Practice Questions, Test 1, Herpetology, Spring 2017

1 Discuss some anatomical traits that are characteristic of amphibians.

2 Discuss some anatomical traits that are characteristic of reptiles.

3 How would you distinguish a caecilian from a snake?

4 Describe some unusual aspects of the anatomy of turtles ('unusual' relative to other tetrapods).

5 "Exhaustive" approaches to finding optimal phylogenetic trees evaluate every possible tree and select the best one. "Heuristic" approaches evaluate only some possible trees and are not guaranteed to find the optimal tree. Why are heuristic rather than exact methods usually used to find optimal trees in phylogenetics?

6 List five graduate programs and/or museums that are well known for herpetological study. Also list associated professors for each group.

7 Discuss arguments for studying amphibians and reptiles together as the single informal group "herps."

8 For the following four characters of DNA sequence data, give the optimal parsimony tree and the length of this tree for the four species. Root the tree on the most logical outgroup. Explain your selection of outgroup.

Ensatina escholtzi   ACCT
Holbrookia maculata   AGTT
Sceloporus cowlesi   AGTC
Aspidoscelis inornata   GCCC

9 If you tell a nonbiologist that you are a herpetologist, they often will think that you study the Herpes virus. Explain why this inference is not unreasonable.

10 Discuss the contributions of three important figures in the history of herpetology. Include figures from both pre--- and post---1900.

11 There are many 'species concepts' available to researchers. Discuss some of these concepts with reference to 'conceptual' and 'operational' criteria for species. (de Queiroz' article should be useful in your answer).

12 How does the 'General Lineage Concept,' or 'Evolutionary Concept' of species solve problems associated with the 'Biological Species Concept?'

13 How does speciation occur?

14 What is 'vicariance?' Contrast this term with 'dispersal.' Give herpetological examples of each term.

15 What processes of speciation seem to be operating in *Ensatina* salamanders in California?

16 What are the different optimality criteria for reconstructing evolutionary relationships? Give a brief (one-two sentence) description of each.

17 Rosenblum and Harmon claim that the White Sands *Holbrookia maculata* could be considered a distinct species from the *Holbrookia maculata* that live in the surrounding desert.
     Which of the following processes of speciation seem to be operating (explain your answers)?: dispersal, vicariance, selection, drift, ecological speciation, reproductive isolation, ring speciation, genetic divergence.
     What evidence suggests the white sands *maculata* are a valid species? What evidence suggests otherwise?

18 Describe similarities and differences across *Holbrookia, Sceloporus, and Aspidoscelis* in their evolutionary response to the White Sands environment. What aspects of the White Sands lizard system suggest evolutionary convergence? Explain your answer.

19 What is a ring species? Give a herpetological example of a ring species.

20 Give an apomorphy--based definition of the group Anura (=frogs).

21 Give herpetological examples of the following terms: homoplasy, homology, synapomorphy, convergence. (be sure to explain why each term applies to whatever example you give. For example, "loss of limbs in snakes is an example of convergence" is not a good answer because it does not explain how 'loss of limbs' can be interpreted as an example of 'convergence.')

22 List kinds of data that are used to reconstruct phylogeny.

23 What approaches are used to assess confidence in the results of a phylogenetic analysis?

24 Use the following set of phylogenetic relationships to give a (verbal, not graphical) node-based definition of a group that includes taxa B and C but not taxon A. Also give a stem-based definition for this group.
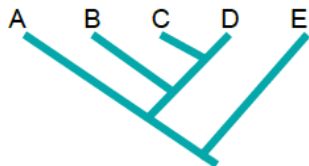
25 List *Anolis* species found at Soroa, Cuba. (see paper by Rodriguez-Schettino).

26 List four snake species found in Hidalgo County, New Mexico.

27 What are the components of a good species description?

28 How are new species discovered?

29 Circle all trees that show the same rooted relationships as tree *. Draw a smiley face by all trees that show the same unrooted relationships as tree *.