

Section 7-1

Are All Cells Alike?

All living things are made up of cells. Some organisms are composed of only one cell. Other organisms are made up of many cells.

1. What are the advantages of a one-celled organism?
2. What are the advantages of an organism that is made up of many cells?

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Section Outline

Section 7-1

7-1 Life Is Cellular

- I. Discovery of Cell
 - A. Robert Hooke (1665)
 - 1. First Microscope
 - 2. Plant cells – cork
 - B. Anton von Leeuwenhoek (1674)
 - 1. Was credited discovery of the microscope
 - 2. Pond water – tiny microscopic organisms
 - C. Matthias Schleiden (1838)
 - 1. German Botanist
 - 2. All plants are made of cells



- D. Theodor Schwann (1839)
 - 1. German
 - 2. All animals are made of cells
- E. Robert Brown
 - 1. Scottish
 - 2. Discovery of the Nucleus
- F. Rudolph Virchow (1855)
 - 1. German Physician
 - 2. All cells come from pre-existing cells
- G. Lynn Margulis
 - 1. Important evolutionary discovery
 - 2. Tiny structures within some cells were once free-living cells themselves



- I. Cell Theory
 - A. All living things are made of cells
 - B. Cells are the basic unit of life
 - C. New cells come from pre-existing cells
- II. Prokaryotic Cells
 - A. Lacks a nucleus
 - B. Lacks membrane-bound organelles
 - C. Example – Bacterial cells
- III. Eukaryotic Cells
 - A. True cells
 - B. Contain a nucleus
 - C. Contain membrane-bound organelles
 - D. Examples – Plant cells and Animal cells



Prokaryotic and Eukaryotic Cells

Section 7-1

Cell membrane

Cytoplasm



Prokaryotic Cell

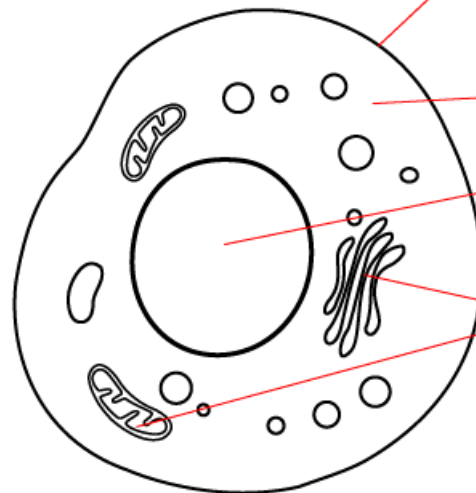
Cell membrane

Cytoplasm

Nucleus

Organelles

Eukaryotic Cell



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Section 7-2

Division of Labor

A cell is made up of many parts with different functions that work together. Similarly, the parts of a computer work together to carry out different functions.

Working with a partner, answer the following questions.

1. What are some of the different parts of a computer? What are the functions of these computer parts?
2. How do the functions of these computer parts correspond to the functions of certain cell parts?



Section Outline

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7-2 Eukaryotic Cell Structure

A. Organelle

1. Structure in cytoplasm
2. Specialized function

B. Nucleus

1. Control center of cell
2. Contains DNA – instructions for making proteins
3. Nuclear envelope – membranes around nucleus
4. Chromatin – pg 176
5. Chromosomes – pg 176
6. Nucleolus – assembly of ribosomes



C. Ribosomes

1. Proteins made
2. Composed of RNA & protein
3. Only 25 nm in size

D. Endoplasmic Reticulum

1. Transports materials through the inside of cell
2. Transportation system
3. Two types
 - a. Smooth ER
 - b. Rough ER
 1. Ribosomes attached
 2. Proteins modified here chemically

E. Golgi Apparatus

1. Discovered by Camillo Golgi
2. Looks like stacked pancakes
3. Modifies, collects, packages, & distributes molecules



F.Lysosomes

1. Cell membrane engulfs material – endocytosis
2. Formed by Golgi Apparatus
3. Help breakdown foreign material & old organelles
4. Plant cells lack

G.Vacuoles

1. Storage tank
2. Store water, salts, & proteins

H.Mitochondria and Chloroplasts

1.Mitochondria

- a. Change chemical energy into compounds used by cel
- b. Two membranes
 1. Inner – folded to increase surface area
 2. Outer membrane



2. Chloroplasts

- a. Found in plant cells only
- b. Photosynthesis takes place here
- c. Converts sunlight into chemical energy

3. Organelle DNA – both mitochondria and chloroplast contain DNA

I. Cytoskeleton

- 1. Filaments fibers
- 2. Support cell structure
- 3. Drive cell movement
- 4. Microtubules
 - a. Provide cell shape
 - b. Help move organelles through cell
 - c. Centrioles – help in cell division (only in animal cells)
- 5. Microfilaments
 - a. Permit movement of cytoplasm
 - b. Movement & support

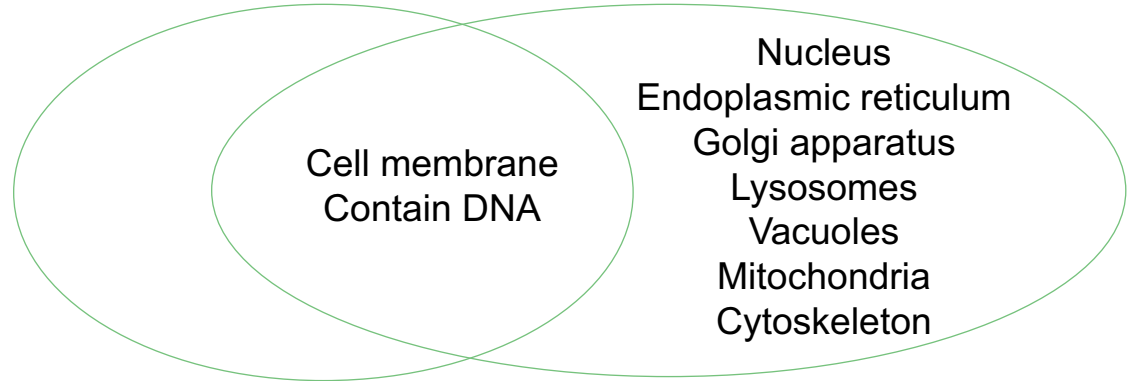


Venn Diagrams

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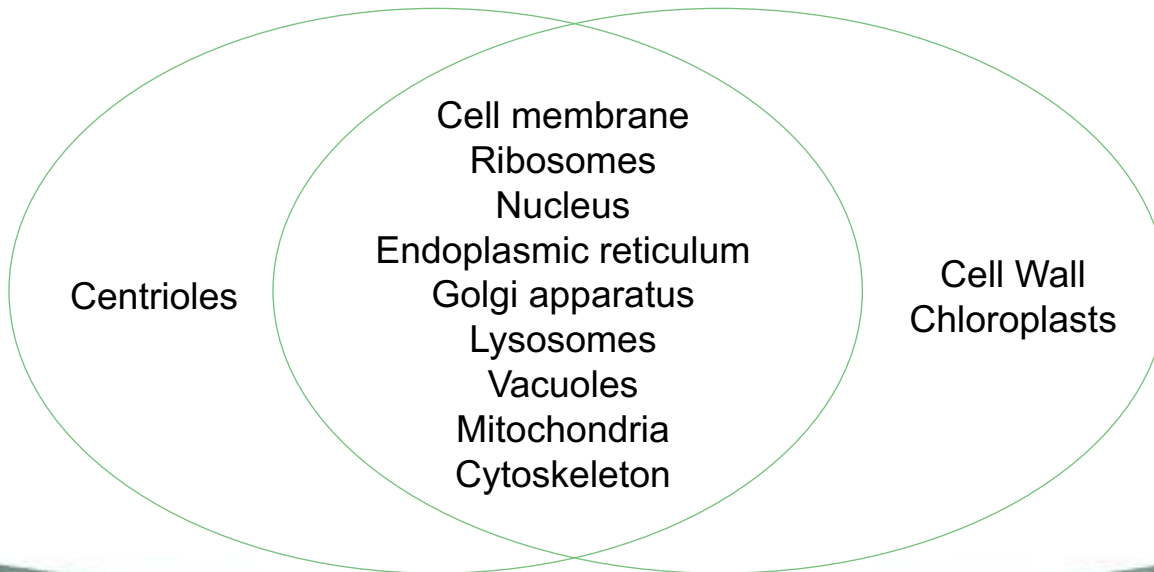
Prokaryotes

Eukaryotes



Animal Cells

Plant Cells

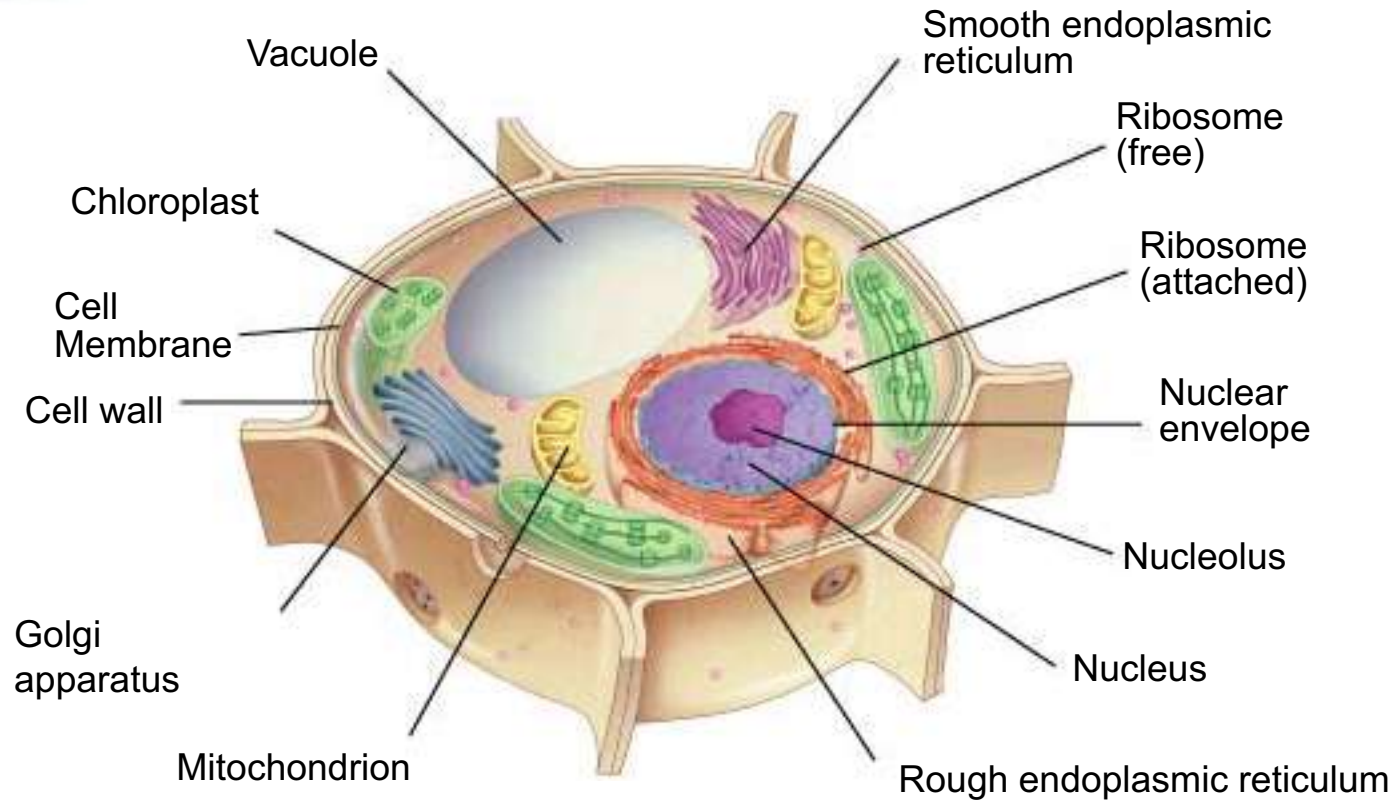


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Figure 7-5 Plant and Animal Cells

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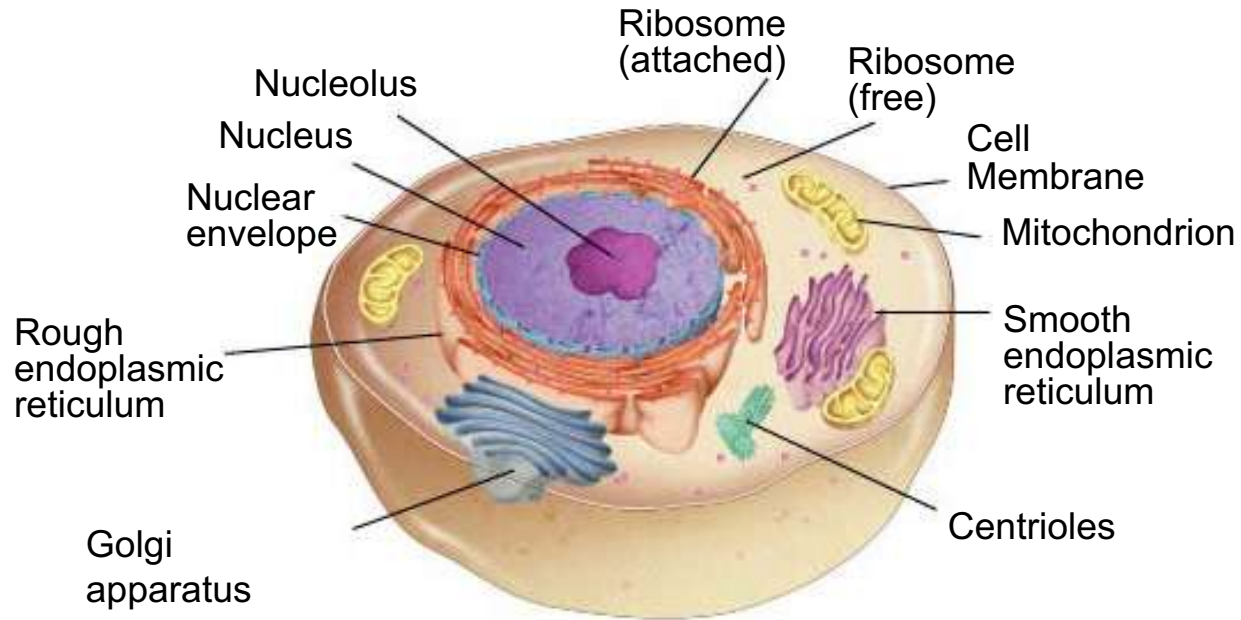
Plant Cell

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Figure 7-5 Plant and Animal Cells

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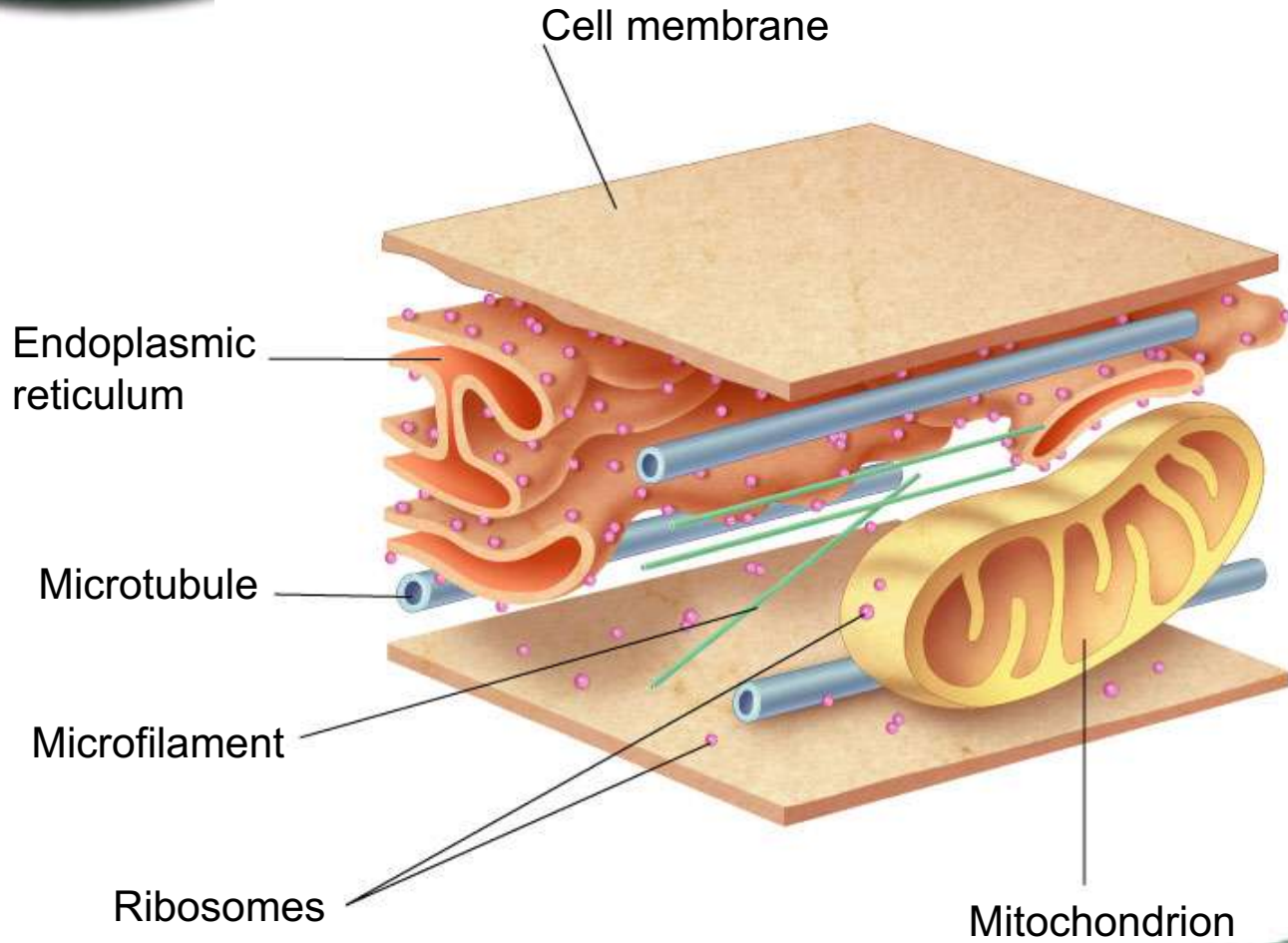


Animal Cell



Figure 7-11 Cytoskeleton

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Section 7-3

In or Out?

How is a window screen similar to a cell membrane? Read on to find out.

1. What are some things that can pass through a window screen?
2. What are some things that cannot pass through a window screen? Why is it important to keep these things from moving through the screen?
3. The cell is surrounded by a cell membrane, which regulates what enters and leaves the cell. Why is it important to regulate what moves into and out of a cell?



Section Outline

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7-3 Cell Boundaries

A. Cell Environment

1. Exists in liquid environment
2. Makes it easier for materials to move in and out of cell

B. Diffusion

1. Process by which molecules move from higher to lower concentration
2. Move towards equilibrium
3. Cell membrane – selectively permeable

C. Osmosis

1. Most compounds able to dissolve in lipid bi-layer
2. One exception H₂O
3. H₂O Movement – osmosis



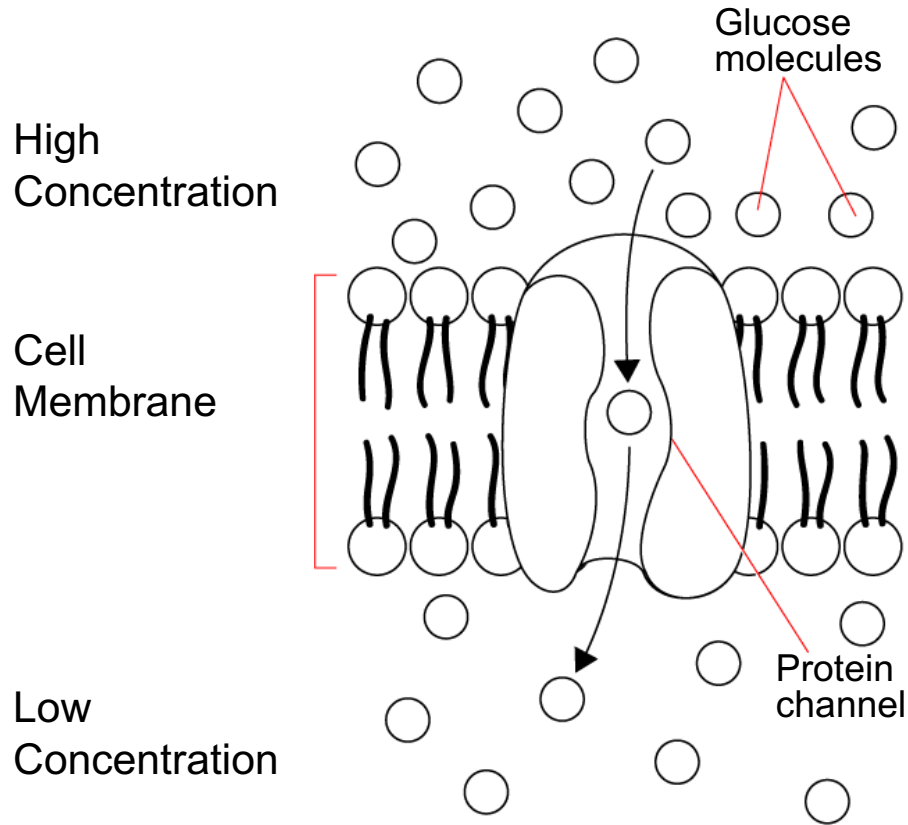
3. Osmotic Pressure

- a. Cytoplasm filled w/salts, sugars, and proteins
- b. If water moves freely, volume increases, cell will burst
- c. Cell deal w/ in variety of ways
 - 1. Cell wall
 - 2. Most cells bathed in fluids such as blood w/equal conc.
 - 3. Contractile vacuole
- D. Facilitated Diffusion
 - 1. Some materials can't dissolve
 - 2. Carrier protein used to transport across membrane



Facilitated Diffusion

Section 7-3



- E. Active Transport
 - 1. Required energy
 - 2. Molecular Pumps
 - a. Macromolecules move materials across cell membrane
 - b. Require chemical energy
 - 3. Endocytosis
 - a. Pockets
 - b. Vacuole formed
 - 4. Phagocytosis
 - a. Large particles taken in
 - b. Extensions of cytoplasm engulf large particles
 - 5. Pinocytosis
 - a. Liquid comes into cell
 - b. Tiny pockets form along membrane
 - c. Vacuoles form



6. Exocytosis
 - a. Large molecules
 - b. Material exits cell
 - c. Membrane surrounding material fuses w/cell membrane

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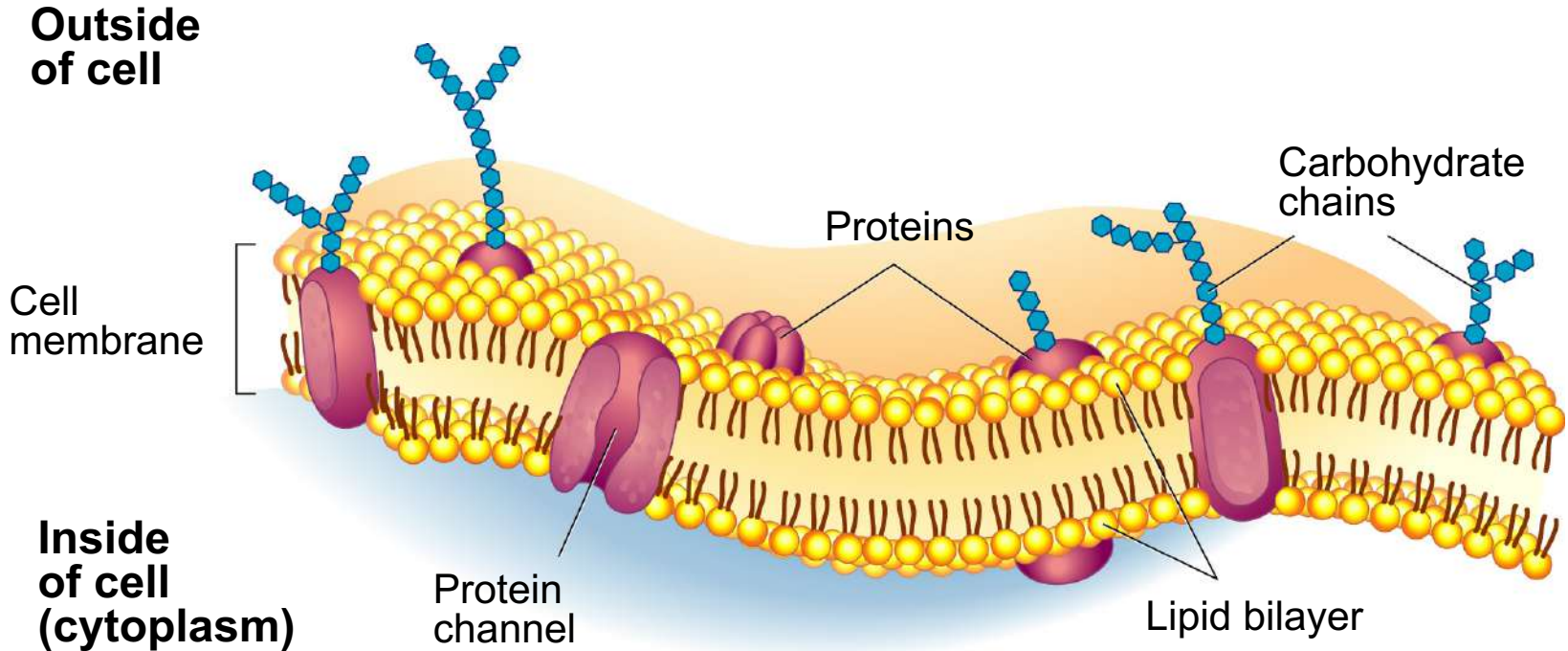
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Figure 7-12 The Structure of the Cell Membrane

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Figure 7-15 Osmosis

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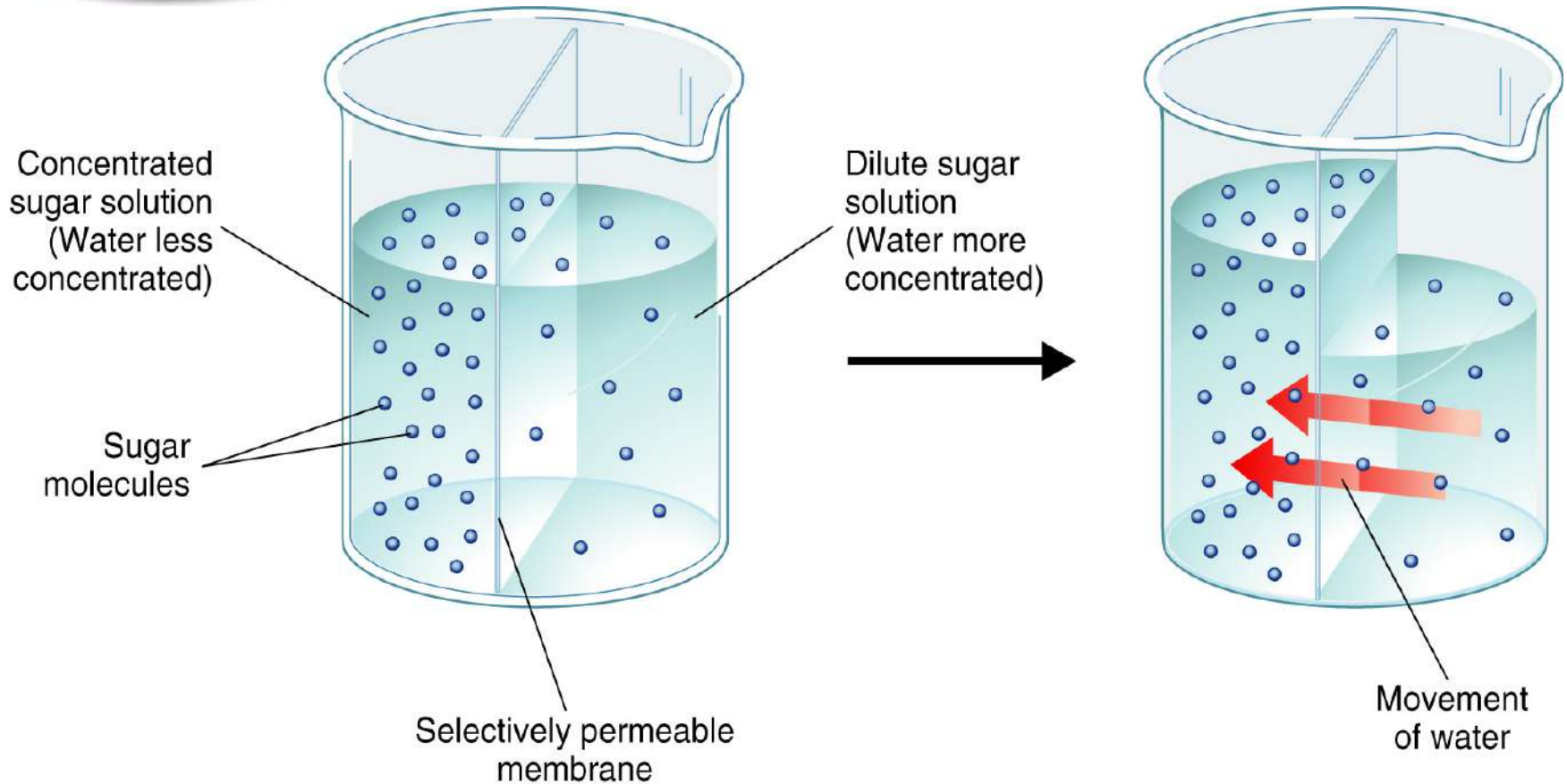
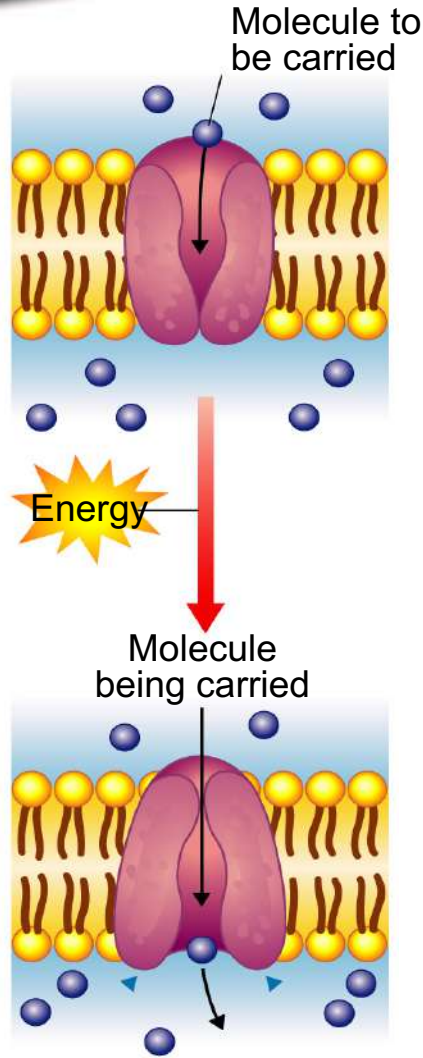


Figure 7-19 Active Transport

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Interest Grabber

Section 7-4

From Simple to More Complex

Many multicellular organisms have structures called organs that have a specific function and work with other organs. Working together, these organs carry out the life processes of the entire organism.

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Interest Grabber *continued*

ANSWERS

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1. Some activities cannot be performed by only one person, but need a team of people. What type of activity requires a team of people to work together in order to complete a task?
2. What do you think are some characteristics of a successful team?
3. How is a multicellular organism similar to a successful team?

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Section Outline

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7-4 The Diversity of Cellular Life

- A. Unicellular Organisms
- B. Multicellular Organisms
 - 1. Specialized Animal Cells
 - 2. Specialized Plant Cells
- C. Levels of Organization
 - 1. Cells
 - 2. Tissues
 - 3. Organs
 - 4. Organ Systems
 - 5. Organism

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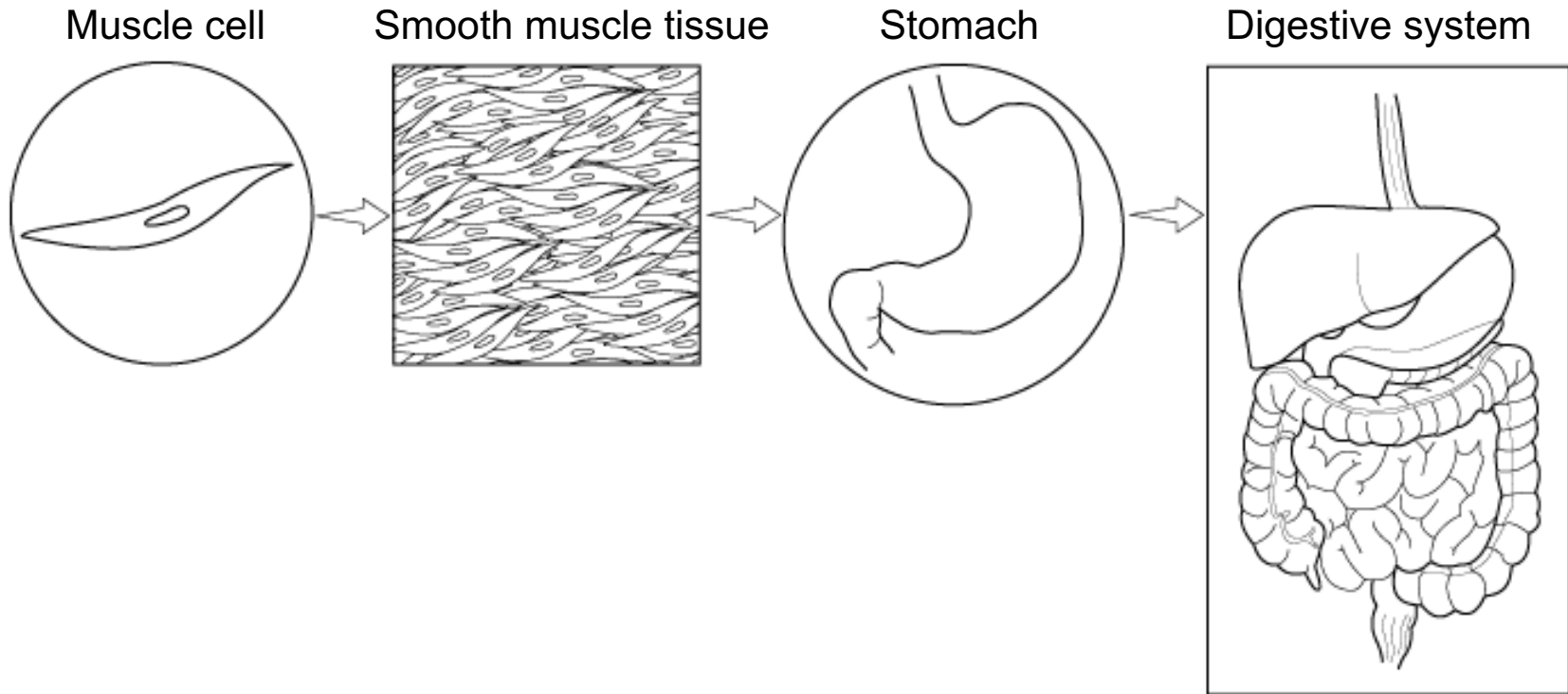
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Levels of Organization

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[Diffusion](#)

[Osmosis](#)

[Passive Transport](#)

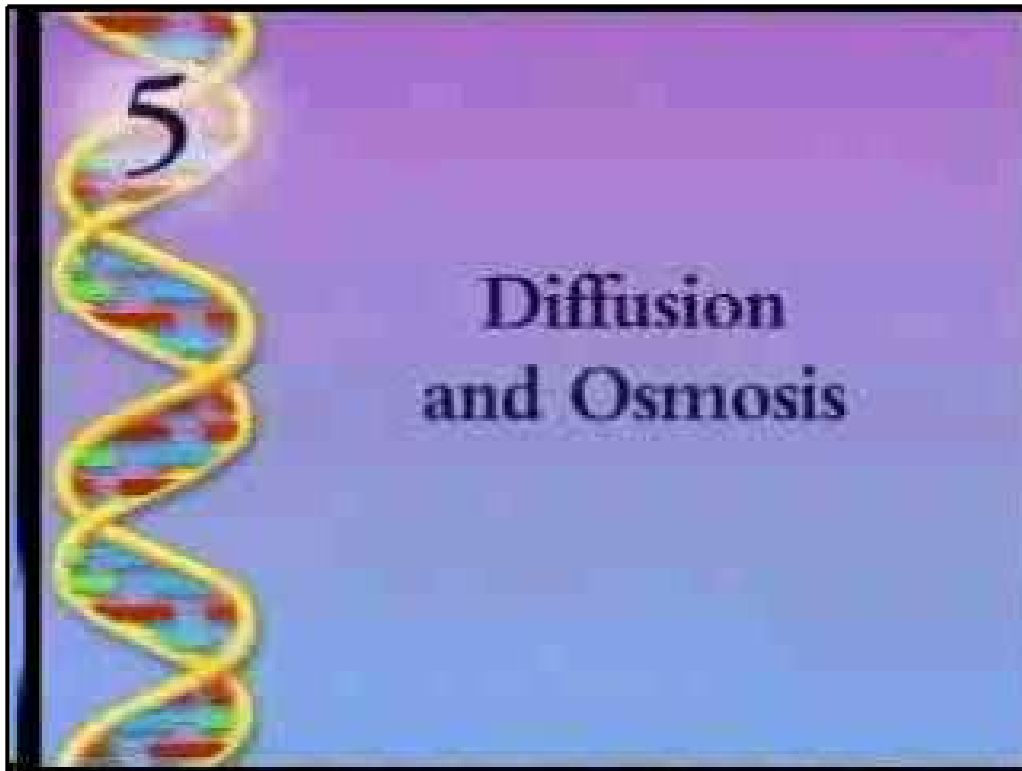
[Active Transport](#)

[Endocytosis and Exocytosis](#)



Video 1

Diffusion



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Video 2

Osmosis

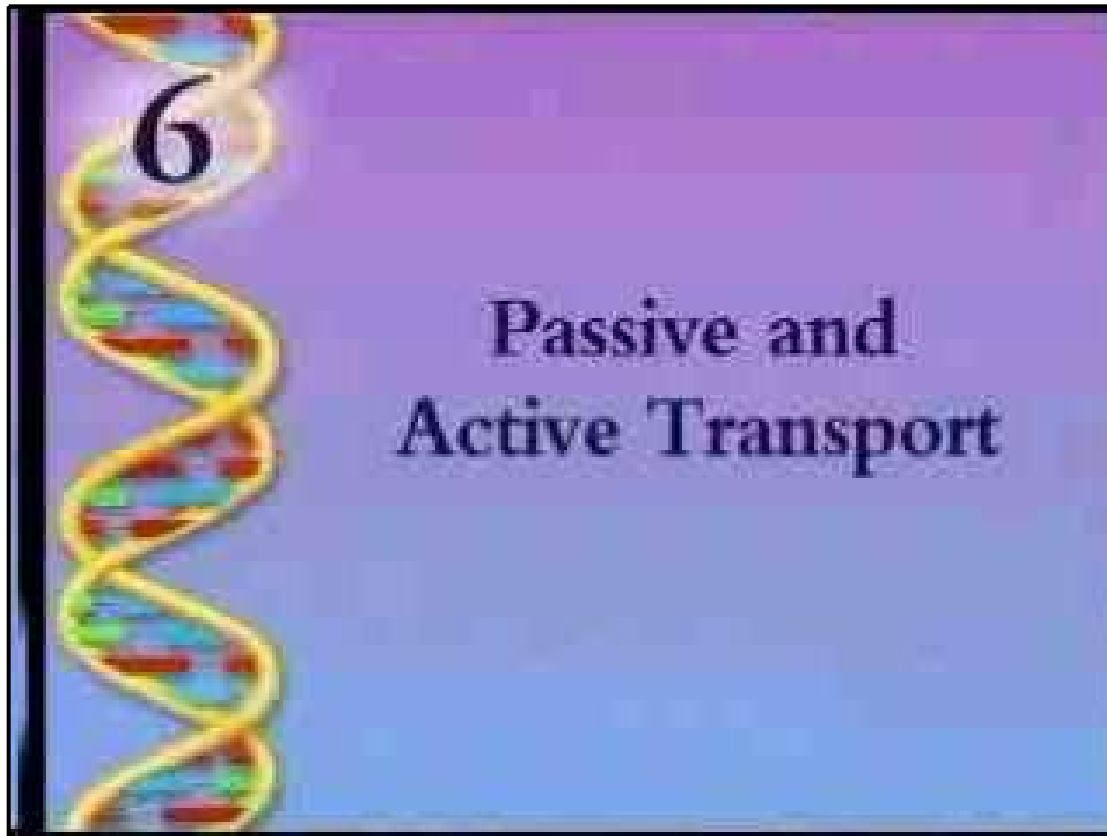


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Video 3

Passive Transport

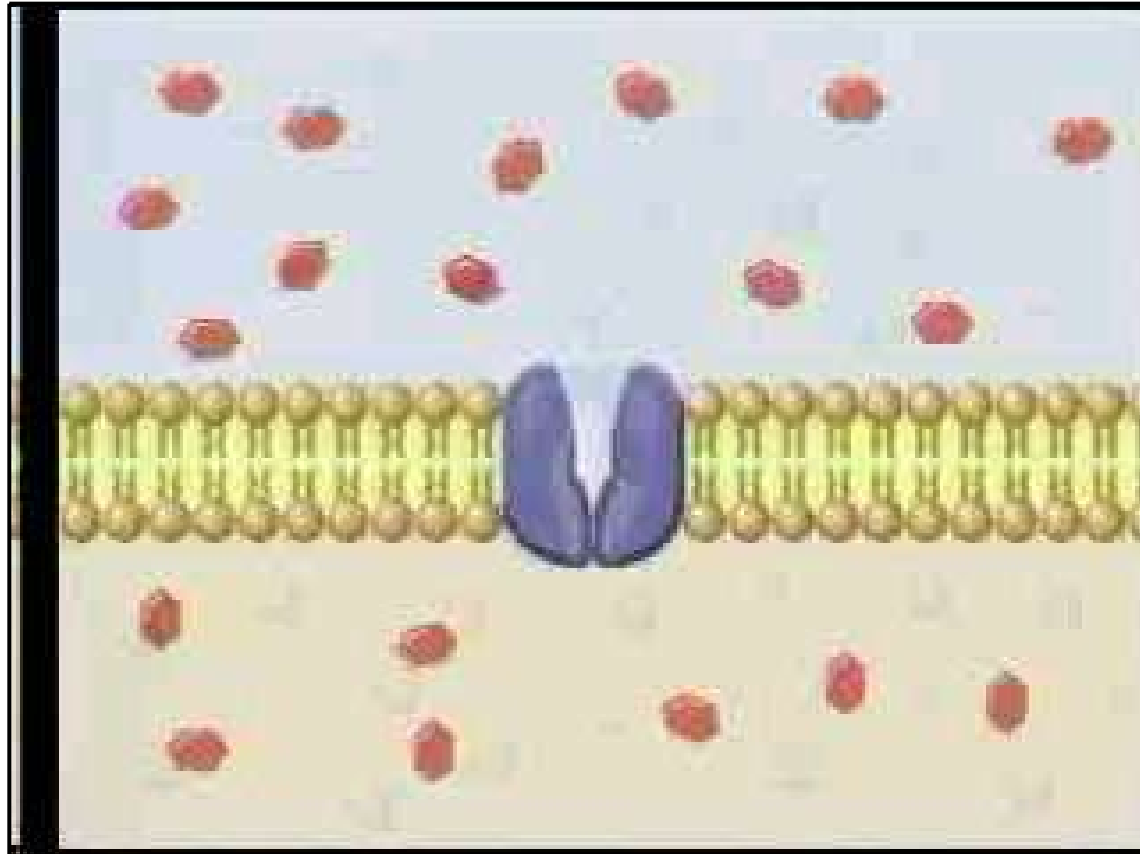


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Video 4

Active Transport

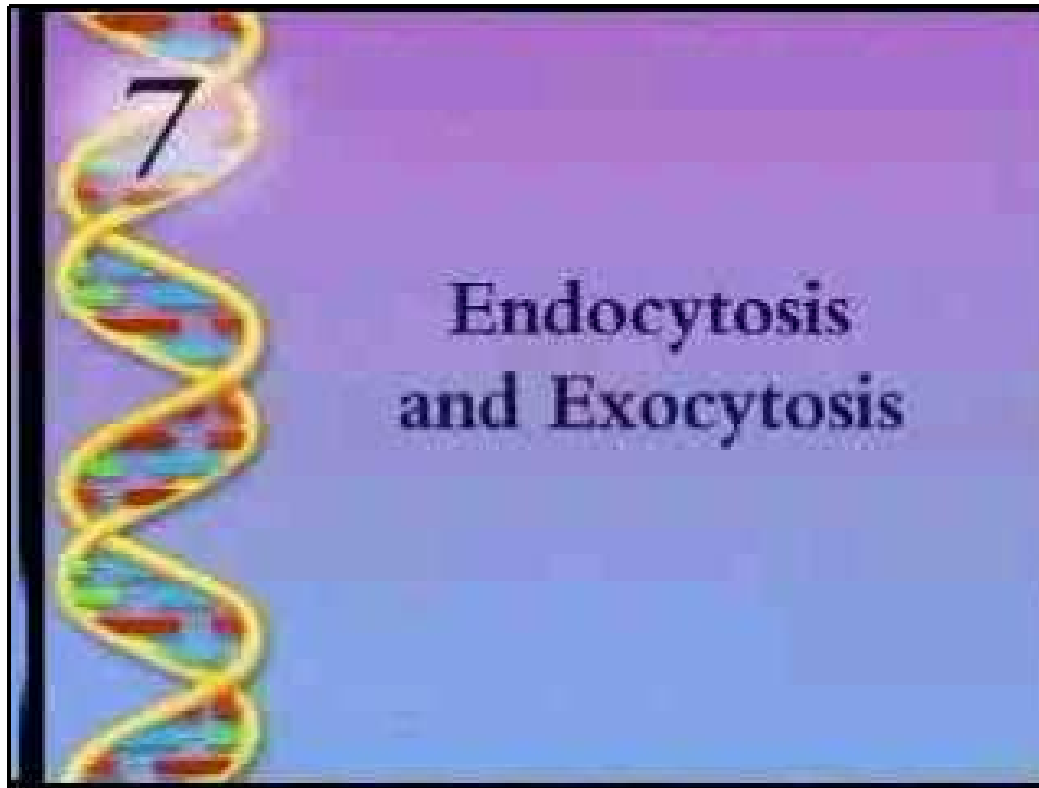


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Video 5

Endocytosis and Exocytosis



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For links on cell theory, go to www.SciLinks.org and enter the Web Code as follows: cbn-3071.

For links on cell membranes, go to www.SciLinks.org and enter the Web Code as follows: cbn-3073.



Interest Grabber Answers

1. What are the advantages of a one-celled organism?

A one-celled organism has simpler needs and can respond immediately to its environment because its entire cell is immersed in its environment.

2. What are the advantages of an organism that is made up of many cells?

In a multicellular organism, different jobs are divided among different groups of cells that work together. Also, a multicellular organism can continue to survive even if it loses some of its cells.



Interest Grabber Answers

Working with a partner, answer the following questions.

1. What are some of the different parts of a computer? What are the functions of these computer parts?

Answers may include: monitor (interfaces with the computer's environment), software (instructions for how to carry out different jobs), CPU (directs the computer's activities), recycle bin or trash can (storage area for wastes), and so on.

2. How do the functions of these computer parts correspond to the functions of certain cell parts?

Students should try to link the functions they described in question 1 to the functions of the different cell structures. The cell needs a way to interface with its environment (cell membrane), instructions for carrying out different jobs (DNA), and a CPU to direct the cell's activities (nucleus).



Interest Grabber Answers

1. What are some things that can pass through a window screen?

Answers may include air, fine dust, and rainwater.

2. What are some things that cannot pass through a window screen? Why is it important to keep these things from moving through the screen?

Insects, leaves, and other matter that may fall from trees. The screen keeps out annoying insects and objects that may bring dirt into the home.

3. The cell is surrounded by a cell membrane, which regulates what enters and leaves the cell. Why is it important to regulate what moves into and out of a cell?

Materials such as oxygen and food that are needed by the cell have to be able to get inside the cell. At the same time, excess materials have to leave the cell.



Interest Grabber Answers

1. Some activities cannot be performed by only one person, but need a team of people. What type of activity requires a team of people to work together in order to complete a task?

Answers might include building a human pyramid or constructing an arch out of blocks.

2. What do you think are some characteristics of a successful team?

Divide up jobs and cooperate well with one another.

3. How is a multicellular organism similar to a successful team?

The functions of the organism are divided up among its parts (organs and organ systems). All the parts cooperate to carry out all the functions of the whole organism.



