

Name: _____ Date: _____

Categorize Your Creatures: Complex 11th Grade Classification Quiz

Synthesize cladistic data and molecular evidence to reconstruct evolutionary relationships across the six kingdoms of life.

1. When analyzing the phylogenetic position of the Ginkgo biloba, which derived characteristic distinguishes it from the Bryophyta division while placing it within the Gymnosperm clade?

- A. Presence of specialized vascular tissue (xylem/phloem)
- B. Production of seeds within an enclosed fruit ovary
- C. Dependence on water for horizontal flagellated sperm motility
- D. Utilization of chlorophyll a and b for photosynthesis

2. The use of _____, a technique comparing the rate of mutations in highly conserved sequences like 16S rRNA, allowed Carl Woese to justify the separation of Archaea from Bacteria.

- A. Radiocarbon dating
- B. Molecular clocks
- C. Morphological serotyping
- D. Gel electrophoresis

3. In a formal cladistic analysis, a polyphyletic group is considered a valid taxon because it includes the most recent common ancestor of all members.

- A. True
- B. False

4. Organisms within the genus Sulfolobus thrive in volcanic springs. Based on their lack of peptidoglycan and presence of ether-linked lipids, how should they be classified?

- A. Domain Bacteria, Kingdom Monera
- B. Domain Eukarya, Kingdom Protista
- C. Domain Archaea, Kingdom Archaeobacteria
- D. Domain Eukarya, Kingdom Fungi

5. When constructing a cladogram, the principle of _____ is applied to ensure that the simplest explanation with the fewest evolutionary changes is prioritized.

- A. Natural selection
- B. Maximum parsimony
- C. Genetic drift
- D. Adaptive radiation

6. Horizontal gene transfer (HGT) complicates the 'tree of life' model because it allows genetic material to move between unrelated species outside of traditional reproduction.

- A. True

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B. False

7. You discover a multicellular organism that is saprotrophic, has cell walls made of chitin, and produces haploid spores. In which kingdom should it be placed?

- A. Plantae
- B. Animalia
- C. Fungi
- D. Protista

8. The development of _____ was a major evolutionary leap in Kingdom Animalia, allowing for the specialization of internal organs within a fluid-filled body cavity.

- A. A coelom
- B. Segmentation
- C. Photosynthesis
- D. Bilateral symmetry

9. Which of the following describes a synapomorphy that unites all members of the Phylum Chordata?

- A. The possession of a calcified vertebral column
- B. The presence of a post-anal tail at some developmental stage
- C. The ability to regulate internal body temperature (endothermy)
- D. The use of lungs for gas exchange

10. Taxonomic levels higher than species, such as Class or Family, are considered biological realities that exist independently of human classification systems.

- A. True
- B. False