Integrative Biology 200B

Spring 2011

## "PRINCIPLES OF PHYLOGENETICS: ECOLOGY AND EVOLUTION"

## Quiz 2

You may use any books, notes, or references, but you must work independently of other people. To keep the amount of writing under control, <u>please confine the answers to the space provided on the front of the page</u> (but write clearly and large enough to see!); outlines and drawings are fine. You may go elsewhere to work on this, but either email it to <u>bmishler@calmail.berkeley.edu</u> or turn it in hard copy to room 3083 by <u>3:30</u>.

## Part one, short answers:

1. [10 pts.]	Explain how the Signor-Lipps effect could affect patterns of origination as	nd
extinction.	Are clades more susceptible to this effect than taxonomic units?	

2. [10 pts.] Are terrestrial organisms more likely to be subjected to vicariance events than marine organisms? Why or Why Not?

3. [10 pts.] How might knowledge of the timing, region, and relationships of the first occurrence of a keystone predator (a species that has a disproportionate effect on its environment relative to its biomass) inform conservation decisions?

4. [10 pts.] What are the major differences between DIVA and Lagrange?	What are the
strengths and weaknesses of each?	

## Part two, longer answers:

5. [20 pts.] Phylogenetic diversity metrics have many uses. First, describe what the metric is (and the several variants of it that we discussed. Then describe: (a) how a phylogenetic diversity metric might be used in conservation biology and how it might differ from the standard speciescount metric, and (b) how a phylogenetic diversity metric might be used to test a scientific hypothesis of your choice and how it might differ from the standard species-count metric.

6. [20 pts.] Some historical biogeography methods assume that each OTU and each reconstructed ancestor lives in one and only one region. Others allow the OTUs and ancestors to live in multiple regions. (a) Give an example of a situation where you might prefer each of these assumptions. (b) For both of these kinds of methods, the scientist has to chose what the "regions" are going to be a priori. How should she go about choosing these regions?

7. [20 pts.] Can reticulation be studied using phylogenetics? Or, does reticulation destroy our ability to do phylogenetics? Discuss these opposing viewpoints as they relate to: (a) species concept debates in eukaryotes, and (b) views of bacterial evolution. In addition to theory, also consider what empirical methods people might apply given their different viewpoints.