

Chapter 6: A Tour of the Cell**Concept 6.2 Eukaryotic cells have internal membranes that compartmentalize their functions**

1. Which two domains consist of prokaryotic cells?
2. A major difference between prokaryotic and eukaryotic cells is the location of their DNA. Describe this difference.

3. On the sketch of a prokaryotic cell, label each of these features and give its function or description.

cell wall

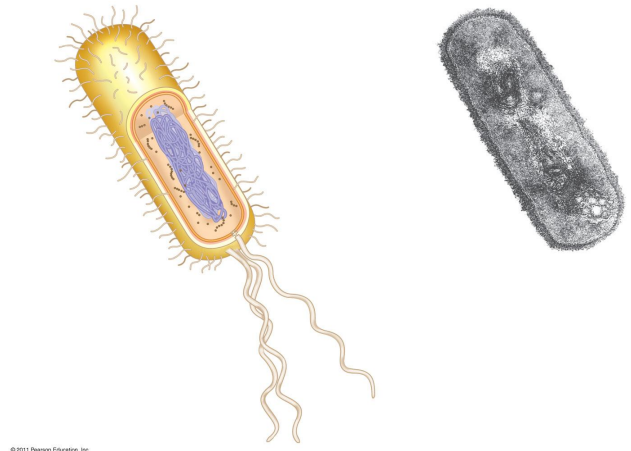
plasma membrane

bacterial chromosome

nucleoid

cytoplasm

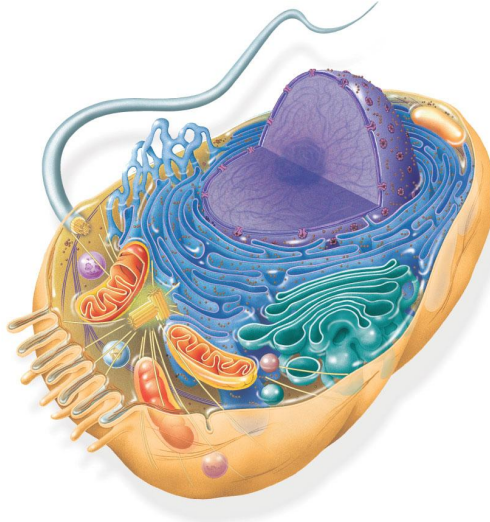
flagella



3. Why are cells so small? Explain the relationship of surface area to volume.
4. What are *microvilli*? How do these structures relate to the function of intestinal cells?

Concept 6.3 The eukaryotic cell's genetic instructions are housed in the nucleus and carried out by the ribosomes

5. In the figure below, label the *nuclear envelope*, *nuclear pores*, and *pore complex*.



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6. Describe the nuclear envelope. How many layers is it? What connects the layers?

7. What is the *nuclear lamina*? *Nuclear matrix*?

8. Found within the nucleus are the *chromosomes*. They are made of *chromatin*. What are the two components of chromatin? When do the thin chromatin fibers condense to become distinct chromosomes?

9. When are the *nucleoli* visible? What are assembled here?

10. What is the function of *ribosomes*? What are their two components?

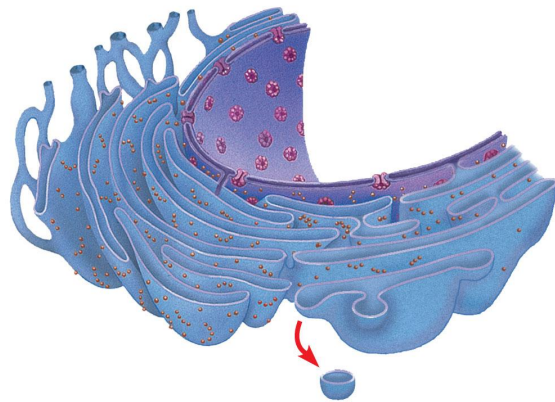
11. Ribosomes in any type of organism are all the same, but we distinguish between two types of ribosomes based on where they are found and the destination of the protein product made. Complete this chart to demonstrate this concept.

Type of Ribosome	Location	Product
Free ribosomes		
Bound ribosomes		

Concept 6.4 The endomembrane system regulates protein traffic and performs metabolic functions in the cell

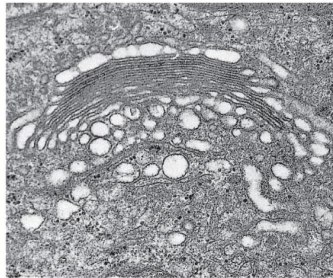
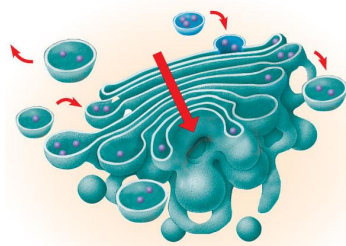
12. List all the structures of the *endomembrane* system.

13. The *endoplasmic reticulum (ER)* makes up more than half the total membrane system in many eukaryotic cells. Use this sketch to explain the *lumen*, *transport vesicles*, and the difference between *smooth* and *rough* ER.



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14. List and describe three major functions of the smooth ER.
15. Why does alcohol abuse increase tolerance to other drugs such as barbiturates?
16. The rough ER is studded with ribosomes. As proteins are synthesized, they are threaded into the lumen of the rough ER. Some of these proteins have carbohydrates attached to them in the ER to form *glycoproteins*. What does the ER then do with these secretory proteins?
17. Besides packaging secretory proteins into transport vesicles, what is another major function of the rough ER?
18. The transport vesicles formed from the rough ER fuse with the Golgi apparatus. Use this sketch to label the *cisterna* of the Golgi apparatus, and its *cis* and *trans* faces.



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Describe what happens to a transport vesicle and its contents when it arrives at the Golgi.

19. What is a *lysosome*? What do they contain? What is their pH?

20. One function of lysosomes is intracellular digestion of particles engulfed by *phagocytosis*. Describe this process of digestion. What human cells carry out phagocytosis?

21. A second function of lysosomes is to recycle cellular components in a process called *autophagy*. Describe this process.

22. What happens in Tay-Sachs disease? Explain the role of the lysosomes in Tay-Sachs.

23. There are many types of vacuoles. Briefly describe:

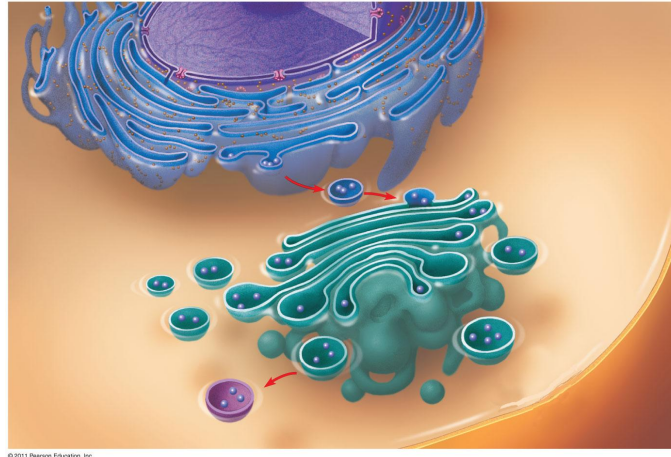
food vacuoles -

contractile vacuoles -

central vacuoles in plants -

(give at least three functions/materials stored here)

24. Use this figure to explain how the elements of the endomembrane system function together to secrete a protein and to digest a cellular component. Label as you explain.



Concept 6.5 Mitochondria and chloroplasts change energy from one form to another

25. What is an endosymbiont?

26. What is the *endosymbiont theory*? Summarize three lines of evidence that support the model of endosymbiosis.

27. Mitochondria and chloroplasts are not considered part of the endomembrane system, although they are enclosed by membranes. Sketch a mitochondrion here and label its outer membrane, inner membrane, inner membrane space, cristae, matrix, and ribosomes.

28. Now sketch a chloroplast and label its outer membrane, inner membrane, inner membrane space, thylakoids, granum, and stroma. Notice that the mitochondrion had two membrane compartments, while the chloroplast has three compartments.

29. What is the function of the mitochondria?

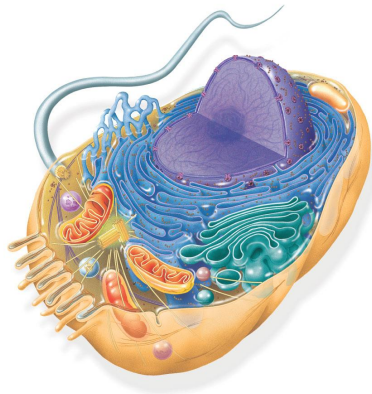
30. What is the function of the chloroplasts?

34. Recall the relationship of structure to function. Why is the inner membrane of the mitochondria highly folded? What role do all the individual thylakoid membranes serve? (Same answer for both questions.)

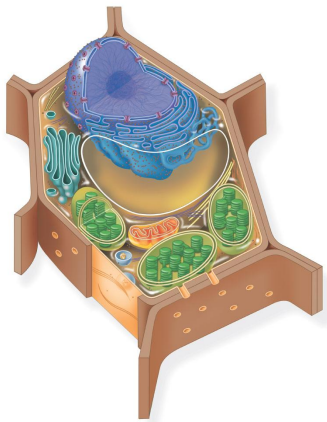
35. Explain the important role played by *peroxisomes*.

SUMMARY

On these diagrams of plant and animal cells, label each organelle and give a brief statement of its function.



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There's an excellent chart on page 123 of your text that summarizes Concepts 6.3-6.5. Be sure to study it! You can copy it here or put some notes here to help you remember the concepts.