Name: _____ **Date:** _____

Answer Key: Categorize Your Creatures: Complex 11th Grade Classification Quiz

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

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

Answer: A) Presence of specialized vascular tissue (xylem/phloem)

Ginkgo biloba is a vascular plant (Tracheophyte). While Bryophytes lack true vascular tissue, Ginkgos possess it, distinguishing them from mosses and liverworts.

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.

Answer: B) Molecular clocks

Molecular clocks use the constant rate of genetic mutations to estimate the time of evolutionary divergence between lineages.

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.

Answer: B) False

Polyphyletic groups lack a common ancestor for all members and are typically avoided in modern taxonomy; a monophyletic group (clade) is the standard for valid taxa.

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?

Answer: C) Domain Archaea, Kingdom Archaebacteria

Ether-linked membrane lipids and the absence of peptidoglycan are chemical signatures unique to the Domain Archaea.

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

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Answer: B) Maximum parsimony

Maximum parsimony (Occam's Razor) is the methodological preference for the simplest evolutionary pathway that explains the observed data.

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.

Answer: A) True

HGT, common in prokaryotes, creates a 'web' of life rather than a simple bifurcating tree, making classification of those lineages challenging.

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?

Answer: C) Fungi

Fungi are defined by chitinous cell walls and absorptive heterotrophy (saprotrophism), unlike plants (cellulose) or animals (no cell wall).

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.

Answer: A) A coelom

A true coelom (body cavity) allows for more complex organ development and independent movement of the gut and body wall.

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

Answer: B) The presence of a post-anal tail at some developmental stage

A post-anal tail, along with a notochord and pharyngeal slits, is a defining trait for all Chordates, even if it disappears during adult development in some species.

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

Answer: B) False

While species are often defined by reproductive isolation, higher taxonomic ranks are constructs used by biologists to reflect evolutionary distance and similarities.

Name: _____ Date: _____