

## Practice questions for GVZ test 1 Spring 2017

- 1 How have the goals of systematics (i.e., the conceptual basis) changed over time from Aristotle to the present day? Put another way, what were/are classifications intended to reflect?
- 2 Describe the structure and function of the liver of a shark.
- 3 Describe the reproductive biology of the anglerfish.
- 4 What are some threats to shark populations? What steps have been taken by some countries to alleviate such threats? What aspects of a shark's population biology make it especially susceptible to population declines due to human activities?
- 5 True or false: an individual of a species cannot interbreed with an individual of a different species and produce viable offspring. Explain your answer.
- 6 What is 'vicariance?' Contrast this term with 'dispersal.' What do these terms have to do with speciation, if anything? Give an example of each of these terms (a contrived example is OK for now if you can't think of a real one).
- 7 Define the term "holotype" and give an example.
- 8 What is myelination of nerves (anatomy, function)? Give examples of taxa that possess myelination and of taxa that lack myelination.
- 9 Assume you decide to name a new species of frog of the genus *Craugastor* after legendary UNM biologist and soul singer James Brown. What do you name this species?
- 10 Describe the predatory and defense behavior of hagfish.
- 11 How are new species discovered? Describe the steps involved with describing a new species—i.e., the components of a good species description.
- 12 Give vertebrate examples of the following terms: synapomorphy, plesiomorphy, homology, homoplasy, reversal. Be sure to identify the taxa involved (i.e., make it clear why your example reflects the term you are describing).  
[Note—your best road to understanding these terms is to think of new examples, rather than to memorize examples from class. For example, try to think of a synapomorphy of humans and other apes relative to other mammals, or of urochordates relative to other clades. Try to imagine examples of each of these terms from molecules and behavior as well as morphology, e.g., is presence of a cell nucleus in most cells of the body homologous between urochordates and seahorses?].
- 13 Suggest potential node- and stem- based definitions for the taxon name Elasmobranchii.
- 14 Describe the contributions of the following figures to systematics: Aristotle, Linnaeus, de Queiroz.

15 Describe Kevin de Queiroz' view of "species." How does de Queiroz view the myriad species 'concepts' (e.g. BSC, cohesion SC, PSC) relative to his own view (you may need to reread his 1998 paper)?

16 Compare and contrast the shark skull and the actinopterygian skull.

17 Compare and contrast the Linnaen system of taxonomy with the system of Phylogenetic Taxonomy.

18 Define a node based name for a group that includes humans and lampreys but excludes Urochordata (note that this question is not asking for the actual name of this group—i.e., Craniata/Vertebrata—but rather for you to come up with a *node-based definition* of this name).

Also define a stem-based name for this group.

19 How might the character state "absence of limbs" be interpreted as a homology, or a homoplasy, or a synapomorphy, or a plesiomorphy, or a convergence, or a reversal?

20 Contrast parsimony, likelihood, and distance methods for reconstructing phylogeny.

21 For the following data matrix of states for DNA characters 1-5 for the taxa human, cookie cutter shark, stingray, and great white shark...

Draw the most parsimonious tree, using human as your outgroup (why is human an appropriate outgroup for the other taxa)?

What is the length in steps (# of changes) of the most parsimonious tree?

	1	2	3	4	5
human	A	C	A	A	C
cookie cutter shark	C	G	A	G	G
stingray	A	C	A	G	A
great white shark	C	G	C	A	A

22 List/describe some synapomorphies of

Gnathostomata

Batoidea

Chondrichthyes

Osteichthyes

A group including Urochordata and humans but excluding Echinoderms.

23 What different types of data are used to reconstruct phylogeny? What are desirable properties of data used to reconstruct phylogeny?

24 Circle the approximate number of species in each group

Sharks        5    50    500    5000

Teleostei     25    250    one gazillion    25000

Holocephali 30    300    3000    30000

25 Describe feeding strategies in Great White Sharks and Basking Sharks.

26 What processes of speciation seem to be operating in the radiation of *Ensatina* salamanders? (choose one or more from: vicariance, dispersal, selection, drift, reproductive isolation,

27 How can you distinguish a lamprey from a clupeomorph eel?

28 What's a hemichordate? Describe the anatomy and phylogenetic position of Hemichordata.

29 List some species of rays (common names are OK).

30 Compare and contrast ostracoderms and placoderms.

31 Describe the evolution of jaws.

32 What is a vestibular organ (structure, function), and how does it vary between taxa?

33 Describe the evolution of the axial skeleton (i.e., the vertebral column); be sure to mention differences between lampreys, cephalochordates, sharks, and ray-finned fish.

34 What's a spiracle? (describe structure, function, and phylogenetic distribution)

35 How does the cookie-cutter shark feed?

36 What characteristics would allow you to distinguish a ratfish (chimaera, holocephalian) from a shark or ray?

37 Contrast the skull of bony fish with that of a shark

38 Describe 'hyostylic' jaw attachment. Contrast this type of jaw attachment with 'holostylic' jaws. List taxa that display each type of jaw attachment.

39 Compare and contrast anatomical approaches to maintaining buoyancy in sharks and bony fish.

- 40 Contrast different types of scales in bony and cartilaginous fishes.
- 41 Describe the sensory systems of sharks, including any specialized cells and anatomical structures.  
Also describe how Kalmijn tested for the relative uses of sensory systems.
- 42 Describe the anatomy and function of a 'clasper' in Chondrichthyes.
- 43 You're walking down the beach and you find a finned aquatic organism with gills. How can you tell if it's a chondrichthyan or an actinopterygian? Imagine you do not have access to the skeleton.
- 44 List the names of some ray-finned fish that are not teleosts.
- 45 Describe how fish overcome drag. (What is drag?)
- 46 What is the optimal body form for a fish to overcome inertial drag?
- 47 Contrast anguiliiform, ostraciform, and carangiform modes of locomotion in fish.
- 48 Describe a system of gas exchange in gills used by (some or most) fish.
- 49 True or false: bluegill sunfish (a teleost fish) are more closely related to humans than they are to sharks. Explain your answer. Include the phrase "share a more recent ancestry" in your answer.  
Use this information to argue why it is or is not appropriate to include sharks and teleosts in a taxonomic group (e.g., 'Pisces,' 'fish') separate from humans.
- 50 Draw the best estimate of phylogenetic relationships for tunicates, hagfish, gars, Batoidea, humans, lungfish, catfish, silvery minnows, and Holocephali.
- 51 Describe the basic anatomy of Urochordata (both adults and larvae) and Cephalochordata.
- 52 What are Weberian ossicles? Name some species or species groups that possess Weberian ossicles.
- 53 In lecture we saw short movies about two cases where human perceptions of very similar species (carp and silvery minnow, Northwest lamprey vs. great lakes lamprey) differ. Explain differing views in one of these systems. That is, how do people feel about (e.g.) Asian carp and silvery minnow, how do they consequently behave towards these species, and how do they justify their behaviors.
- 54 Would you expect the most recent common ancestor of humans, sharks, and salmon to possess limbs, paired fins, or neither? Justify your answer.

55 Circle any trees that show the same evolutionary relationships as tree \*.

