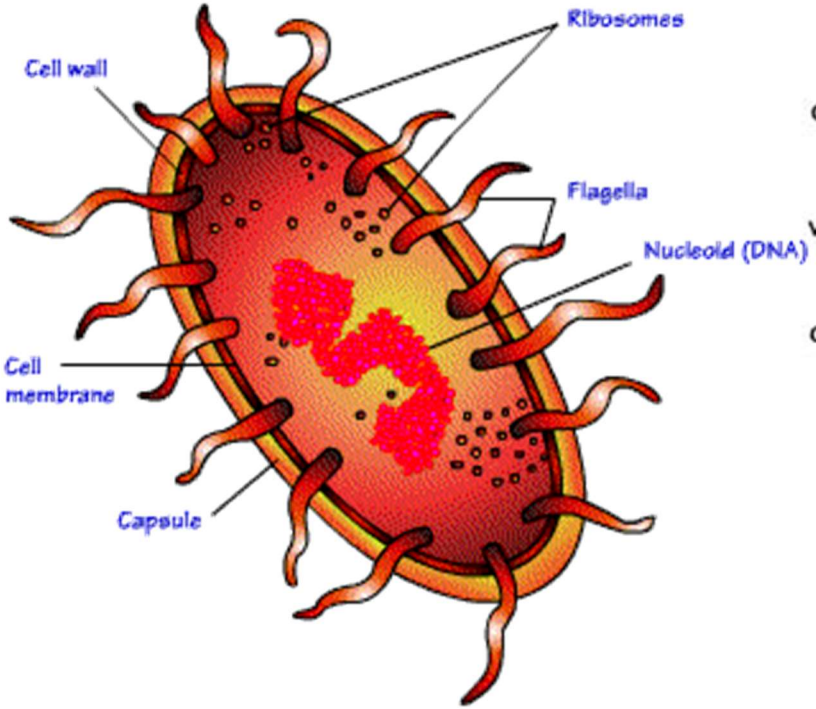
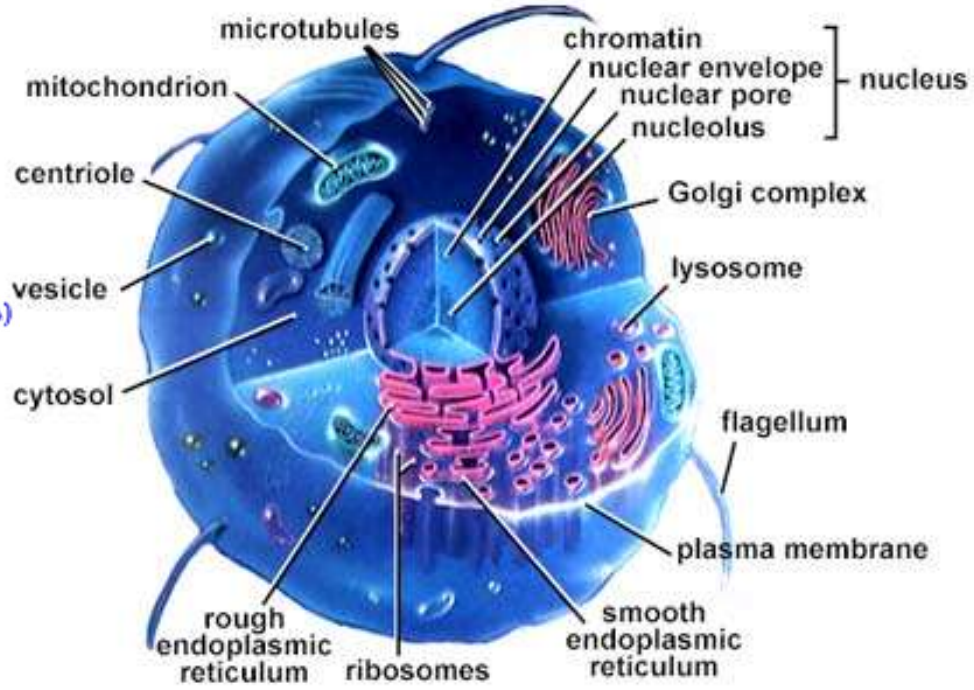
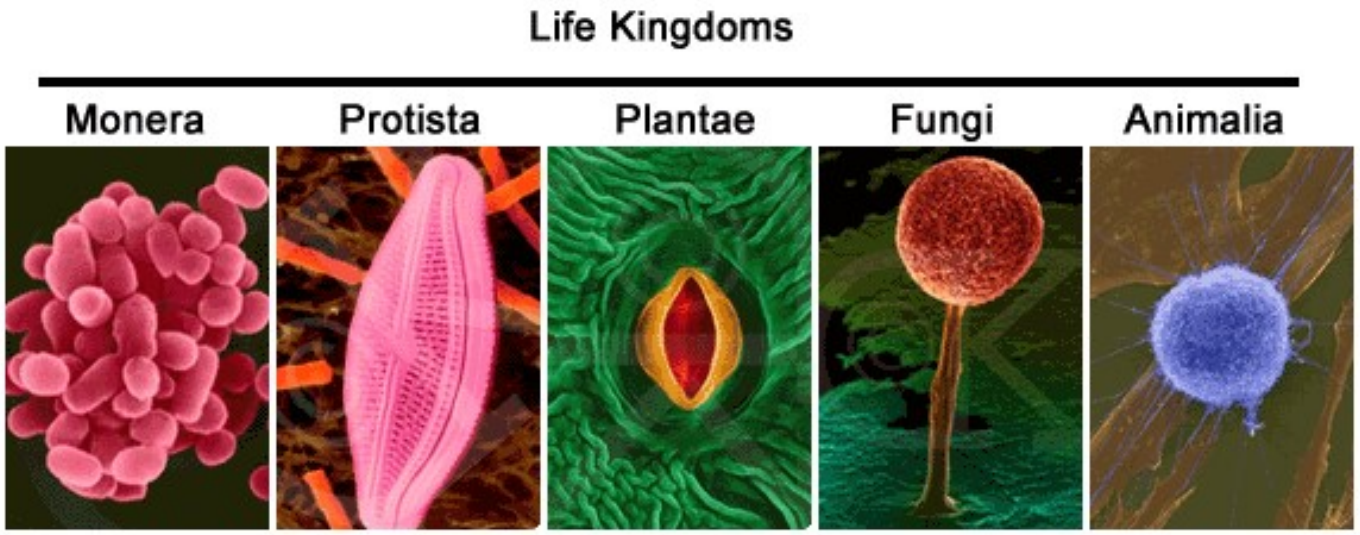
- **Cell types**
- **Cell Structure** – Different Organelles and Function
- **Cell Division**



Prokaryotic



Eukaryotic



- Cells that lack a membrane-bound nucleus are called prokaryotes. Cells in the monera kingdom such as bacteria and cyanobacteria (also known as blue-green algae) are prokaryotes.

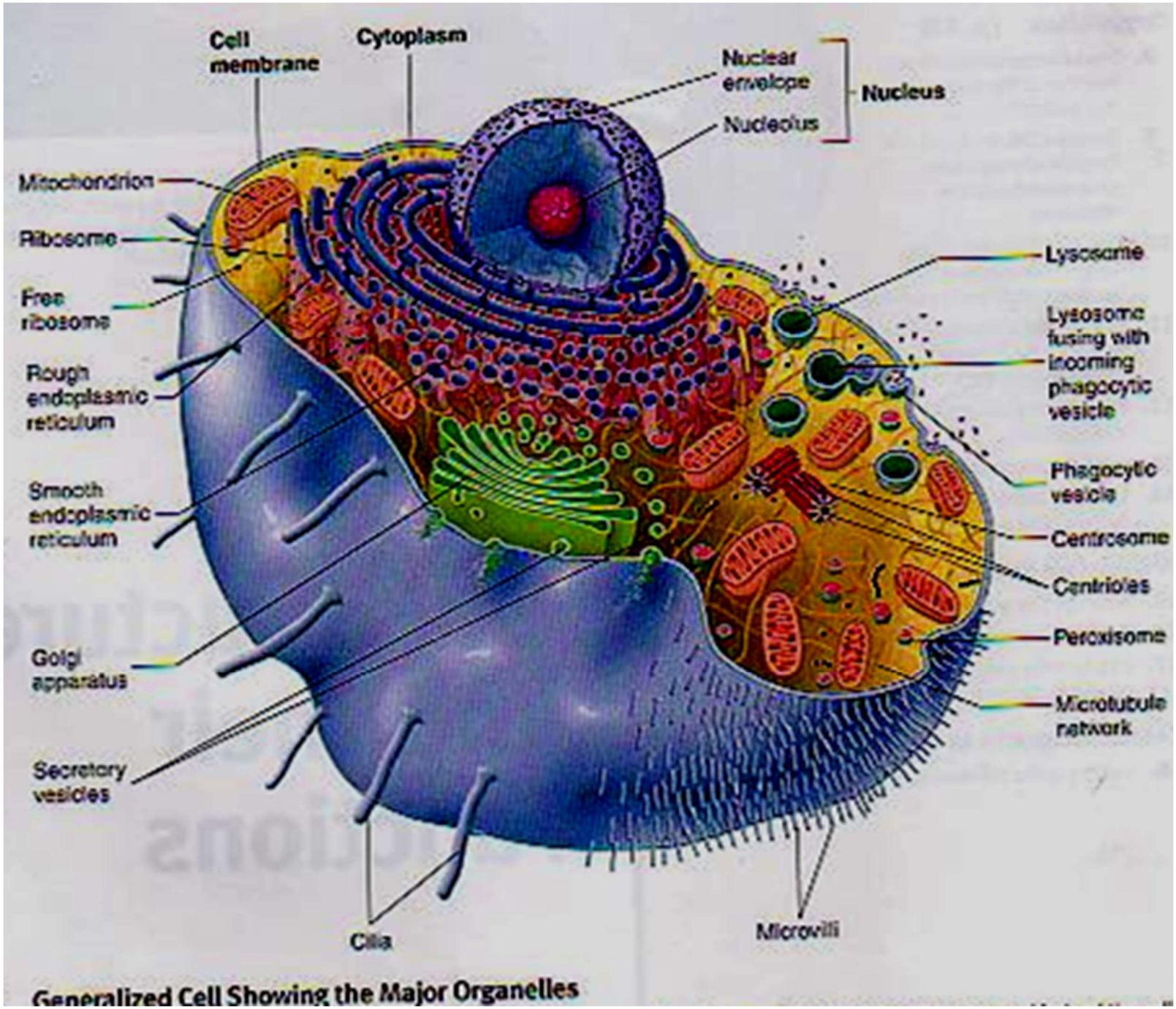
- Eukaryotic cells comprise all of the life kingdoms except monera.

Cell Structure

- Highly Organized

. Specialized structures called **organelles in a jelly like substance called cytoplasm**

Amount and type of organelles is related to function



Generalized Cell Showing the Major Organelles

Functions of the Cell

- Basic Unit of Life -smallest part that still retains characteristics of life
- Protection And Support – cells secrete substances that provide
- Movement- occurs because of molecules that are located in specific cells e.g. muscle cells
- Communication-cells receive information that allow them to communicate with each other eg nerves cell tells muscle cells to contract
- Cell metabolism and energy release- all the chemical reactions that occur within the cell
- Inheritance – each cell contains a copy of the genetic information of the individual

Cell Structure

- Highly Organized

. Specialized structures called **organelles in a jelly like substance called cytoplasm**

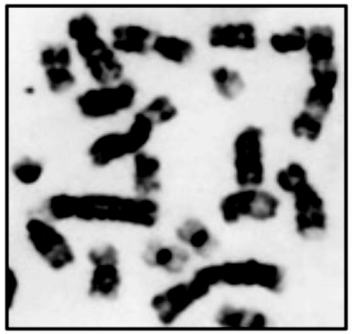
Amount and type of organelles is related to function

The Organelles

- The Nucleus
- Nucleoli and Ribosomes
- Rough and Smooth Endoplasmic Reticulum
- The Golgi Apparatus
- Chloroplast (plant cell)
- Lysosomes
- Mitochondria
- Cytoskeleton
- Centrioles
- Cilia, Flagella and Microvilli
- The Cell Membrane

Cell Structure: Nucleus

- **Spherical shape**
- **Denser than surrounding cytoplasm**

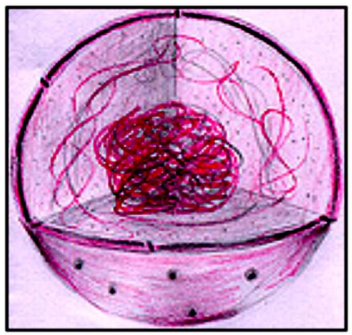


Chromosomes

- Usually in the form of chromatin
- Contains genetic information
- Composed of DNA
- Thicken for cellular division
- Set number per species (i.e. 23 pairs for human)

Nuclear membrane

- Surrounds nucleus
- Composed of two layers
- Numerous openings for nuclear traffic

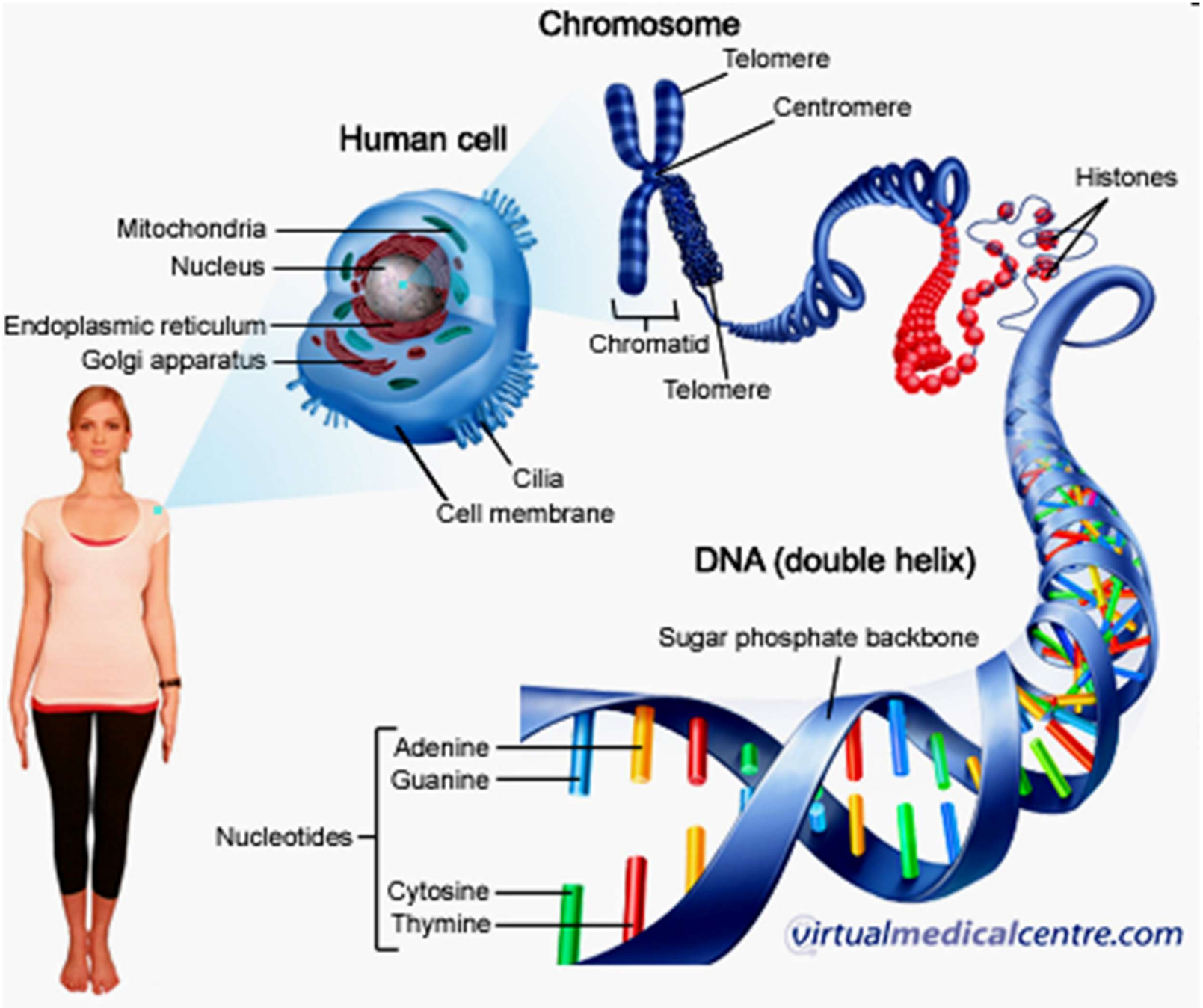


Nucleolus

- Spherical shape
- Visible when cell is not dividing
- Contains RNA for protein manufacture

Nucleus

- Contains the genetic material of cell (DNA)
- Located near the center of the cell
- Some cells lose their nucleus as they mature, some have more than one nucleus bone cells
- Nuclear envelop (outer and inner membranes and nuclear pores)
- Contains loosely coiled fibers called chromatin consisting of DNA. When a cell divides the chromatin becomes more tightly coiled to form the 23 pairs of chromosomes


Chromosome
Telomere
Centromere
Human cell
Histones
Mitochondria
Nucleus
Endoplasmic reticulum
Golgi apparatus
Chromatid
Telomere
Cilia
Cell membrane
DNA (double helix)
Sugar phosphate backbone
Adenine
Guanine
Nucleotides
Cytosine
Thymine
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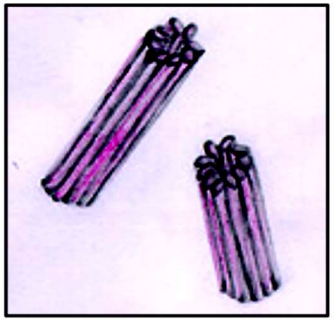
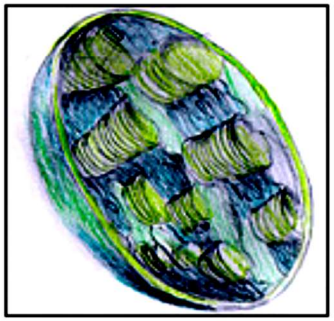
Cell Structure: Cytoplasm

- **Colloidal suspension**
- **Cytosol mainly composed of water with free-floating molecules**
- **Viscosity constantly changes**



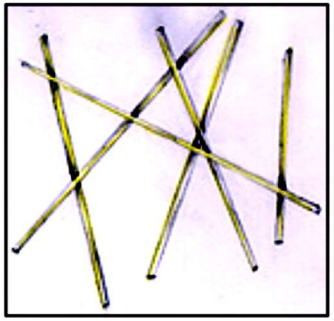
Centrioles

- Paired cylindrical organelles near nucleus
- Composed of nine tubes, each with three tubules
- Involved in cellular division
- Lie at right angles to each other



Chloroplasts

- A plastid usually found in plant cells
- Contain green chlorophyll where photosynthesis takes place



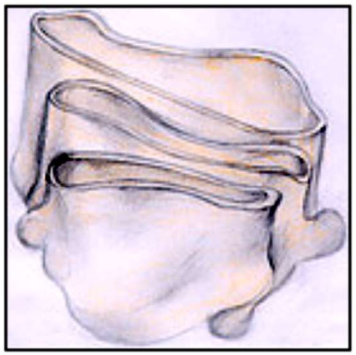
Cytoskeleton

- Composed of microtubules
- Supports cell and provides shape
- Aids movement of materials in and out of cells

Cell Structure: Cytoplasm (continued)

Endoplasmic reticulum

- Tubular network fused to nuclear membrane
- Goes through cytoplasm onto cell membrane
- Stores, separates, and serves as cell's transport system
- Smooth type: lacks ribosomes
- Rough type (pictured): ribosomes embedded in surface



Golgi apparatus

- Protein 'packaging plant'
- A membrane structure found near nucleus
- Composed of numerous layers forming a sac

Lysosome

- Digestive 'plant' for proteins, lipids, and carbohydrates
- Transports undigested material to cell membrane for removal
- Vary in shape depending on process being carried out
- Cell breaks down if lysosome explodes

Smooth and Rough Endoplasmic Reticulum

- The ER is a series of membranes forming sacs and tubules that extends from the outer nuclear membrane into the cytoplasm
- Rough ER – has ribosomes attached indicting that it is synthesizing large amounts of protein for export from the cell

The Golgi Apparatus

- Golgi Apparatus- closely packed stacks of curved membrane –bound sacs.
- Its function is to collect modify , package and distribute proteins and lipids manufactured by the Endoplasmic Reticulum
- May also chemically modify the proteins by attaching carbohydrates or lipids to them
- Found in great number in cells that make a great deal of protein e.g. pancreas

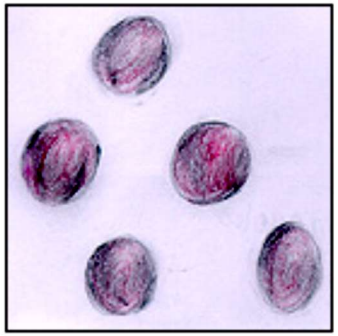
Cell Structure: Cytoplasm (continued)

Mitochondria

- Second largest organelle with unique genetic structure
- Double-layered outer membrane with inner folds called *cristae*
- Energy-producing chemical reactions take place on cristae
- Controls level of water and other materials in cell
- Recycles and decomposes proteins, fats, and carbohydrates, and forms urea

Ribosomes

- Each cell contains thousands
- Miniature 'protein factories'
- Composes 25% of cell's mass
- Stationary type: embedded in rough endoplasmic reticulum
- Mobile type: injects proteins directly into cytoplasm



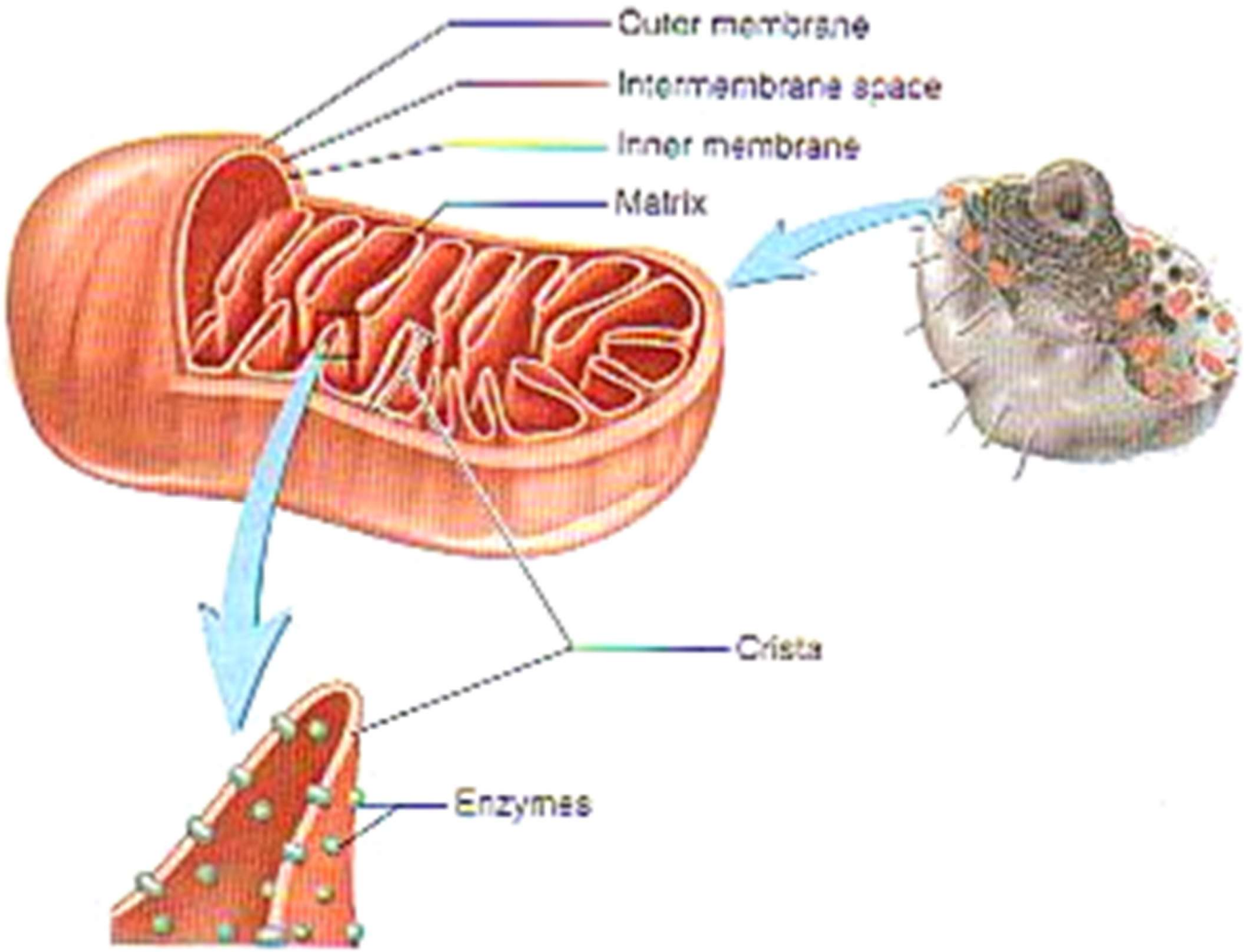
Vacuoles

- Membrane-bound sacs for storage, digestion, and waste removal
- Contains water solution
- Contractile vacuoles for water removal (in unicellular organisms)

Mitochondria

- Mitochondria- small bean shaped, long threadlike organelles that has inner and outer membranes separated by a space. The outer membranes have a smooth corebut the inner membrane has numerous folds called cristae
- Site of ATP production within the cells and carry out aerobic respiration
- muscle cells

Mitochondria



Ribosome

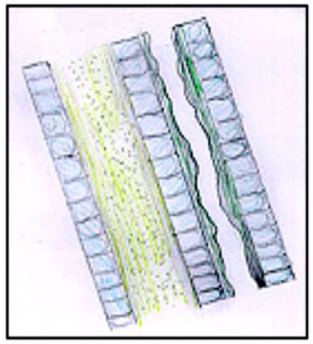
- Ribosome's- are the organelles where proteins are produced

-may be free

-attached to the endoplasmic reticulum

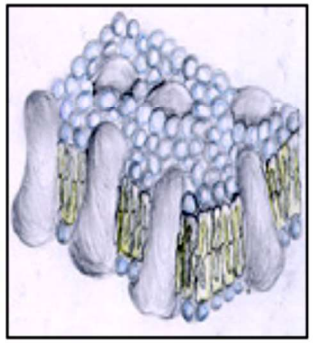
-made in the nucleus

Cell Structure: Cell Surface



Cell wall

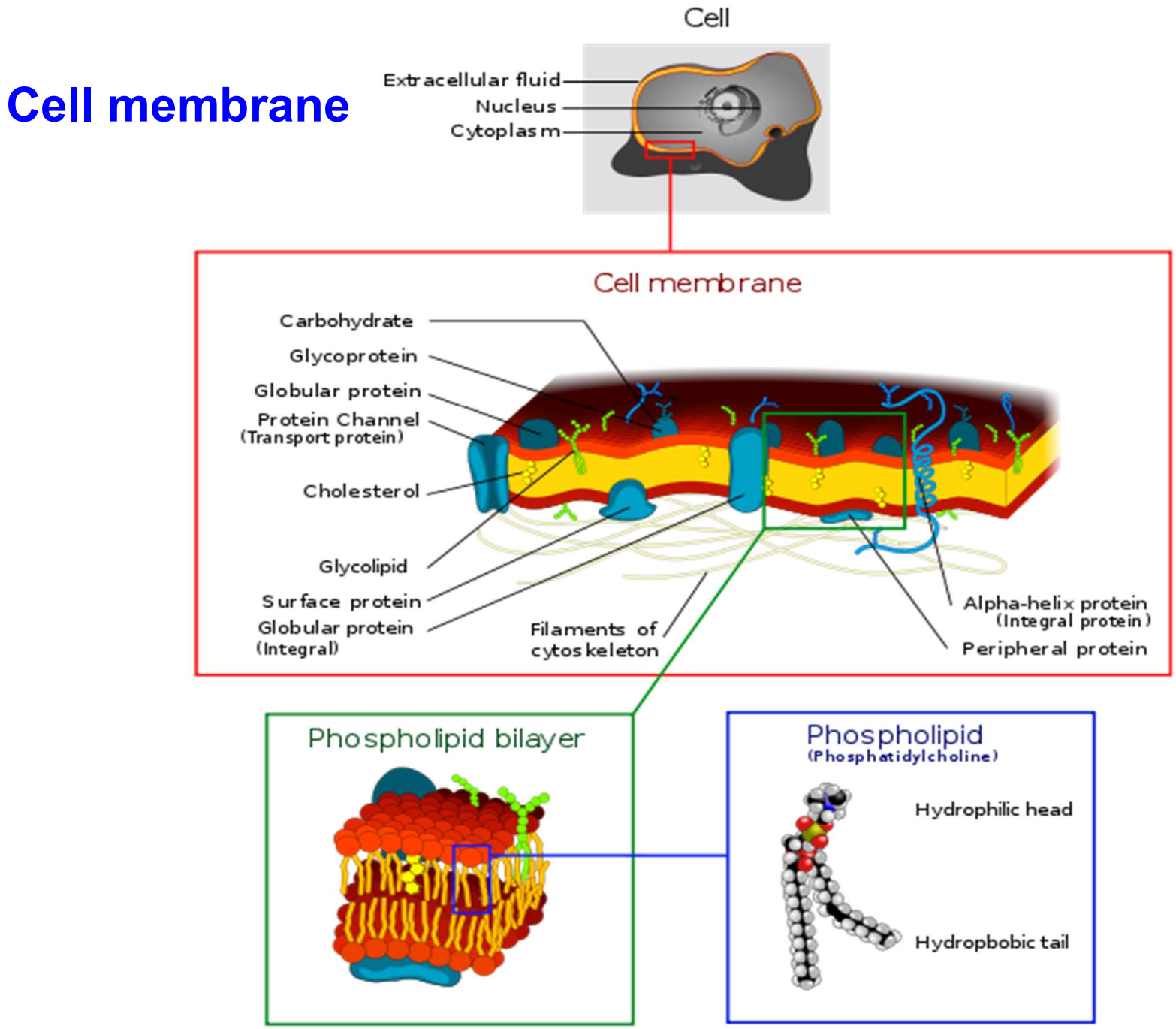
- Most commonly found in plant cells
- Controls turgity
- Extracellular structure surrounding plasma membrane
- Primary cell wall: extremely elastic
- Secondary cell wall: forms around primary cell wall after growth is complete

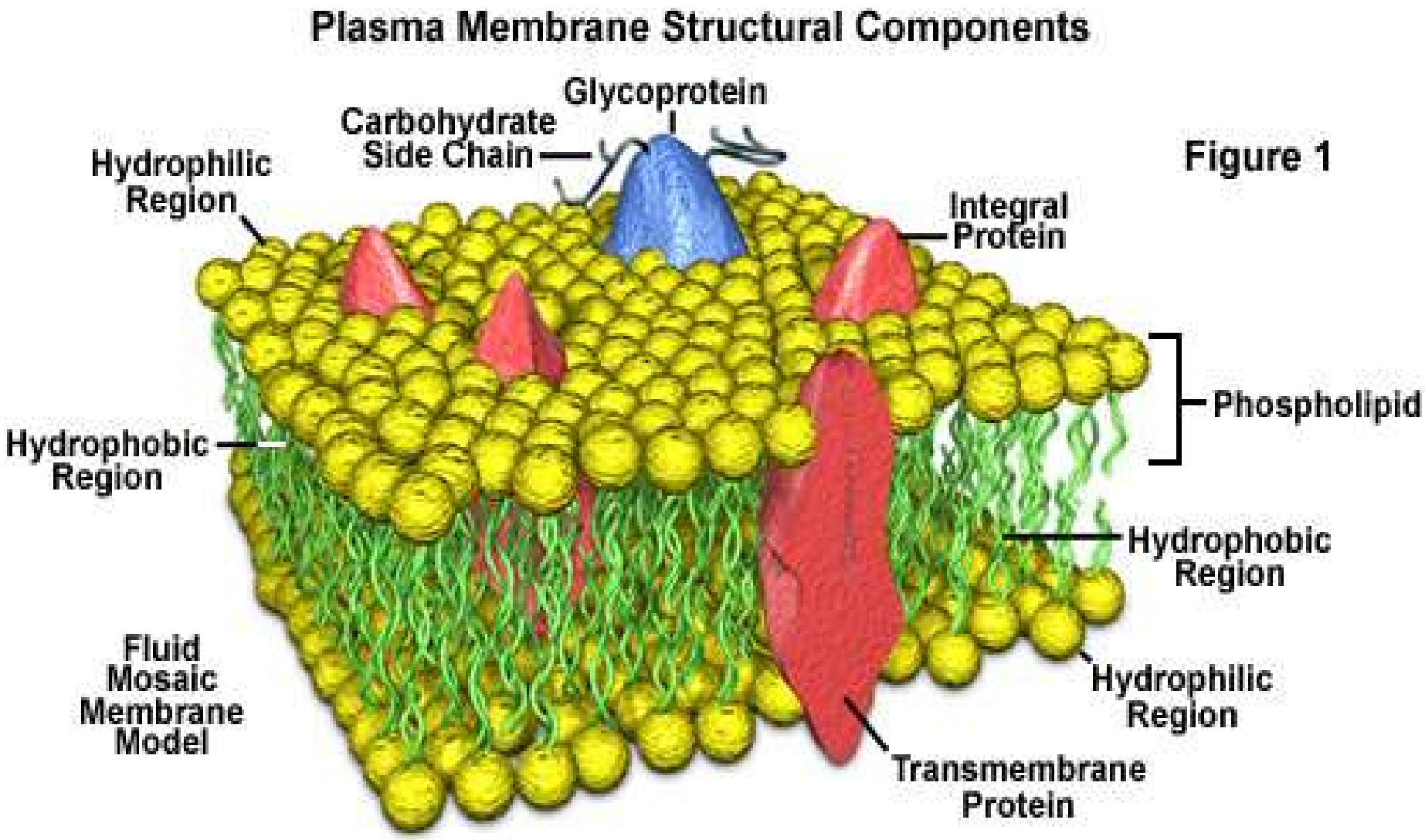


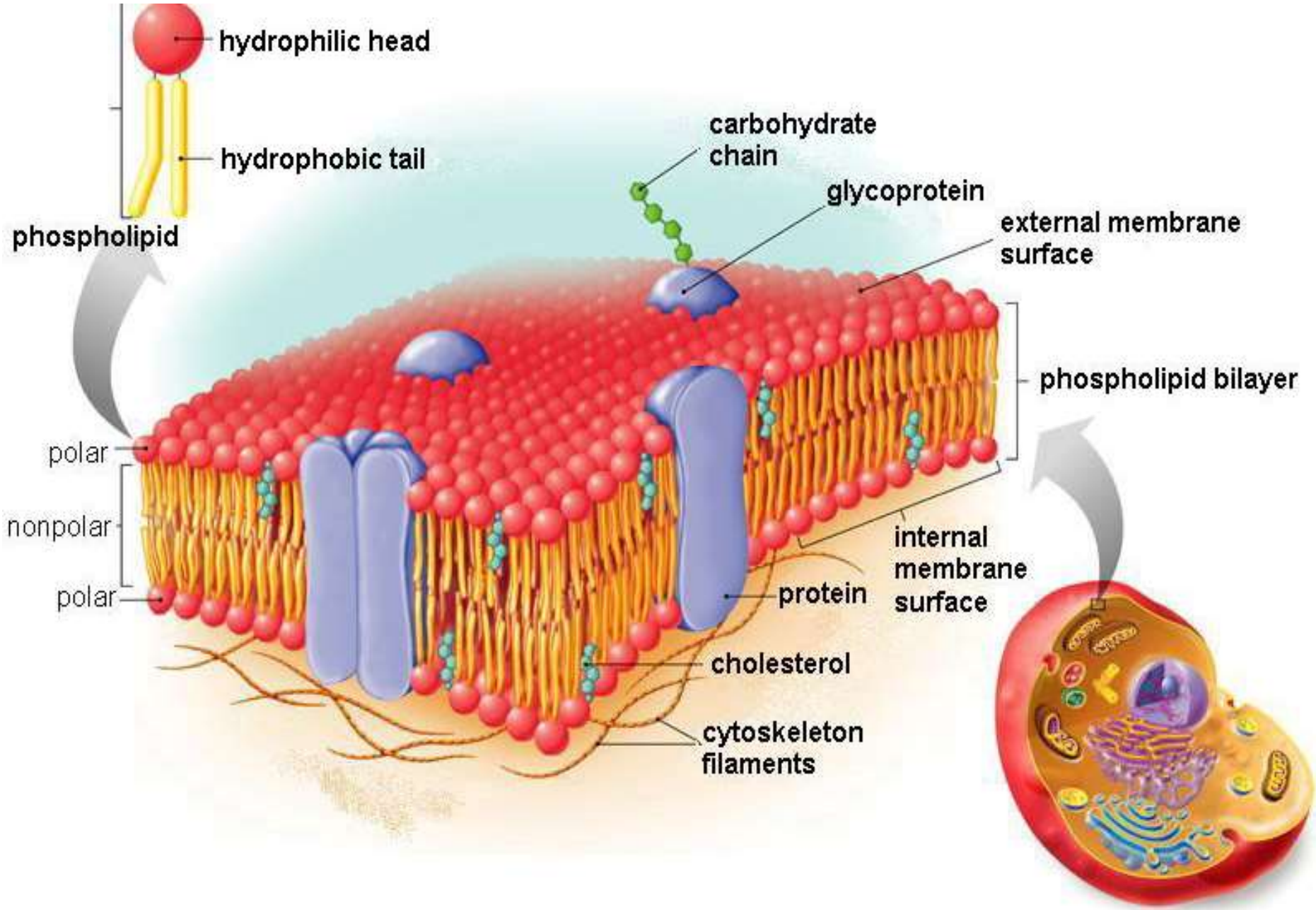
Plasma membrane

- Outer membrane of cell that controls cellular traffic
- Contains proteins (left, gray) that span through the membrane and allow passage of materials
- Proteins are surrounded by a phospholipid bi-layer.

Cell membrane




Plasma Membrane Structural Components
Glycoprotein
Carbohydrate Side Chain
Hydrophilic Region
Integral Protein
Figure 1
Phospholipid
Hydrophobic Region
Hydrophobic Region
Fluid Mosaic Membrane Model
Hydrophilic Region
Transmembrane Protein


hydrophilic head
hydrophobic tail
phospholipid
carbohydrate chain
glycoprotein
external membrane surface
phospholipid bilayer
polar
nonpolar
polar
internal membrane surface
protein
cholesterol
cytoskeleton filaments

Cell Membrane

- Phospholipid Bilayer
- Protection and Transport
- Types of Transport
- Active (requires ATP)
- Passive

Functions of the Cell

- Basic Unit of Life -smallest part that still retains characteristics of life
- Protection And Support – cells secrete substances that provide
- Movement- occurs because of molecules that are located in specific cells e.g. muscle cells
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