test. Record your results in the table.

<table>
<thead>
<tr>
<th>Body Area Tested</th>
<th>Two-Point Threshold (millimeters)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fingertip</td>
<td></td>
</tr>
<tr>
<td>Back of the hand (posterior)</td>
<td></td>
</tr>
<tr>
<td>Palm of the hand (anterior)</td>
<td></td>
</tr>
<tr>
<td>Posterior Forearm</td>
<td></td>
</tr>
</tbody>
</table>

Please answer the questions on the next page.
1. How do your results compare to your predictions? Which area of your body appeared to have the smallest receptive field? Which appeared to have the largest?

2. Suppose you were to do the two-point discrimination test on your upper back. Which of the body areas that you tested in the table (above) do you think would have the most similar results to what you would expect to find with your back? Would you expect to find a small or large receptive field on your back?

3. Why would you expect an area like your back to have a large receptive field? Construct your answer in terms of evolutionary adaptation and energetics.

Throw away your used toothpicks (and plastic wrap!) in a trash can. Do not put them back into the kit!

Please ask a BLC staff member for a check off.

(Unit 11, Step 6)