Practice questions, Herpetology test 2, 2022

1 Draw the most plausible phylogenetic tree of Chikilidae, Ascaphidae, Ranidae, *Ambystoma*, *Plethodon*, *Triadobatrachus, Typhlonectes*.

2 Give a node-based definition for the group-name Batrachia, which includes extant salamanders and frogs.

3 Give two synapomorphies for each of the following groups. Also describe each

synapomorphy in terms of its structure and function.

Anura

Gymnophiona

Amphibia

4 Describe the history of studies of the relationships of the three major lineages of

Amphibians: frogs, salamanders, and caecilians (relative to each other, not within lineages). What relationships have been suggested for these lineages, what evidence has been offered, and what relationships are preferred today?

5 What is paedomorphosis? List two species of salamanders that evolved paedomorphic traits convergently. Also list two species of salamanders for which paedomorphic traits are homologous. Be able to recognize paedomorphosis in other lineages besides salamanders (What would paedomorphosis look like in frogs with a larval stage? In direct developing frogs?)

6 How can you distinguish Sirenids from Amphiumids?

7 Approximately how many species are recognized in the Family Plethodontidae?

(2, 25, or 350)

How many species are in the family Ascaphidae? (2, 25, or 350)

Compare species numbers in the major amphibian lineages.

8 Contrast internal fertilization in frogs, salamanders, and caecilians.

9 Describe the skin of amphibians, including unusual traits relative to other

Tetrapods.

10 List some characteristics that vary between caecilian species.

11 Contrast the skull of a caecilian with the skull of a frog.

12 List five Families of salamanders. For each Family, list at least one genus that is in this Family. Also list some anatomical trait that members of this Family possess that is not shared by all salamanders.

13 List five Families of frogs. For each Family, list at least one genus that is in that Family. Also list some anatomical trait that members of this Family possess that is not shared by all frogs.

14 Which of the following is true? Explain your answer.

a. *Triadobatrachus* is more closely related to frogs than to salamanders

b. *Triadobatrachus* is approximately equally related to salamanders and frogs but more distantly related to caecilians

c. *Triadobatrachus* is approximately equally related to salamanders, frogs, and caecilians

15 Characterize the following groups as including species that are predominantly arboreal, fossorial, aquatic, and/or terrestrial (list all terms that apply).

Gymnophiona

Caudata

*Typhlonectes*

Anura

Hylidae

Pipidae

Rhinophrynidae

Ambystomatidae

16 Do caecilians engage in parental care? If so, describe examples.

17 Describe the hearing system(s) of amphibians.

18 Discuss toxins in amphibian skin.

19 Members of which amphibian group have a tentacle? What is a tentacle?

20 A new Family, Chikilidae, was erected for some species of Gymnophiona found

in India. Did the rules and standards of taxonomy require that a new Family be erected, based on the results presented by Kamei et al. (2012)? If not, what other options were available to the authors? Suggest a valid, existing, alternative Family name for the caecilians assigned to Chikilidae.

21 Wilkinson et al. and Pyron and Wiens propose alternative taxonomies of

Caecilians. Argue (present evidence, use logic) in favor of one of these systems, or argue that they are equally valid.

22 Discuss alternative arrangements of jaw-closing musculature in caecilians.

23 Give herpetological examples of the following terms: homoplasy, homology, synapomorphy, convergence. (Be sure to explain why each term applies to whatever example you give)

24 Know the common local herps we discussed in an early lecture.

25 Describe ballistic tongue projection in (some) plethodontid salamanders, and contrast this approach with how frogs project the tongue. Also discuss how frog saliva works during prey procurement by tongue.

26 What approaches do male frogs use to attract a mate?

27 What is amplexus? What variation in amplexus occurs between species?

28 Describe the "alternative" mating strategies of *clutch piracy* and *functional necrophilia* in frogs. In your opinion, which of these approaches is more f-ed up?

29 Describe approaches to parental care in *Oophaga*, *Rhinella*, *Rheobatrachus*, Pyxicephalus, and *Pipa*.

30 Describe areas where frogs deposit eggs (kinds of nests, kinds of substrate, etc.).

31 Describe gynogenetic, kleptogenetic, and hybridogenetic breeding systems.

32 Salamanders have an extraordinarily large genome relative to other Tetrapods. Is this condition properly interpreted as a synapomorphy of Caudata? Why or why not?

33 What anatomical traits possessed by most caecilian species suggest that most species of this clade are fossorial?

34 What anatomical changes accompany the ontogeny of a tadpole becoming a frog?

35 Describe approaches to intraspecific communication in frogs.

36 Describe how a male salamander "convinces" a female to pick up his spermatophore (and what is a spermatophore?).

37 "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?

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

39 Compare and contrast Phylogenetic and Linnaean systems of taxonomy.

40 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?

41 In terms of computational difficulty, finding the optimal phylogenetic tree for 5 taxa is finding the optimal tree for 50 taxa. Fill in the blank with one of the statements below, and explain your answer.

a much easier than

b slightly easier than

c about the same difficulty as

d slightly more difficult than

e much more difficult than

42 List five species of frog and five species of salamander. Use correct spelling and capitalization. List the Family for each species.

43 (For Costa Rica students). List five species that we caught in Costa Rica. Use correct spelling and capitalization.

44 List a family of frogs that…

includes fewer than five species

includes completely aquatic species

includes burrowing forms

has translucent skin

has direct development (define direct development, contrast with larval development)

includes arboreal forms

45 Name bones on this dorsal view of a salamander skull:

