

Quizlet #1

Bio 252.01 – Prof. Brown -- February 13, 2004

Full credit given for answers that are complete and concise.

1. Write 2-3 sentences that illustrate the meanings of and the relationships between the following concepts: *homology(-ous)*, *analogy(-ous)*, *phylogeny*, *synapomorphy*, *natural selection*, and *descent with modification from common ancestors*. (10 pts.)

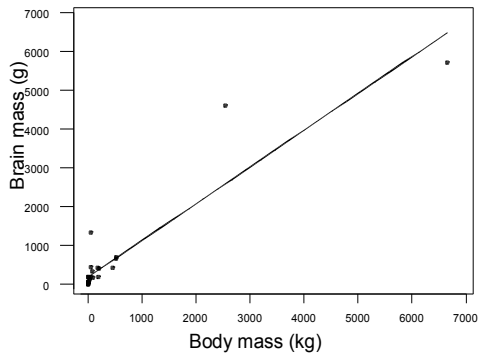
2. The figure below illustrates brain/body mass relationships among 30 mammal species. Does the analysis illustrate whether brain and body size display interspecific allometry? Explain your answer. (10 pts.)

Analysis of Variance

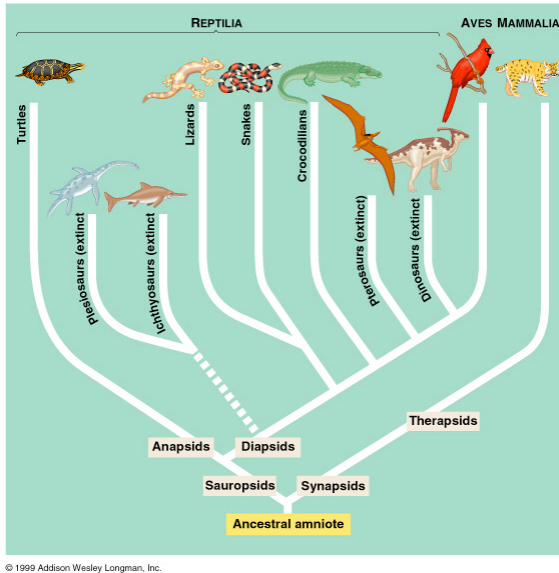
| Source | DF | SS | MS | F | P |
|------------|----|----------|----------|---------|-------|
| Regression | 1 | 42292157 | 42292157 | 187.082 | 0.000 |
| Error | 28 | 6329726 | 226062 | | |
| Total | 29 | 48621883 | | | |

Regression Plot

Brain mass (= 170.942 + 0.947953 Body mass (k
S = 475.459 R-Sq = 87.0 % R-Sq(adj) = 86.5 %



3. Traditionally, the land vertebrates have been classified as belonging to three groups, Class Aves (birds), Class Mammalia (mammals), Class Reptilia (reptiles). Based on the phylogeny below, why would a *cladist* object to this classification? (6 pts.)



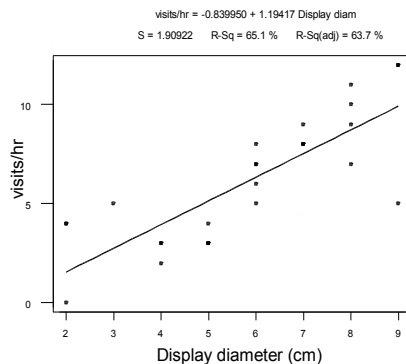
4. Two intrepid young biologists were walking through a CERA prairie in Late September that was swarming with butterflies feeding on the nectar of one species of goldenrod, *Solidago rigida* (a member of the Aster family). They noticed that individuals plants varied in height and size (diameter) of the entire floral display, among other things. They measured the floral display of a number of plants, counted the number of butterfly visitors at each of these plants over a 30 minute period, and later presented an analysis of their data) below.

(a) Should they conclude butterflies are attracted to larger floral displays? Explain your reasoning, and describe any further data and analyses you would undertake to confirm this hypothesis. (8 points)

Analysis of Variance

| Source | DF | SS | MS | F | P |
|------------|----|---------|---------|---------|-------|
| Regression | 1 | 170.280 | 170.280 | 46.7145 | 0.000 |
| Error | 25 | 91.128 | 3.645 | | |
| Total | 26 | 261.407 | | | |

Regression Plot



(b) Describe what *additional* hypotheses you would need test to establish that butterflies exert *natural selection* on floral size in these plants. (8 pts.)

5. Propose a study that considers whether individual plants alter their growth patterns in response to water availability. Describe your study as completely and concisely as possible, including how it would test an interesting and relevant hypothesis. (16 pts.)

6. Some species have *humongous* geographic distributions, spanning wide temperature gradients. For example, your book describes two snail species found in Europe, a widespread species (*Cepea nemoralis*) which has a wider temperature tolerance than a localized species (*Arianta arbustorum*). Describe two distinct hypotheses for how populations of *C. nemoralis* can persist as far north as southern Scandinavia and as far south as the southern coast of Spain. (10 pts.)

7. (a) Describe an example of an animal adaptation to reduce water loss. What evidence could you use to argue that this adaptation has a cost? (8 pts.)

(b) Describe a plant adaptation to regulate internal temperature. What evidence could you use to argue that this adaptation has a cost? (8 pts.)

8. Recent human activities, including the burning of fossil fuels and the destruction of forests, have resulted in a gradual increase in CO₂ concentrations in the atmosphere. Explain your prediction regarding the effect a continuing increase in CO₂ levels should have on the proportion of C₃ vs. C₄ plants in tallgrass prairies. (16 pts.)

Name _____

Box # _____