Ecology 203, Exam I. February , 2004. **Print name:**_____
Rules: **Read carefully, work accurately and efficiently.** There are no questions that were submitted by students. "[FG:page #]" is a question based on information from the field guide, "[TB:page]" the textbook, and "[L]" the lectures. I hope this helps you track down information when you get the exam back. Good luck!

Multiple guess. (3 pts each, 30 pts total)

1. The arctic ground squirrel is able to become "supercooled" during hibernation (body temperature goes well below freezing) because [L]
   a) it's blood plasma contains an antifreeze.
   b) solute concentrations are sufficiently low.
   c) hibernation is done under snow pack, resulting in increased pressure that reduces its freezing point.
   d) of something, but no one knows what.
   e) there are no nucleation sites (where water crystals can begin forming).

What is an adaptation [L]?

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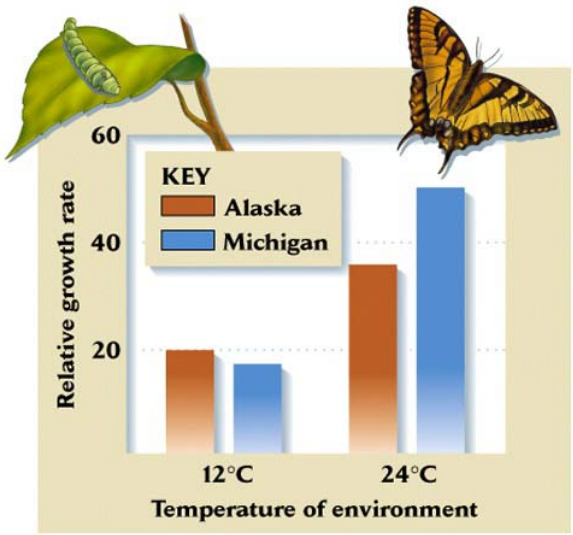
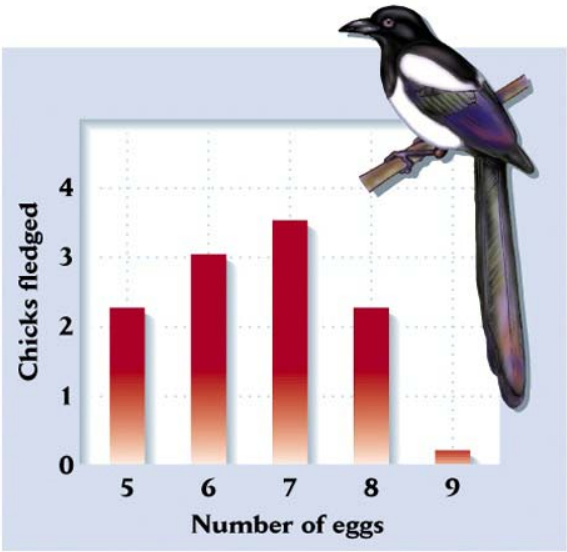
2. The figure of swallowtail butterfly larvae suggests that their growth rates [TB: 203, L]
   a) exhibit phenotypic stochasticity.
   b) are genetically determined.
   c) are environmentally determined.
   d) exhibit a genotype by environment interaction.
   e) are determined by temperature.
3. A p-value of 0.5 (P = 0.5) suggests [L]
   a) 50% of the variance is explained by the data.
   b) 95% of the variance is not explained by the data.
   c) the null hypothesis is true.
   d) the null hypothesis is false.
   e) the null hypothesis is 50% true.
4. Lions deal with the heat of mid-day by [L]
   a) eating.
   b) drinking pina coladas.
   c) hunting.
   d) all of the above.
   e) non of the above.
5. Hardy-Weinberg equilibrium suggests that [L, web]
   a) genotypes remain unchanged generation after generation.
   b) gene frequencies remain unchanged generation after generation.
   c) evolution can happen only due to mutation, gene flow, and genetic drift (not natural selection).

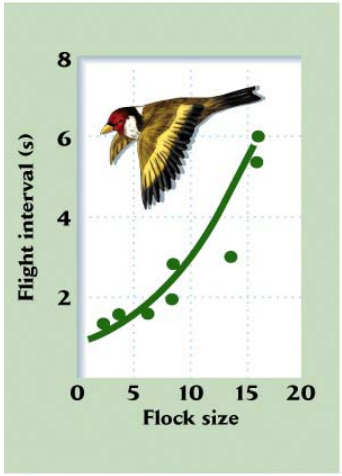


d) all of the above.
e) none of the above.

6. An evolutionary explanation as to why lions hunt in groups is because [L]
   a) they live in groups.
   b) they are social.
   c) those that do, leave more offspring.
   d) those that don't get more food.
   e) none of the above.



7. The figure to the right suggests that Magpies [TB: 201, L]
   a) fledge the largest number of chicks when they have seven eggs.
   b) experience the greatest chick mortality when they have seven eggs.
   c) most frequently have seven eggs.
   d) have greatest fitness with longer tails.
   e) all of the above.
8. Evolution is best described as the theory that [TB: 15-16, FG: Chapt. 5, L]
   a) organisms change over time.
   b) communities change over time.
   c) genes change over time.
   d) the frequencies of genes in species change over time.
   e) life arose from non-life.
9. Forest stratification, described in the field guide, can be seen in the Arboretum when we [FG: 10]
   a) look at the different types of soils found under grassy areas to forested areas.
   b) encounter animal damage to plants.
   c) see that areas are either open or forested.
   d) see levels of vegetation within a forest, including herbs, shrubs, and trees.
   e) observe all of the above.
10. Hadley Cells [TB:76, L] are largely driven by
    a) the heavy rains found in the tropics.
    b) the snows that occur at or near the poles.
    c) the droughts that occur at 30 degrees north and south latitudes.
    d) the sun beating down on a spherical planet.
    e) none of the above.



11. European goldfinches generally benefit by living in groups. The graph to the right suggests, however, that they spend more time flying when in larger groups. This is likely because [TB: 240-241, L]
    a) individuals are chasing each other.
    b) individuals spend more time flying amongst high-quality feeding sites.
    c) there are many birds eating seeds so individuals must essentially try to get away from competitors.
    d) the increased vigilance for enemies results in their seeing predators more often and are able to fly to get away.
    e) all of the above are benefits of living in groups.

Short-answers. Write legibly. Use ONLY the space provided. Answers should be succinct - no brain dumps. Graphs should include axis labels. **Choose 6**. (10 pts each, 60 pts total)

1. Your field guide recounts the story that it has been said that squirrels once could travel from New England to Arkansas without touching the ground. What evidence suggests that this isn't likely to be true (FG: 3-4, Arbo field trip).

2. During our visit to the Arboretum we saw many examples of adaptations of organisms. One involved trail formation by small mammals underneath the snow. Discuss why this is an adaptation. [L].

3. What is science? [L, web reading]

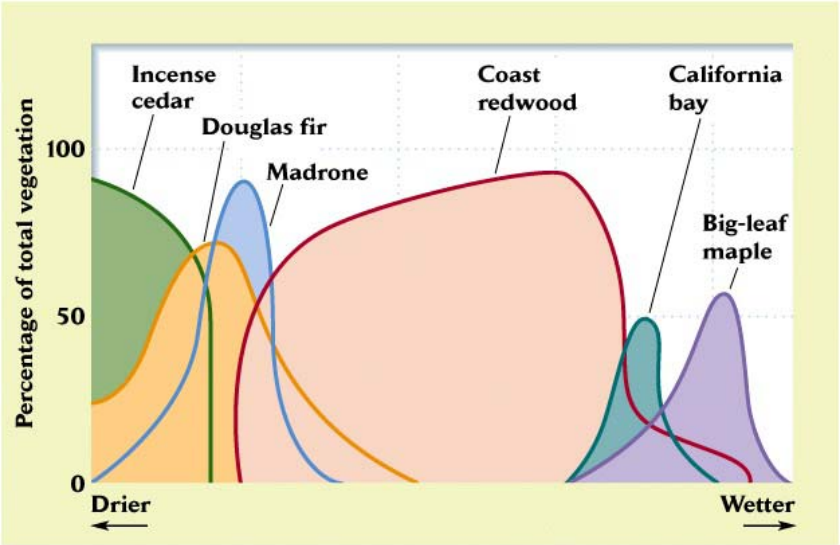
4. Why, in technical terms, is it colder at higher latitudes than lower latitudes (equator)? Please draw upon several forms of evidence. [TB: Chapt. 4, L]

5. Draw a **histogram** (frequency graph) that shows the distribution of the heights of trees where the mean, median, and mode are all different. Label the graph completely.

6. Discuss the different types of models we might use in ecology. Why use such quantitative approaches?

7. Define the model for Cole's Paradox and discuss what it implies. [L]

8. What does the figure suggest about individuals in the physical environment? Provide a more general graph for individuals in one species, indicating the outcome of individuals away from the center of the distribution. Label graph completely. [TB: 101-102, 184, L]



9. Please discuss the how and why birds migrate. [FG: Chapt. 5]

Mandatory question (2.5 pts ea., 10 pts total).

1. What are the four easily observed characteristics of natural selection? [L]

   1. _____

   2. _____

   3. _____

   4. _____