

CHAPTER 6

A TOUR OF THE CELL

Learning objectives:

How We Study Cells

1. Distinguish between magnification and resolution.
2. Describe the principles, advantages, and limitations of the light microscope, transmission electron microscope, and scanning electron microscope.
3. Explain why cell fractionation is a useful technique.

A Panoramic View of the Cell

4. Distinguish between prokaryotic and eukaryotic cells.
5. Explain why there are both upper and lower limits to cell size.
6. Explain the advantages of compartmentalization in eukaryotic cells.

The Nucleus and Ribosomes

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

The Endomembrane System

11. List the components of the endomembrane system, and describe the structure and function of each component.
12. Compare the structure and functions of smooth and rough ER.
13. Explain the significance of the *cis* and *trans* sides of the Golgi apparatus.
14. Describe the cisternal maturation model of Golgi function.
15. Describe three examples of intracellular digestion by lysosomes.
16. Name three different kinds of vacuoles, giving the function of each kind.

Mitochondria and Plastids

17. Briefly describe the energy conversions carried out by mitochondria and chloroplasts.
18. Describe the structure of a mitochondrion and explain the importance of compartmentalization in mitochondrial function.
19. Distinguish among amyloplasts, chromoplasts, and chloroplasts.
20. Identify the three functional compartments of a chloroplast. Explain the importance of compartmentalization in chloroplast function.
21. Describe the evidence that mitochondria and chloroplasts are semiautonomous organelles.
22. Explain the roles of peroxisomes in eukaryotic cells.

The Cytoskeleton

23. Describe the functions of the cytoskeleton.
24. Compare the structure, monomers, and functions of microtubules, microfilaments, and intermediate filaments.

25. Explain the structure and role of centrioles and basal bodies.
26. Explain how the ultrastructure of cilia and flagella relate to their functions.

Cell Surfaces and Junctions

27. Describe the basic structure of a plant cell wall. Distinguish between the primary cell wall, middle lamella, and secondary cell wall.
28. Describe the structure and roles of the extracellular matrix in animal cells.
29. Explain how the extracellular matrix may act to integrate changes inside and outside the cell.
30. Name the intercellular junctions found in plant and animal cells and list the function of each type of junction.