

Honor pledge: "I have neither given nor received unauthorized aid on this test."

Signed : _____

Date : _____

Name : _____

TOTAL = 40/100 points

7. What are the 3 primary evolutionary branches of life? (5 points)

8. ____ Which if the following terms in *not* a hold-over of pre-Darwinian "Chain of Being" thought? (1 point)

- A. Missing link
- B. Bootstrap value
- C. Higher eukaryote
- D. Evolutionary ladder
- E. All of these are from "Chain of Being" thought

9. ____ Which of the following are the parts of a Taxonomy? (1 point)

- A. Grouping/Naming/Identifying
- B. Genealogy/Sorting/Reconstruction
- C. Alignment/Treeing/Prediction
- D. Enrich/Select/Purify
- E. None of the above

10. ____ Clock-like behavior in a gene sequence is dependent on which of these factors? (1 point)

- A. constant function
- B. appropriate levels of variation
- C. composed of many independently-evolving units
- D. long enough to be statistically meaningful
- E. all of the above

11. ____ Which of these molecules would be the *worst* choice for phylogenetic analysis of a group of organisms? (1 point)

- A. Small-subunit ribosomal RNA
- B. Ribonuclease P RNA
- C. Glyceraldehyde-phosphate dehydrogenase
- D. Tetracycline-resistance gene
- E. catenated ribosomal protein sequences

12. ____ Sequence alignment is the process of ... (1 point)

- A. locating a homologous gene in a genome
- B. reading the sequence from a chain-termination reaction
- C. maximizing similarity amongst a collection of sequences
- D. measuring evolutionary distance between genes
- E. identifying homologous residues in a sequence collection

13. ____ Isolate ES-2 was given the name *Eubacterium thermomarinus*, and is related to ... (1 point)

- A. *Clostridium* (a Firmicute)
- B. *Frankia* (an Actinobacterium)
- C. *Halobacterium* (a Euryarchaeon)
- D. *Escherichia* (a Proteobacterium)
- E. *Sirenia* (a Metazoan)

14. ____ Long branch attraction is ... (1 point)

- A. a way to assess the quality of a tree
- B. a tree-building artifact
- C. a sophisticated substitution model
- D. a mechanism for horizontal transfer
- E. a disease of shrubberies

15. ____ Which if the following organelles descended from endosymbiotic alpha-proteobacteria? (1 point)

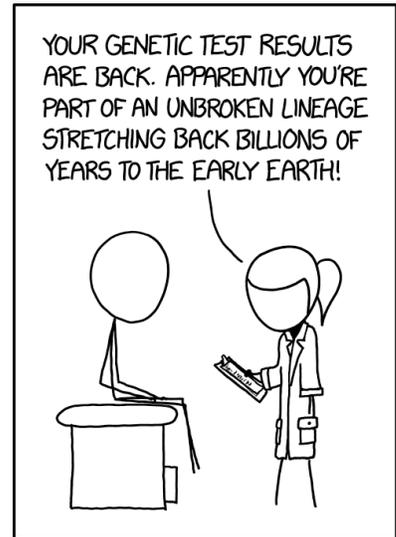
- A. Centrioles
- B. Mitochondria
- C. Plastids
- D. Golgi apparatus
- E. Micronuclei

16. ____ The advantage of molecular phylogenetic trees is that they are ... (1 point)

- A. Readily arranged into a linear order
- B. Correct and verifiable
- C. A good representation of progressive evolution
- D. Quantitative and objective
- E. All of the above

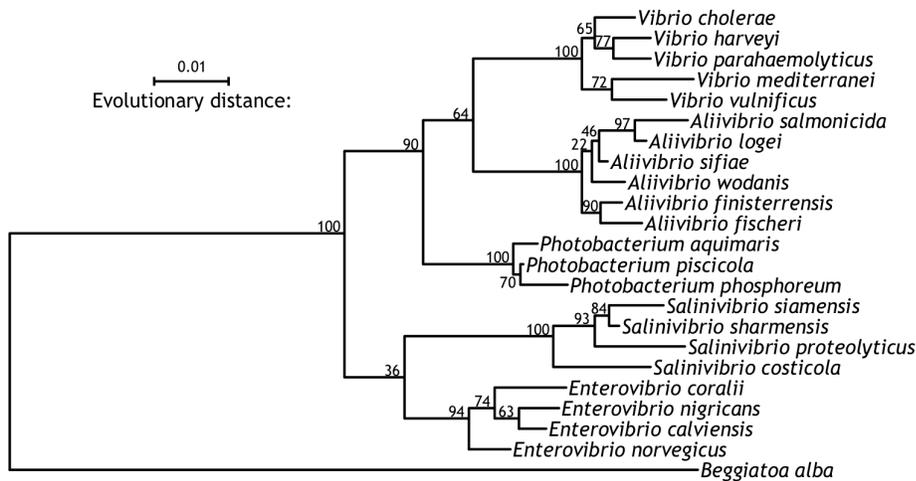
17. ____ Which of the following is *not* a tree-construction algorithm? (1 point)

- A. Parsimony
- B. Maximum-likelihood
- C. Neighbor-joining
- D. Fitch-Margoliash
- E. Jukes and Cantor



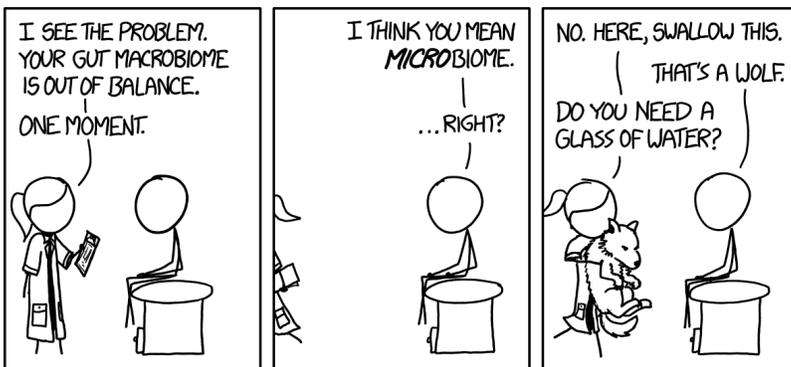
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18. Answer the following questions from this phylogenetic tree of the Family Vibrionaceae:



- a. Which organism is presumably the outgroup? _____ (1 point)
- b. Circle the last common ancestor of each genus in the tree (except the outgroup) and label it with the genus name. (5 points total)
- c. Circle the *least* reliable node in this tree and label it "B". (1 point)
- d. What is the evolutionary distance between *Vibrio cholera* and *Aliivibrio fischeri*? _____ (2 points)
- e. What is the closest relative of *Vibrio vulnificus*? _____ (1 point)

19. *Describe in detail* why small-subunit ribosomal RNA is generally the best molecular sequence for phylogenetic analysis. (10 points)



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20. Describe a method *other* than molecular phylogenetic analysis that can be used to identify organisms. (5 points)

