

Integrative Biology 200B

Spring 2005

Quiz 2**1. Short answers (15 points):**

Briefly answer the following questions in the space provided, giving the most important and/or controversial points, the assumptions that must be made, and potential problems.

Describe how you would use parametric bootstrapping to test a hypothesis about clade monophyly. Hint: what distribution do you need to generate?

Describe the likelihood approach to testing for a molecular clock.

Does answering the question, "Did clade A diverge before clade B" require absolute dates? Explain your answer.

2. (15 points) Briefly contrast the following pairs of terms (Use diagrams if they help):

Open vs. closed communities

Phylogenetic clustering vs. overdispersion of communities

Coalescent theory vs. standard phylogenetics

3. Essay (10 points): What are the steps necessary to estimate absolute divergence times on a phylogeny? Please discuss each step, give prevailing approaches for each, and indicate possible problems and controversies.

4. (20 points) What sort of comparative method or approach would you apply to the following evolutionary questions (e.g., what assumptions would you make, what kind of data would you require, how would you generate a null hypothesis, how would you judge statistical significance?):

a. Did the early radiation of angiosperm lineages cause the diversification of the insects?

b. In the breakup of Gondwana, which two present-day continents were connected the longest?

c. True species-level selection occurred in the radiation of the Hawaiian drosophilas?

d. Conventional ecological theory states that ecologically identical species cannot coexist. Using phylogenetic approaches, how could you test whether this principle of competitive exclusion was in operation during the assembly of the California chaparral community? What assumptions or additional data would you need to support your interpretation of phylogenetic data?