**Biology Worksheet: Analysis of Microbial Diversity in an Ecological Framework**

**Group Members:** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Instructions:

Your group is tasked with conducting a detailed analysis of one microorganism, focusing on its ecological roles, classification, metabolic functions, structural characteristics, and environmental adaptations. This exercise is designed to deepen your understanding of microbial diversity, the importance of microbes in ecosystems, and their broader ecological connections.

**Your Assigned Organism to Research:** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. **Domain, Classification, and Ecological Roles**
* Is it Bacteria or Archaea? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
1. **Classify the organism based on its structural and functional characteristics.**
* Is the organism Gram-negative or Gram-positive (if applicable)? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Explain what color it appears after staining and what this indicates about its cell wall composition. Discuss how these structural differences might affect the organism's interactions with its environment and other organisms.
1. **Cellular Morphology and Environmental Interactions**
* What shape is the organism (coccus, bacillus, spirillum, or other)? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Describe the shape and discuss any implications it has for the organism’s lifestyle or pathogenicity, particularly in relation to its ecological roles and interactions with other species.
1. **Motility and Ecological Mobility**
* Is the organism motile? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* If so, how does it move (e.g., flagella, cilia)? Provide details on the type of locomotion and discuss its ecological significance, such as escaping predators, finding nutrients, or colonizing new niches.
1. **Metabolic Functions and Ecological Niche**
* **Identify the type of metabolism (e.g., chemoautotroph, photoautotroph, heterotroph, etc.):**

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

*An organism’s* ***'ecological niche' is t****he specific role or function an organism has within its environment, including how it obtains energy, interacts with other organisms, and adapts to external conditions.*

* **Explain how this metabolic process helps the organism fulfill its role in its niche, including its contributions to the ecosystem.**
1. **Environmental Adaptations**
* What adaptations does this organism have that allow it to thrive in its environment (e.g., ability to withstand high temperatures, acidic conditions, etc.)?
* Discuss how these adaptations support its survival and role in the environment.
1. **Trophic Level and Energy Flow**
* At which trophic level does this organism primarily operate (producer, consumer, decomposer)? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

*The* ***'trophic level'*** *is the position an organism occupies in a food chain, which is determined by how it obtains energy.*

* Discuss the organism's role in energy flow and nutrient cycling within its ecosystem in terms of its trophic level.
1. **Interactions and Symbiosis**
* Does this organism participate in any symbiotic relationships (mutualism, commensalism, parasitism)? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Describe the type of interaction and its importance to the ecosystem.

**Discussion Questions:** Select 3 questions of your choice to answer.

1. How do the organism's structural features contribute to its survival in its natural habitat?
2. Discuss the ecological role of your chosen microorganism. How might it impact its environment or other organisms?
3. Reflect on the importance of biofilms in microbial life. How do they benefit or harm other organisms, including humans?
4. How does the organism's ecological niche and trophic level influence the broader ecosystem?
5. Discuss how understanding microbial diversity is crucial for managing environmental and health-related challenges.
6. What are the biotechnological potentials of studying this organism?

**Group Reflection:** In a brief paragraph, summarize what your group found most intriguing about this microorganism and any challenges you encountered during your research.