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Integrative Biology 200B Spring 2001

"PRINCIPLES OF PHYLOGENETICS: ECOLOGY AND EVOLUTION"

Quiz 2

1. (10 points) Compare and contrast a morphometric study using thin-plate splines versus one based on distance measures (e.g., data gathering, data types, analysis).

2. (25 points) Define the following terms and give a short example of how it applies to comparative phylogenetic studies:
a. shoehorning

b. shape coordinates

c. ghost lineages

d. theoretical morphospace

e. independent contrasts

3. (10 points) You just got your copy of NATURE in the mail and there is a report of the oldest aplacophoran mollusk ever discovered. It is known from a connected series of plates and spicules and the authors claim that this discovery extends the range of aplacophoran mollusks back over 230 million years. Do you agree or

disagree with their pronouncement and why?

4. (10 points) How might the reconstruction of a clade undergoing punctuated equilibrium differ from a clade undergoing phylketic gradualism?

5. (10 points) What is parsimony debt and why is this concept important to stratocladistics?

6. (10 points) Both age rank/clade rank stratigraphic metrics have been proposed to be useful for measuring the completeness of the fossil record. However, all of these methods also have been criticized as poor ways to measure completeness. Do cladograms provide a better view of the fossil record than statistical techniques such as those of Sepkoski or Foote? Explain.

7. (25 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?):

Do lineages in a particular clade have a significant propensity to replace their teeth with beaks.

Is tooth loss is caused by large body size or herbivory.

Has the evolution of diploidy casued and renhanced rate of diversification in lioneages

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Was vicariance an important factor in causing lineage divergences is a particular clade?

Was the evolution of the angiosperms an adaptive radiation driven by co-evolution with pollinators?