EXAM 1  
Zoology 313 -- Spring 2001

Please provide a short answer to all of the questions below. In most cases you should be able to answer them with a single sentence or even a sentence fragment. In some cases you can give a list of a few words or sentences. Feel free to use a diagram if it will make you understanding of the topic clearer. Total points: 100.

1. What is “Morgan's Canon”? (Describe the essence of it in your own words--i.e., don’t worry about quoting it accurately.) (5 pts.)

2. Recall Niko Tinbergen’s studies of digger wasps (in the film Signs and Signals), in which he discovered that wasps found their nests by reference to landmarks surrounding it. I would like you to think about this as an example of “strong inference” science. Remember that the basic question Tinbergen was trying to answer was how wasps find their nests, and that the experiment provided support for the hypothesis that wasps learn surrounding landmarks. You have two tasks:

   a. State one hypothesis other than the landmark hypothesis that was tested by Tinbergen’s experiment (there are at least two others), and explain how the experiment provided evidence against it (6 pts.)

   Hypothesis:

   How the experiment provides evidence against it:

   b. This research is an example of which of Tinbergen’s four “Levels of Analysis”? (4 pts.)

3. Questions about learning:

   a. State one key similarity between “classical conditioning” and “trial-and-error learning.” (5 pts.)

   b. State one key difference between these types of learning. (5 pts.)

4. Pavlov proposed the “reflex” as the fundamental unit of behavior. Lorenz proposed the “Fixed Action Pattern” as the fundamental unit of behavior. State one fundamental difference between these two concepts. (5 pts.)

******PUT YOUR NAME ON ALL PAGES*******
5. Some honey bee facts concerning juvenile hormone (JH) and the behavioral changes that worker bees undergo as they age (this is from textbook):

- young worker bees tend to be “nurses” and have low levels of JH in their blood
- old worker bees tend to be foragers and have high levels of JH in their blood
- sometimes young workers speed up their development and become “precocious foragers” and have high levels of JH in their blood
- sometimes old workers revert to nursing and their JH levels go down.

a. From these facts, can you conclude that JH is the cause of the behavioral changes? Why or why not? (4 pts.)

b. Assuming JH does cause the behavioral changes, what do these facts tell you about the possible activational versus organizational role played by the hormone? (6 pts.)

6. Data from Table 3.1 in book: Familial correlations for IQ scores based on the genetic differences hypothesis versus actual correlations—used to study heritability of IQ as a trait.

<table>
<thead>
<tr>
<th>Category</th>
<th>Predicted Correlation</th>
<th>Actual median Correlation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identical twins reared together</td>
<td>1.0</td>
<td>0.85</td>
</tr>
<tr>
<td>Identical twins reared apart</td>
<td>1.0</td>
<td>0.67</td>
</tr>
<tr>
<td>Fraternal twins reared together</td>
<td>0.5</td>
<td>0.58</td>
</tr>
<tr>
<td>Genetic parent-child</td>
<td>0.5</td>
<td>0.39</td>
</tr>
<tr>
<td>Adoptive parent–child</td>
<td>0.0</td>
<td>0.18</td>
</tr>
</tbody>
</table>

a. In class I described five general methods for studying the role of genes producing behavioral traits. Which method is this study an example of? (4 pts.)

b. Explain what the “predicted” and “actual” correlations are, and why they differ. (4 pts.)
7. In the film “Signs and Signals” we saw that male sticklebacks were driven crazy when a red mail van passed by the window.
   
a. How does this provide evidence for the concept of “key features” or “sign stimuli”? (5 pts.)
   
b. List two other examples (from films, book or lecture) of “key features” or “sign stimuli” (5 pts.)
   
8. In white-crowned sparrows, the song developed by males depends upon their experience. The questions here concern exactly how different types of experience play a role in song development
   
a. State the TWO ways in which auditory experience plays a role (6 pts.)
   
b. How does social experience play a role? (4 pts.)
   
9. “Constraints on learning”
   
a. What does this term (“constraints on learning”) mean? (5 pts.)
   
b. What is one line of evidence for “constraints on learning” (from the book or from lecture)? (5 pts.)
   
10. Neurons and receptors
   
a. State one key similarity between neurons and receptors? (4 pts.)
   
b. What is the most important difference between neurons and receptors (4 pts.)
   
c. What is the most common way for a neuron to pass its signal to another neuron? (2 pts.)
11. This figure shows an “actigram,” or activity rhythm, for a hypothetical animal. Study this actigram and answer the following questions about the animal.

a. Is the animal nocturnal or diurnal? (4 pts.)

b. What is the period, “tau,” of this animal’s free-running circadian rhythm? (an estimate to the nearest hour will suffice) (4 pts.)

c. What is the “Zeitgeber” for this rhythm? (4 pts.)

***DO NOT WRITE BELOW THIS LINE***