Integrative Biology 200 Spring 2014

"PRINCIPLES OF PHYLOGENETICS "

Quiz 1

You may use any books, notes, or references, but you must work independently of other people. To help keep the amount of writing under control, outlines, bullet points, and drawings are fine. Please email to bmishler@berkeley.edu by **Midnight (12:00 am)** this evening, 3/21.

1. [20 pts.] You have recently completed a phylogenetic analysis for your group of interest using the optimality criteria of Parsimony and Maximum Likelihood. Prior to journal submission, you have a colleague peer review your work who recommends that you also include a Neighbor-Joining tree and Bayesian Inference tree. What justification would you give the reviewer for omitting these analyses? What justification is there to include them?

2. [20 pts.] You are conducting a study to reconstruct the ancestral state of life form in angiosperms (for example, woody vs. herbaceous, or tree vs. shrub). Identify the steps you need to take, including the required data or other inputs to your analyses, and your choice of methods. Which step do you think your results will be most sensitive to (in other words, what information or analytic choices might have the most influence on obtaining alternative results).

3. [20 pts.] What is the role of similarity in phylogenetics and how is it related to the concept of homology? Discuss this relationship both for morphological and DNA sequence data.

4. [20 pts] Give four different views about species (or more generally terminal taxa), and discuss how they differ in underlying theory, and in practice.

5. [5 pts each] What is the conceptual difference between the following pairs of terms, and what is the difference in practice?

a. The use and meaning of type specimens under the current Zoological and Botanical codes vs. specifiers under the Phylocode.

b. classification versus nomenclature

c. high phylogenetic signal versus low phylogenetic signal

d. Coddington's two approaches to studying adaptation (including a phylogenetic comparative method that can be used to test hypotheses for each approach).