# Lab 4: Cell Structure and Function Response Form

1. Are **nuclei** visible in cyanobacterial cells?
2. How many cells are held within one sheath of *Gloeocapsa*?
3. Draw *Rhodospirillum rubrum* in the space below:

1. How does the appearance of the Rhodospirillum bacteria compare to the cyanobacteria? List some similarities and differences.
2. How does the size of *Lactobacillus* compare with that of *Oscillatoria*, *Gloeocapsa*, and *Rhodospirillum*?
3. Would you classify filamentous bacteria as multicellular? Why or why not?
4. Sketch the appearance and relative size of eukaryotic epithelial cells compared to prokaryotic cells.
5. Prepare a sketch of the onion cells under low and high power.
6. Prepare a sketch of the aquatic plant cells under low and high power.
7. Briefly describe the function of each structure.

Cell Membrane-

Cell Wall-

Chloroplasts-

Nucleus-

Cytoplasm-

Nucleolus/Nucleoli-

Vacuole-

1. How do the individual cells in each organism (*Chlamydomonas*, *Gonium*, *Pandorina*, *Eudorina*, and *Volvox*) compare in terms of size, shape, and structure?
2. What is the level of cellular organization in each organism? Are the cells unicellular, forming colonies, or fully multicellular?
3. What similarities and differences in cell structure (e.g., chloroplasts, flagella, cell wall) do you observe across these species?
4. At what stage in the Volvocine lineage do you first observe clear evidence of **cellular differentiation**?
5. In which species do you notice the earliest indications of cells that seem to function? This complexity, known as division of labor, is a key characteristic of multicellularity. To understand this concept, think about how cells are organized in humans. There are about 200 cells, each with a unique function. Colonial organisms are simply clusters of independent cells that do not perform different tasks on behalf of the whole colony.
6. How does the arrangement of cells within the colony differ between organisms like *Gonium* and *Volvox*?
7. How do these organisms illustrate the evolutionary transition from unicellularity to multicellularity?
8. At which point in the Volvocine line does the organism begin to show traits that are characteristic of multicellular organisms, such as specialization or larger, more complex colony structures?
9. What evolutionary advantages might multicellularity, as seen in *Volvox*, provide over unicellular organisms like *Chlamydomonas*?
10. What conclusions do you draw about the evolution of multicellularity based on observing the progression in various groups?

**Table 4.1: Indicate whether each structure is found in prokaryotes, eukaryotes, or both.**

|  |  |  |
| --- | --- | --- |
|  | Prokaryotic Cell | Eukaryotic Cell |
| Nucleus |  |  |
| Organelles |  |  |
| DNA |  |  |

**Table 4.2: Indicate whether each structure is found in plant cells, animal cells, or both.**

|  |  |  |
| --- | --- | --- |
|  | Plant cell | Animal cell |
| Eukaryotic or prokaryotic |  |  |
| Cell wall |  |  |
| Cell membrane |  |  |
| Vacuole |  |  |
| Chloroplasts |  |  |
| Cytoplasm |  |  |

**Table 4.3: Single-cell organism vs multicell organism.**

|  |  |  |
| --- | --- | --- |
| Organism Name | Single Cell | Multicell |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

**Table 4.4: Cell shape diversity.**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Type | Shape | Special Features | Hypothesized Function | Evidence to support your hypothesis |
| Muscle cell |  |  |  |  |
| Cheek cell |  |  |  |  |
| Duodenal intestine cell |  |  |  |  |
| Nerve cell |  |  |  |  |
| Amoeba proteus cell |  |  |  |  |
| Fungal cell |  |  |  |  |
| Bacterial cell |  |  |  |  |