Name: _____ **Date:** _____

Answer Key: Microbial War Zone High School Biology Quiz

Analyze predatory prokaryotes and viral recombination mechanisms to evaluate how microscopic evolution impacts global health and biotechnological innovation.

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1. Which mechanism of horizontal gene transfer involves the uptake of 'naked' DNA from the environment following the lyse of a donor cell, and is a primary driver of transformation in species like Neisseria meningitidis?

Answer: B) Natural Transformation

Transformation is the specific process where bacteria incorporate exogenous genetic material from their surroundings, provided they are in a state of 'competence'.

2. In the context of metabolic diversity, organisms like Nitrosomonas that oxidize ammonia for energy and fix CO2 for carbon are classified as _____.

Answer: C) Chemoautotrophs

Chemoautotrophs (or chemolithoautotrophs) derive energy from inorganic chemical reactions and use inorganic carbon sources like carbon dioxide.

3. The Lysogenic cycle of a bacteriophage results in the immediate destruction of the host cell's genomic integrity and rapid release of virions.

Answer: B) False

The Lytic cycle causes cell destruction; the Lysogenic cycle involves the integration of viral DNA into the host genome as a prophage, remaining dormant until triggered.

4. An investigator observes a microorganism thriving in an environment with a pH of 2.0 and a temperature of 85°C. This organism likely belongs to the domain Archaea and is classified as a(n):

Answer: A) Thermoacidophile

Thermoacidophiles are extremophiles that require both high temperatures and low pH levels to maintain cellular membrane stability and enzymatic function.

5. During the Nitrogen Cycle, the process of _____, primarily performed by bacteria like Pseudomonas and Clostridium, converts nitrate back into gaseous nitrogen.

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Answer: D) Denitrification

Denitrification is an anaerobic process that reduces nitrates or nitrites to nitrogen gas, effectively removing bioavailable nitrogen from the ecosystem.

6. Gram-positive bacteria possess an outer membrane rich in Lipopolysaccharides (LPS) that protects them from certain antibiotics like Penicillin.

Answer: B) False

Gram-negative bacteria possess the LPS outer membrane; Gram-positive bacteria have a thick peptidoglycan layer but lack the protective outer lipid membrane.

7. Considering the Endosymbiotic Theory, what is the primary evidence that mitochondria were once free-living proteobacteria?

Answer: B) Circular DNA and 70S ribosomes independent of the host nucleus

Mitochondria contain their own circular genome and ribosomes that represent bacterial characteristics rather than eukaryotic ones.

8. A mutation in the gene encoding the _____ protein would directly inhibit a bacterium's ability to undergo conjugation by preventing physical contact with a recipient cell.

Answer: C) Pilus

A sex pilus is a proteinaceous appendage used to bridge two bacterial cells during the transfer of plasmids during conjugation.

9. Certain fungi, such as Mycorrhizae, form symbiotic relationships with plant roots. How does the plant primarily benefit from this exchange?

Answer: B) Increased surface area for phosphate and water absorption

Mycorrhizal fungi extend the reach of root systems, allowing for significantly higher uptake of mineral nutrients, specifically phosphorus, in exchange for sugars.

10. Retroviruses, such as HIV, utilize the enzyme Reverse Transcriptase to synthesize DNA from an RNA template, contradicting the traditional Central Dogma of biology.

Answer: A) True

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Retroviruses reverse the standard flow of genetic information (DNA to RNA) by creating DNA from RNA to integrate into the host's genome.