

Practice Questions, Test 1, Herpetology, Spring 2018

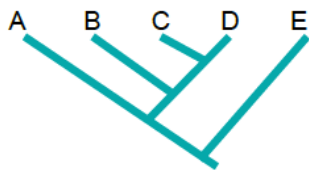
- 1 Discuss some anatomical traits that are characteristic of amphibians.
- 2 Discuss some anatomical traits that are characteristic of reptiles.
- 3 How would you distinguish a caecilian from a snake?
- 4 Describe some unusual aspects of the anatomy of turtles ('unusual' relative to other tetrapods).
- 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 exhaustive 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 unrooted 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.

<i>Ensatina escholtzi</i>	ACCT
<i>Holbrookia maculata</i>	AGTT
<i>Sceloporus cowlesi</i>	AGTC
<i>Aspidoscelis inornata</i>	GCCC

(answer: length=5; optimal unrooted parsimony tree has *Holbrookia* and *Sceloporus* together; *Ensatina* and *Aspidoscelis* together)

- 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. Describe what they studied, where they worked, and one or more important publications.
- 11 There are many 'species concepts' available to researchers. Describe some of these, and note cases where they might conflict.
- 12 Give some information on the MSB Division of Amphibians and Reptiles.
- 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 Give herpetological examples of homoplasy and of homology using behavioral traits, and using molecular traits.
- 17 List three herp species found on Guadeloupe.
- 18 Distinguish the terms "systematics," "taxonomy," "classification," and "nomenclature" as they apply to biology.
- 19 Summarize the arguments of de Queiroz (1998) regarding species. How does he "unify" the different species concepts? What species concept does he favor? Do you agree with him (why)?
- 20 Summarize the arguments of Wiens (2004) regarding speciation. What historical context was he responding to?
- 21 Give herpetological examples of the following terms: homoplasy, homology, synapomorphy, symplesiomorphy, 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 is the difference between "conceptual" and "operational" definitions (can you apply this distinction to something besides species)? What does this distinction have to do with species definitions?
- 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 branch-based definition for this group.



- 25 Give an apomorphy-based definition for the group name Testudines (i.e., turtles).
- 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 Contrast the terms "monophyly" and "paraphyly" and illustrate these terms graphically using phylogenetic trees.

30 Contrast systems of Linnaean and phylogenetic nomenclature. How could the Linnaean system be applied to phylogenetic trees? What problems might arise in this application?

31 What are the components of a phylogenetic method? How do commonly used phylogenetic optimality criteria differ? What are the (dis)advantages of each optimality criterion? What computer programs are commonly used for phylogenetic analysis?

32 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 *.

