**Inside a Microbial Ecosystem**

**Winogradsky Columns and Microbial Communities**

1. Define the following:

Organism:

Population:

Community:

Ecosystem:

2. Describe the relationship between the terms in #1.

3. Draw/describe what you see in the Winogradsky column. Include at least 5 observations. (Color and/or clearly label your observations.)

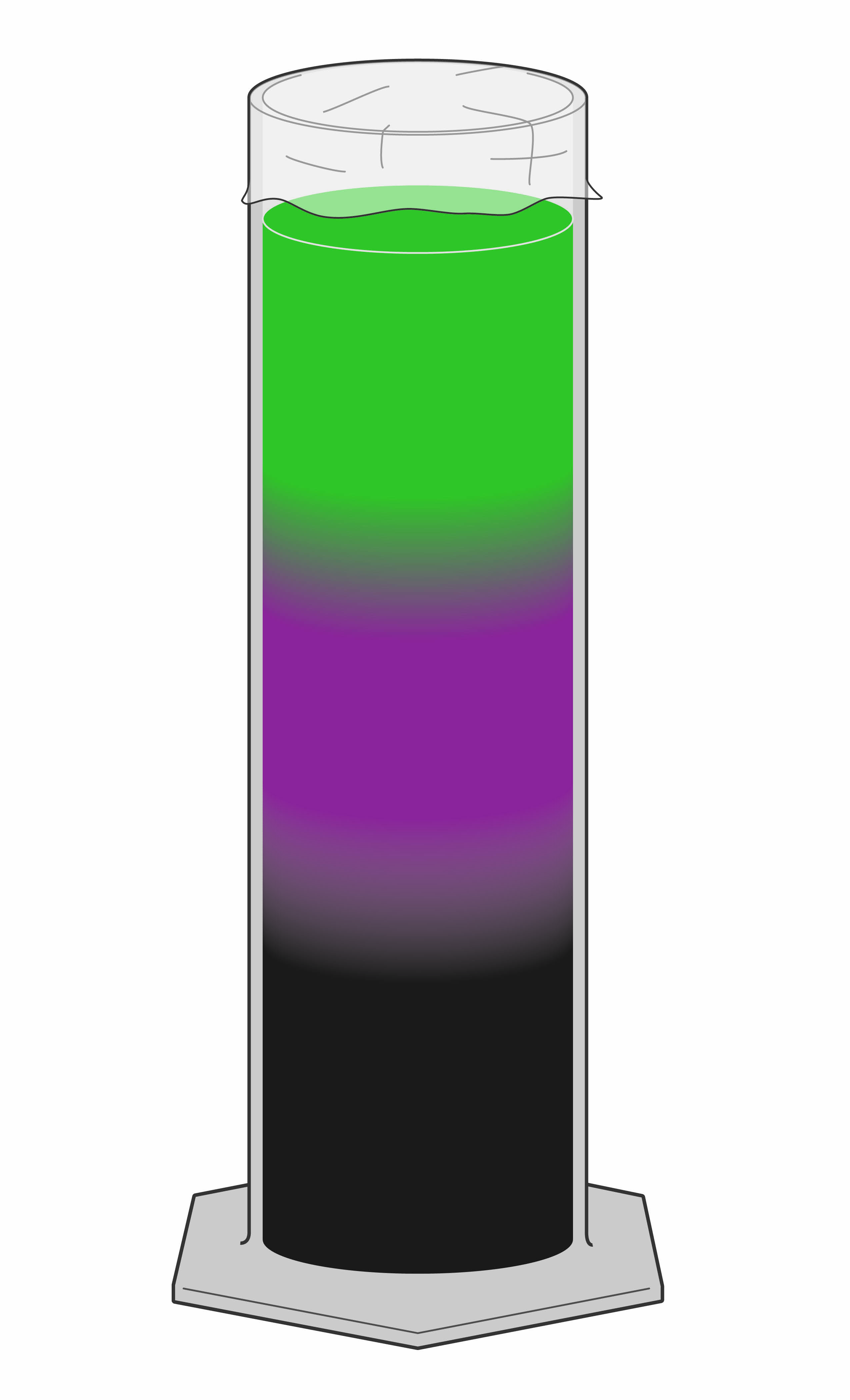
4. Using the Microbial Field Guide, identify 4 types of microbes that might be in your Winogradsky column. Describe the field marks that indicate the presence of these microbes. Complete the table below with this information:

|  |  |  |
| --- | --- | --- |
| **Microbe group** | **Location in column** | **Field marks (i.e. How can you tell?)** |
|  |  |  |
|  |  |  |
|  |  |  |
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5. In a mature Winogradsky column, you will see several layers or areas of different micro-organisms. This banding pattern exists due to the metabolic niches of the different microbes present in the ecosystem of the column.

For this activity, you will be given a set of cards containing information about species of bacteria that are likely found in Winogradsky columns made from freshwater sediment. Your task is to determine: 1) which type of microbe lives where and 2) create a logical movement of matter that allows for each species to have a source of its inputs (what it needs to survive) and a place for its outputs (what it produces) to be used by another species of microbe.

After you have developed your model, draw it in the space below. Be sure to include each species along with its inputs and outputs. Draw and label arrows to indicate where outputs are going and where inputs are coming from on this model.



|  |  |
| --- | --- |
| C:\Users\Chandana\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.IE5\PPNRX588\MC900434805[1].png | Stop and check your model with your group members and teacher before continuing. |

6. Compare and contrast your Winogradsky model with the actual Winogradsky column. Explain the strengths and limitations of the model while discussing the similarities and differences between the two.

7. On your model in #5, indicate the availability of light throughout the column by drawing an arrow from highest availability to lowest availability.

8. On your model in #5, indicate the availability of oxygen (O2) throughout the column by drawing an arrow from highest availability to lowest availability. *Hint: Where is the primary producer of oxygen in this ecosystem?*

|  |  |
| --- | --- |
|  |  |

9. Use your responses to #7 & 8 about the gradients of available abiotic (non-living chemical and physical) factors to explain the stratification (the layering) of the different types of microbes in the Winogradsky column.

10. If you were to mix up everything in the Winogradsky column and leave it in the same setting, what might you see after several weeks? Explain your answer.

11. If you blocked light from the Winogradsky column, how would the Cyanobacteria and Rhodopseudomonas likely be affected? Would this affect the other bacteria in the column? Explain your answer.

12. If you were able to remove Clostridium from the column without disturbing anything else, how might the other microbe species respond to this change in the ecosystem?

13. Is this a self-sustained closed system (all the inputs needed by the different organisms are also produced within the system)? What is the one thing that is needed to keep this system going? Explain.

14. Do you consider the Winogradsky column to be an organism, population, community, or ecosystem? Explain your answer.

15. Do you consider yourself to be an organism, population, community, or ecosystem? Explain your answer.