

CHAPTER 6

A TOUR OF THE CELL

Learning objectives:

A Panoramic View of the Cell

1. Distinguish between prokaryotic and eukaryotic cells.
2. Explain why there are both upper and lower limits to cell size. Be able to calculate the Surface Area to Volume ratio of a cube.
3. Explain the advantages of compartmentalization in eukaryotic cells.
4. Compare and contrast plant and animal cells.

The Nucleus and Ribosomes

5. Describe the structure and function of the nuclear envelope, including the role of the pore complex.
6. Briefly explain how the nucleus controls protein synthesis in the cytoplasm.
7. Explain the role of the nucleolus in protein synthesis.
8. Distinguish between free and bound ribosomes in terms of location and function.

The Endomembrane System

9. List the components of the endomembrane system, and describe the structure and function of each component.
10. Describe the path that a protein destined for the organelles of the endomembrane system, the plasma membrane or the outside of cell would follow.
11. Compare the structure and functions of smooth and rough ER.
12. Explain the significance of the *cis* and *trans* sides of the Golgi apparatus.
13. Describe three examples of intracellular digestion by lysosomes.
14. Name three different kinds of vacuoles, giving the function of each kind.

Mitochondria and Plastids

15. Briefly describe the energy conversions carried out by mitochondria/chloroplasts.
16. Describe the structure and function of mitochondria and chloroplasts.
17. Describe the evidence that mitochondria (and chloroplasts) evolved from a prokaryotic endosymbiont. Be able to discuss the endosymbiotic hypothesis.
18. Explain the roles of peroxisomes in eukaryotic cells.

The Cytoskeleton

19. Describe the functions of the cytoskeleton.
20. Compare the structure, monomers, and functions of microtubules, microfilaments, and intermediate filaments.

Cell Surfaces and Junctions

21. Describe the basic structure of a plant cell wall. Distinguish between the primary cell wall, middle lamella, and secondary cell wall.
22. Describe the structure and roles of the extracellular matrix in animal cells.
23. Explain how the extracellular matrix may act to integrate changes inside and outside the cell. Describe the proteins and glycoproteins involved in this process.
24. Name the intercellular junctions found in plant and animal cells and describe the differences between the intercellular junctions in animal tissues.