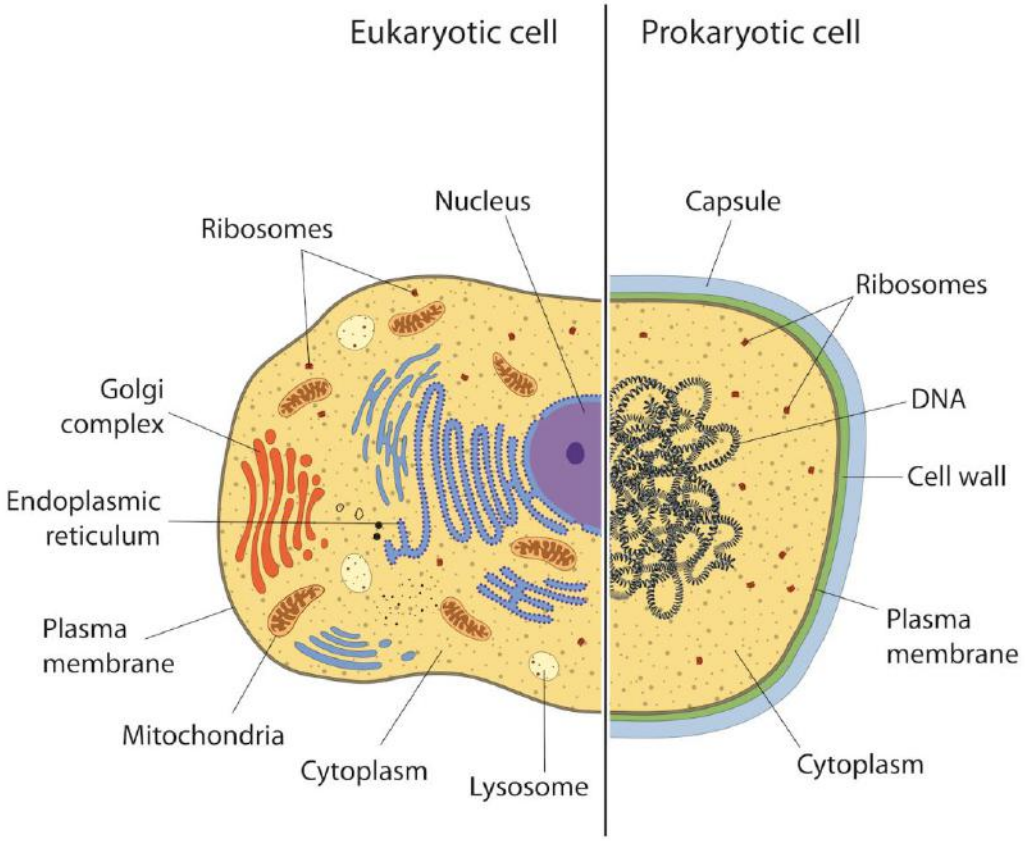
CELLS AND MICROORGANISMS

STAGE 1 BIOLOGY

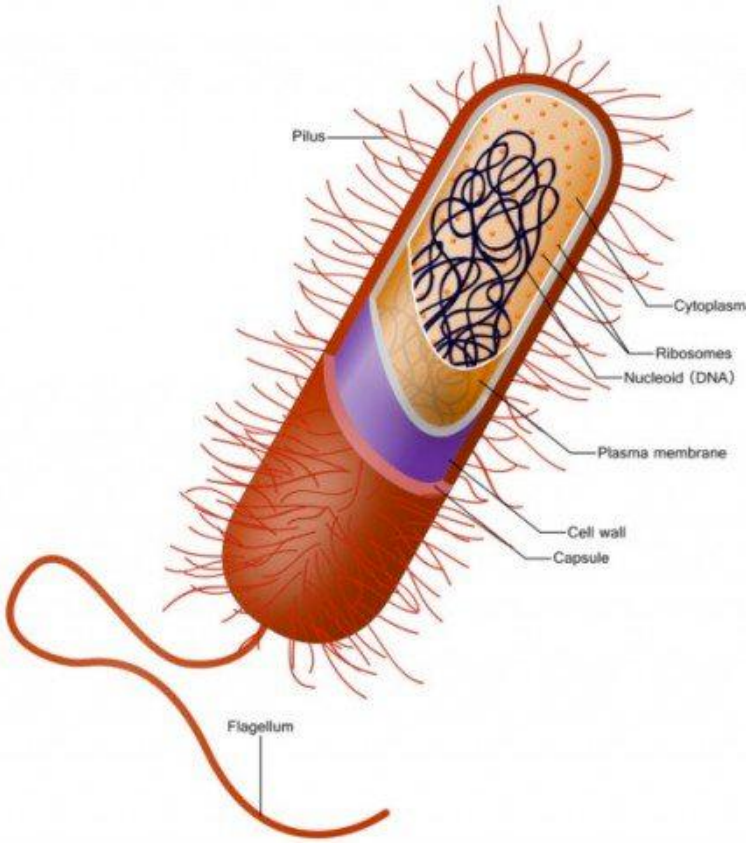


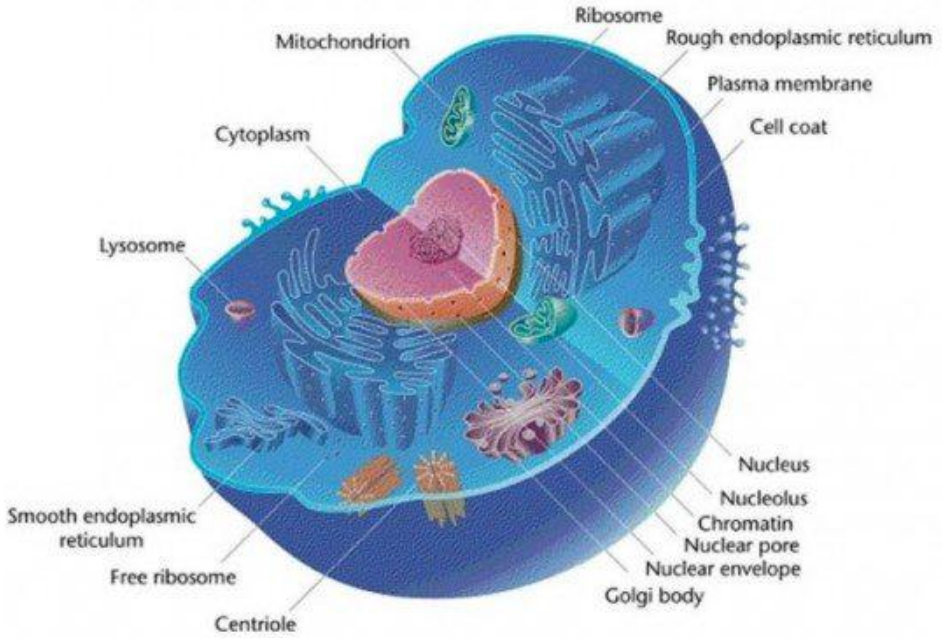
1.2 PROKARYOTES AND EUKARYOTES

Activity

Spot the Difference

List as many similarities and differences you can between the two images.

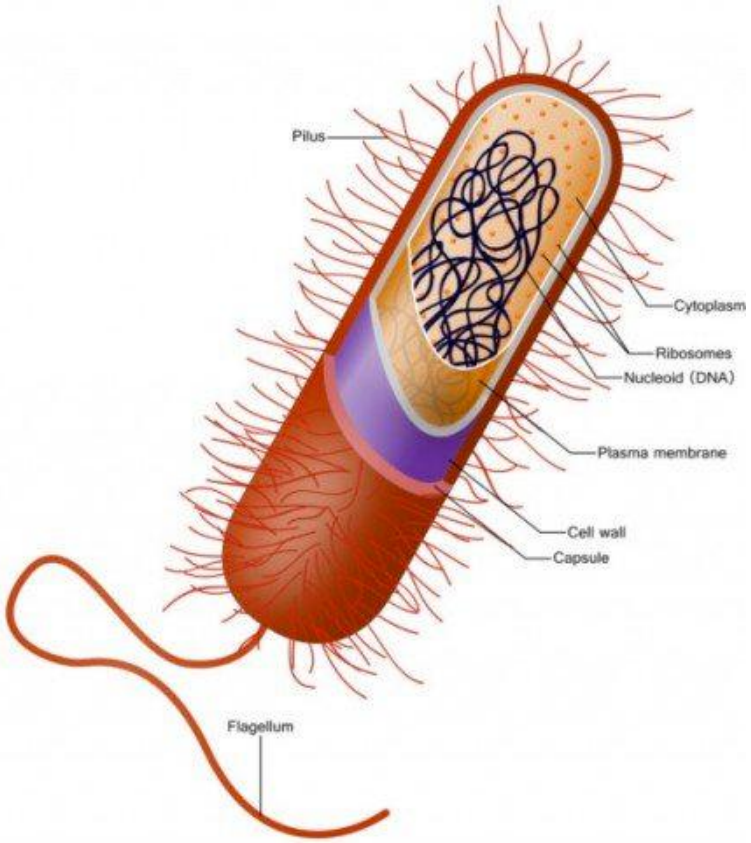




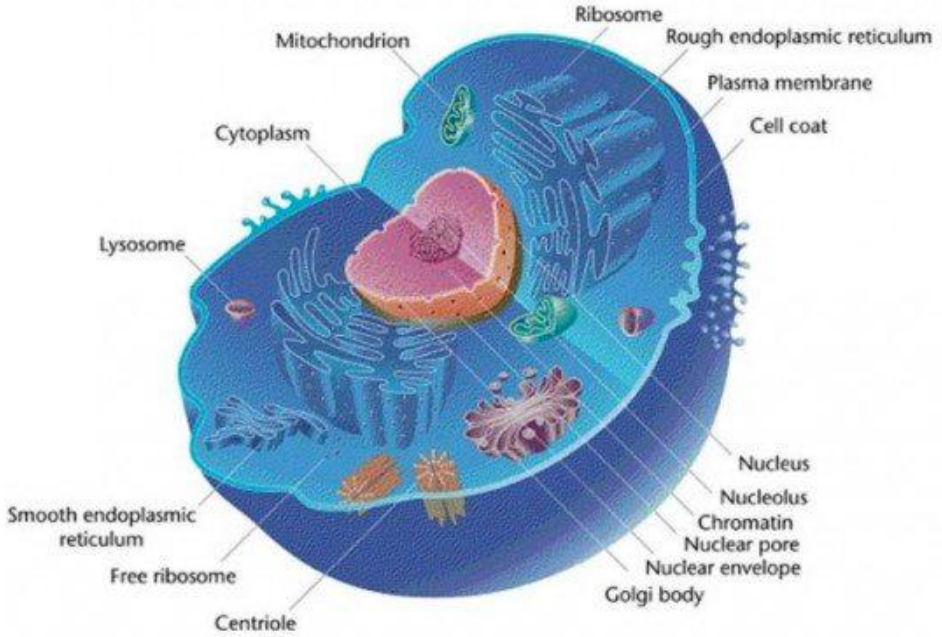
Types of Cells

There are **two main types** of cells:

Prokaryotic cells

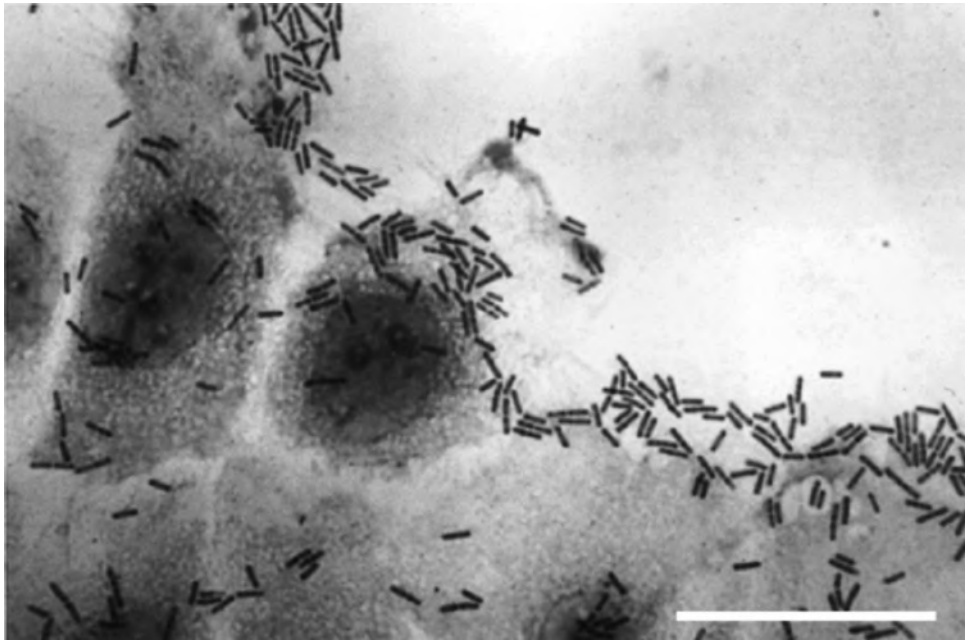


Eukaryotic cells



Types of Cells

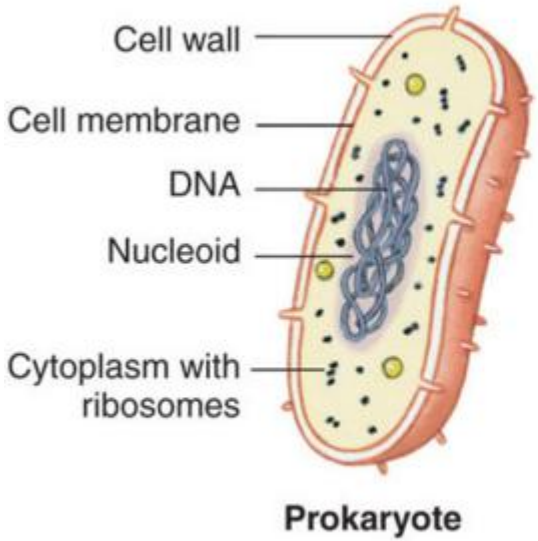
Relative cell size comparisons:



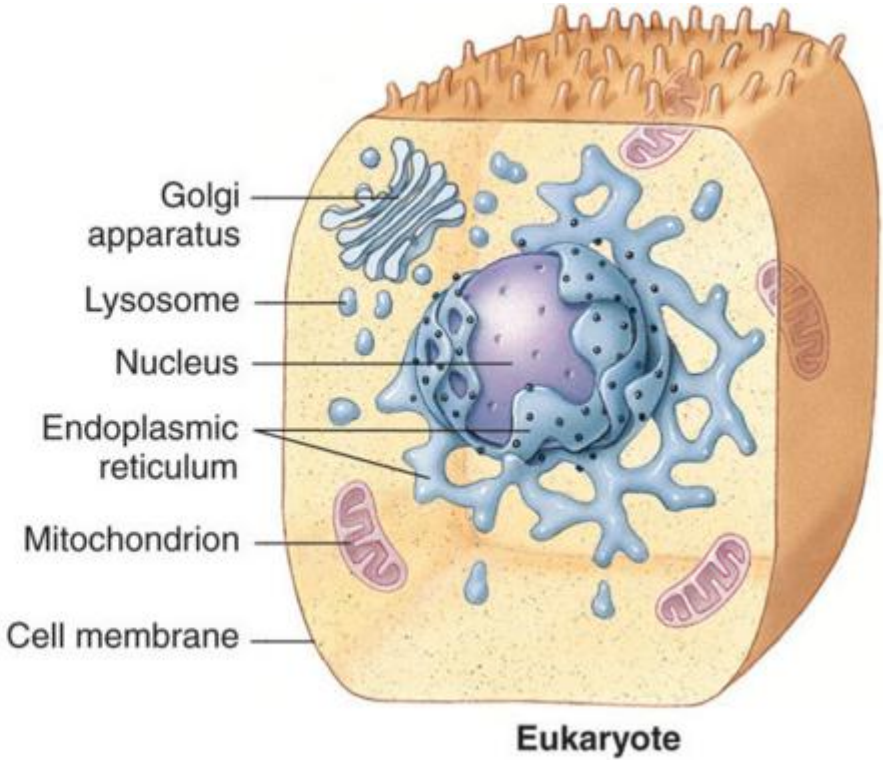
Major Cell Types

There are two major cell types:

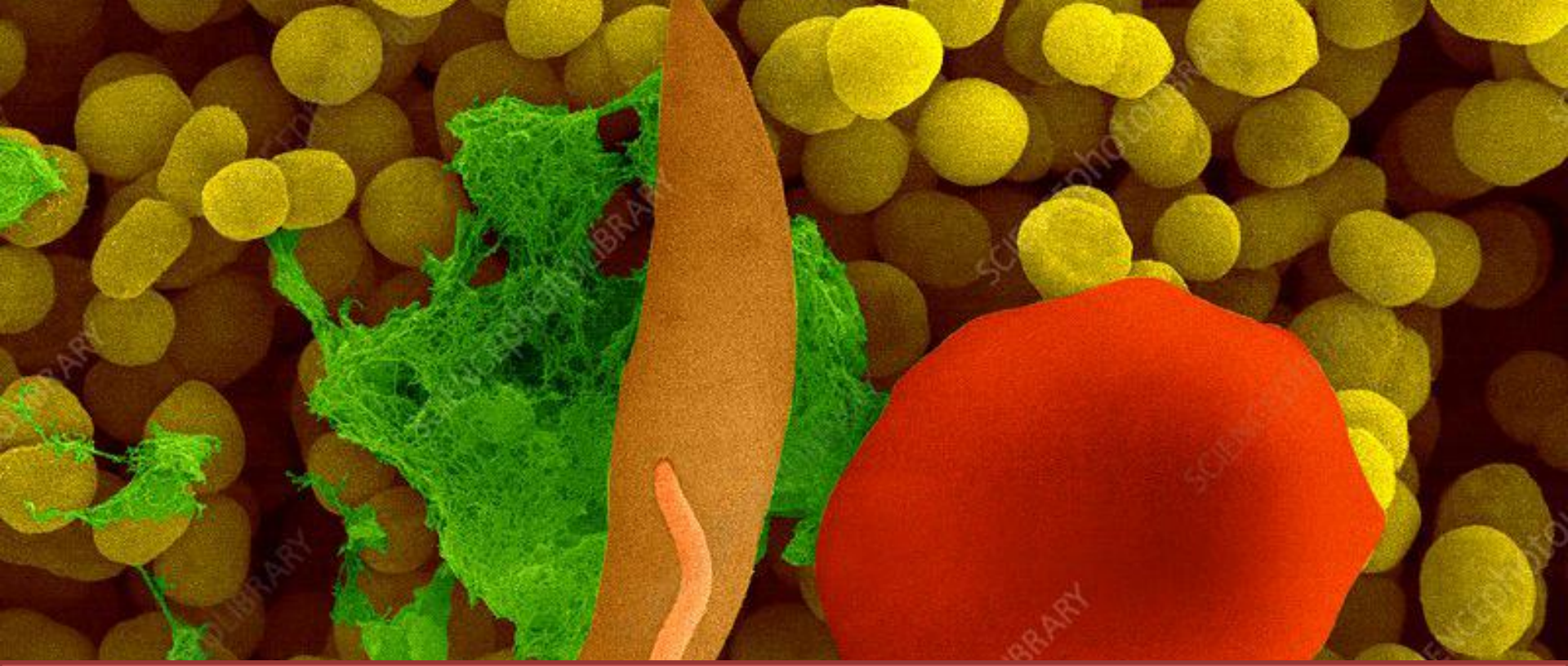
1. **Prokaryotes** (bacteria)
2. **Eukaryotes** (all other cells, eg: plant and animal cells)



Prokaryote



Eukaryote



The major **cell types** are **prokaryotes** and **eukaryotes.**

INTENDED STUDENT LEARNING

Cell Features

Prokaryotic and **eukaryotic cells** contain a number of similar features in common.

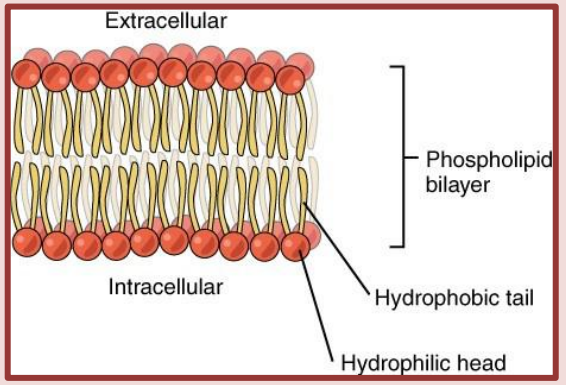
Both types of cells share similar:

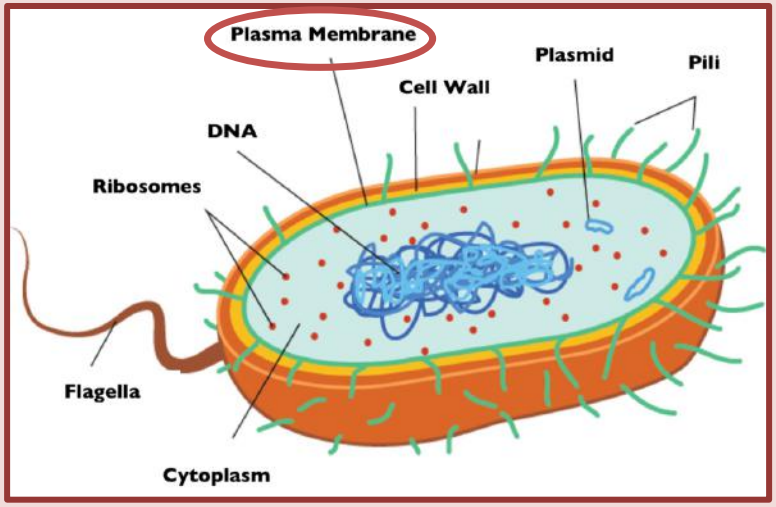
- Cell membranes
- Nucleic acids
- Proteins
- Ribosomes

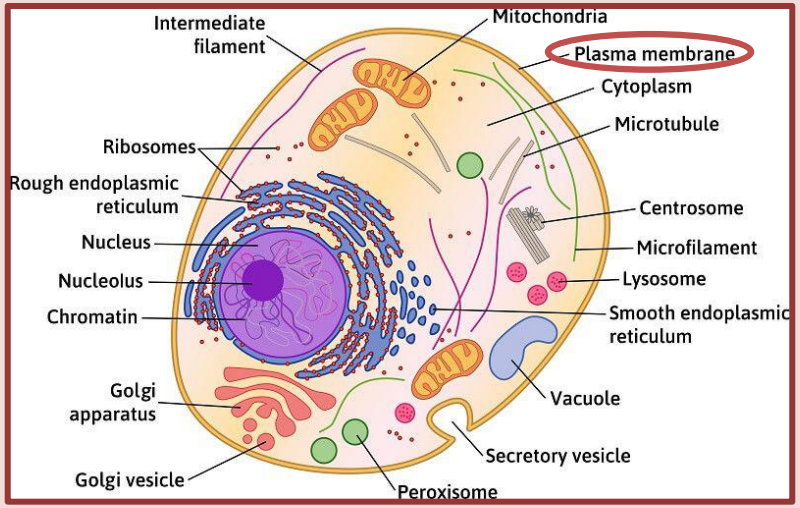
Cell Features

CELL MEMBRANE

- Involved in the regulation of materials inside and outside of the cell.
- Made of a **phospholipid bilayer**.
- The membrane is very thin, allowing for **rapid exchange of materials**.





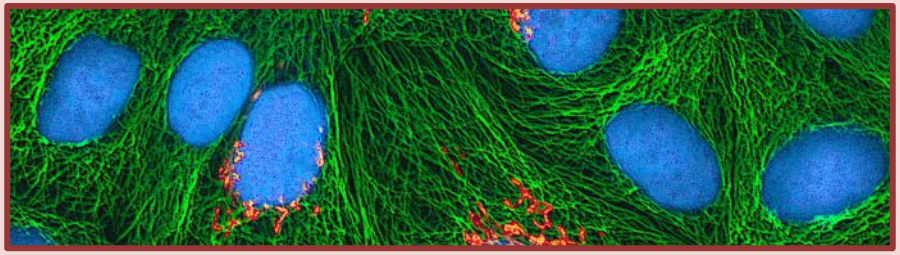


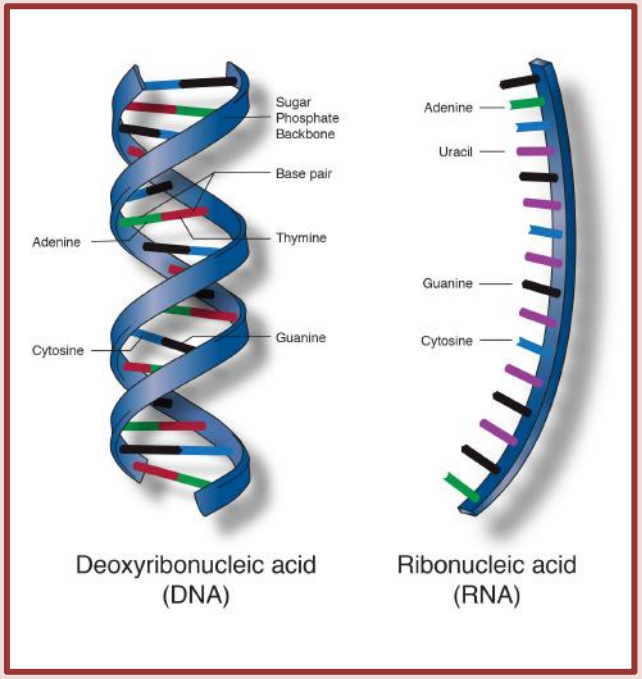
Cell Features

NUCLEIC ACIDS

- Nucleic acids are information-carrying molecules.
- Two main types: deoxyribonucleic acid (**DNA**) or ribonucleic acid (**RNA**).
- Used to create proteins and are essential for cell survival.

- **DNA** is the blueprint for life and makes up genetic material in all organisms.
- **RNA** is the genetic material in some viruses and plays an important role in protein production in all cells.





Cell Features

PROTEINS

- Large, complex molecules that play critical roles in the body.
- Do most of the work in cells.
- Required for **structure, function and regulation** of the body's tissues and organs.

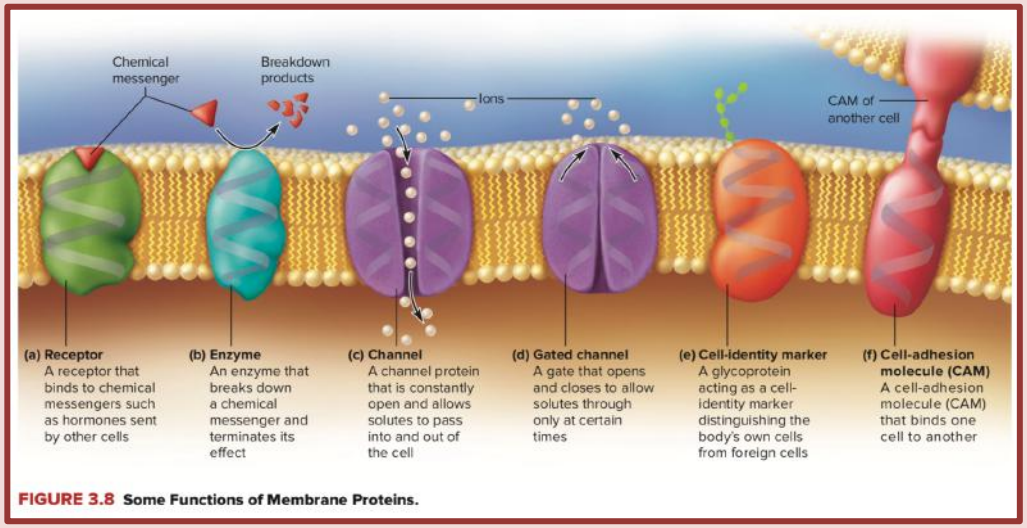
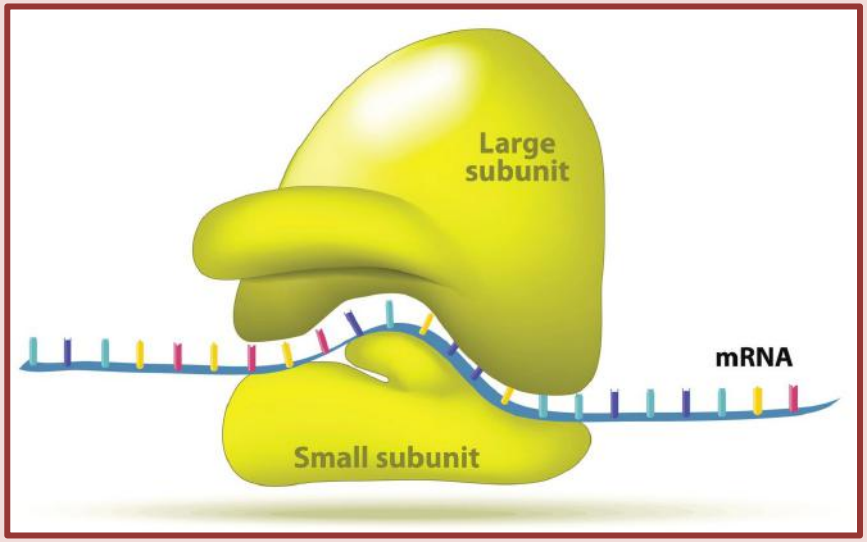


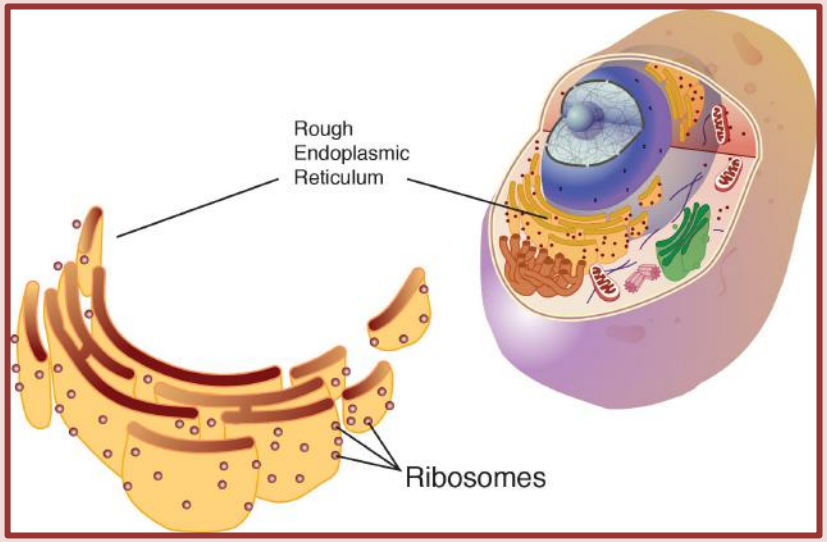
FIGURE 3.8 Some Functions of Membrane Proteins.

Cell Features

RIBOSOMES

- Play a key role in **protein production**.
- Found in both prokaryotes and eukaryotes.
- Made up of two subunits: a small subunit and a large subunit.
- Can be **free-floating** in the cytoplasm, or **attached** to a membrane-bound organelle in eukaryotes.



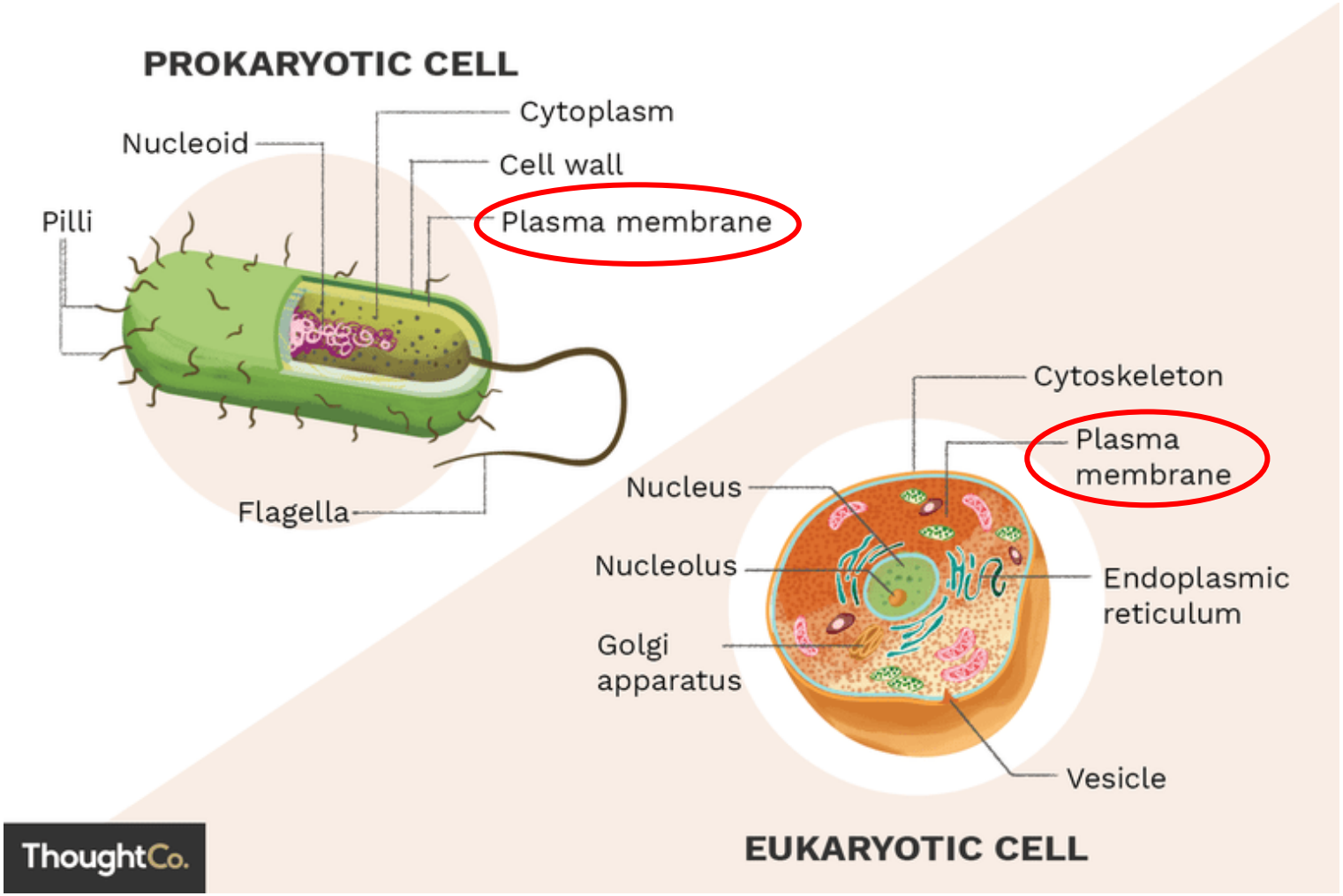


Prokaryotic and **eukaryotic** cells have many features in common, including a **cell membrane, nucleic acids, proteins** and **ribosomes**.

INTENDED STUDENT LEARNING

Cell Structure

All cells are enclosed by a **membrane.**

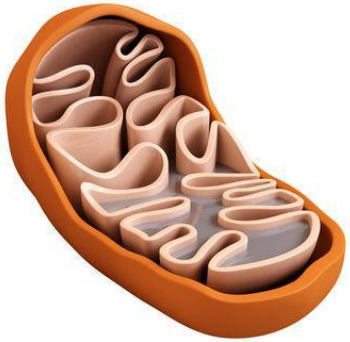


Cell Structure

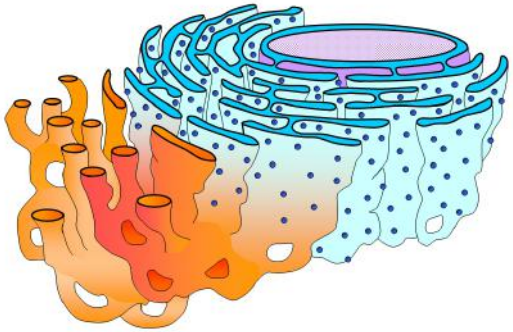
Within the cell is the **cytoplasm**, which consists of mainly water and also a number of smaller structures called **organelles** (small organs).

The types of organelles found in the cell depends on the type of cell.

Golgi Body



Mitochondria

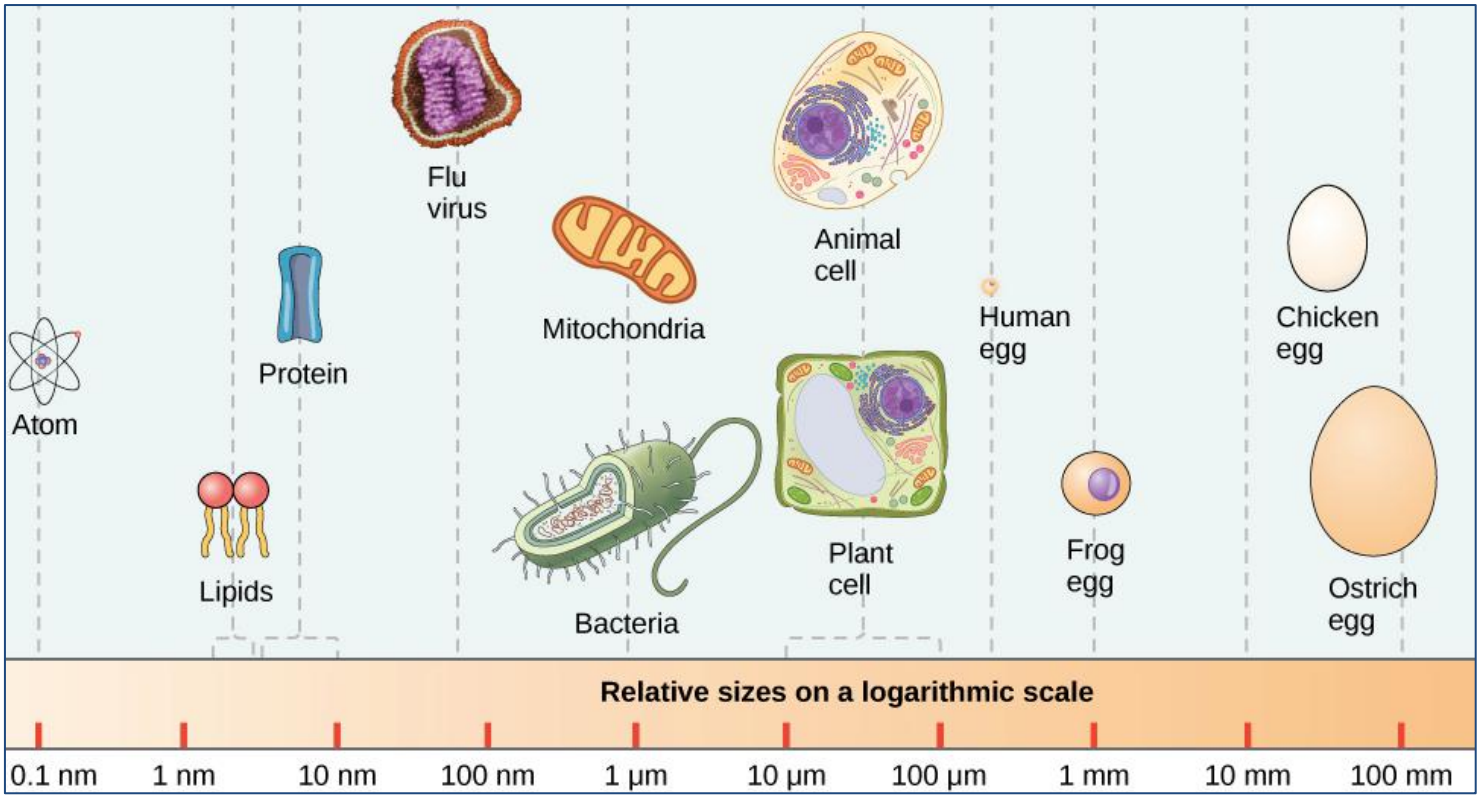


Endoplasmic Reticulum

Chloroplast

Cell Sizes

Typical **prokaryotic** cells range from 0.1 to 5.0 micrometres (μm) in diameter and are <u>significantly smaller</u> than **eukaryotic** cells, which usually have diameters ranging from 10 to 100 μm



1 cm = 10 mm
1 mm = 1000μm

1 μm = 0.001 mm
1 μm = 1000 nm

Animation

Cell Size and Scale

https://learn.genetics.utah.edu/content/cells/scale/

Prokaryotic vs Eukaryotic Cells

Feature	Prokaryotes (bacteria)	Eukaryotes (plants, animals, fungi, protists)
Size	Small (1-10μm)	Larger (10-100μm)
Nucleus Presence	No	Yes
Internal Organisation	Simple	Complex
Membrane-bound Organelles	None	Many (mitochondria, golgi body, endoplasmic reticulum, lysosomes, etc.)
DNA	Circular Chromosome	Linear Chromosomes
Cell Wall	Protein and Complex Sugar	Plant Cells – Complex Sugar
Cell Division	Binary Fission	Mitosis and Meiosis

Prokaryotic vs Eukaryotic Cells

Compare the structure of **prokaryotes** and **eukaryotes**.

INTENDED STUDENT LEARNING

Cell Videos

Human Bone Cells

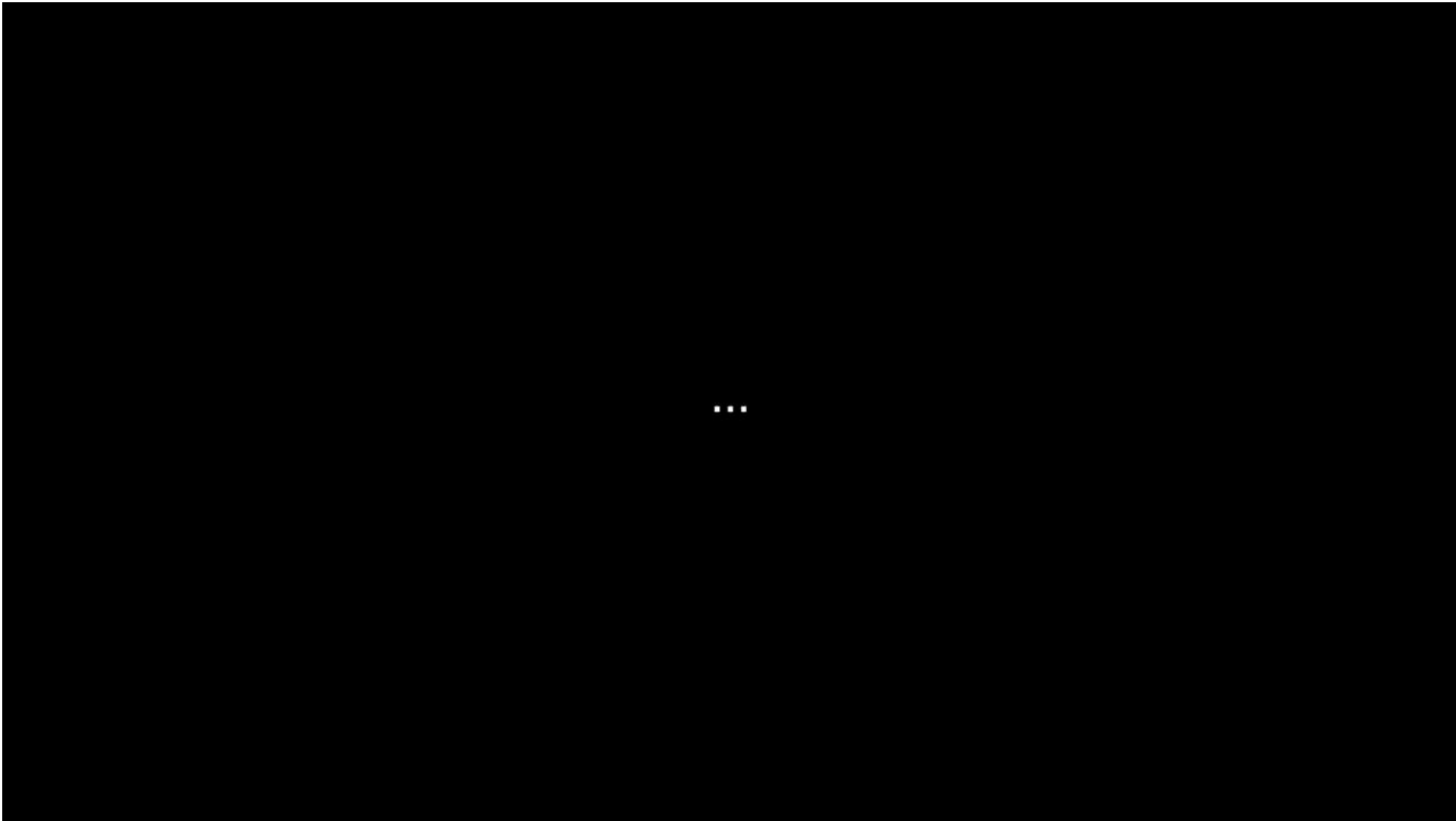
Human Lung Cancer Cells

Cow Kidney Cells

Mouse Embryo Cells infected with a Virus

Bonus

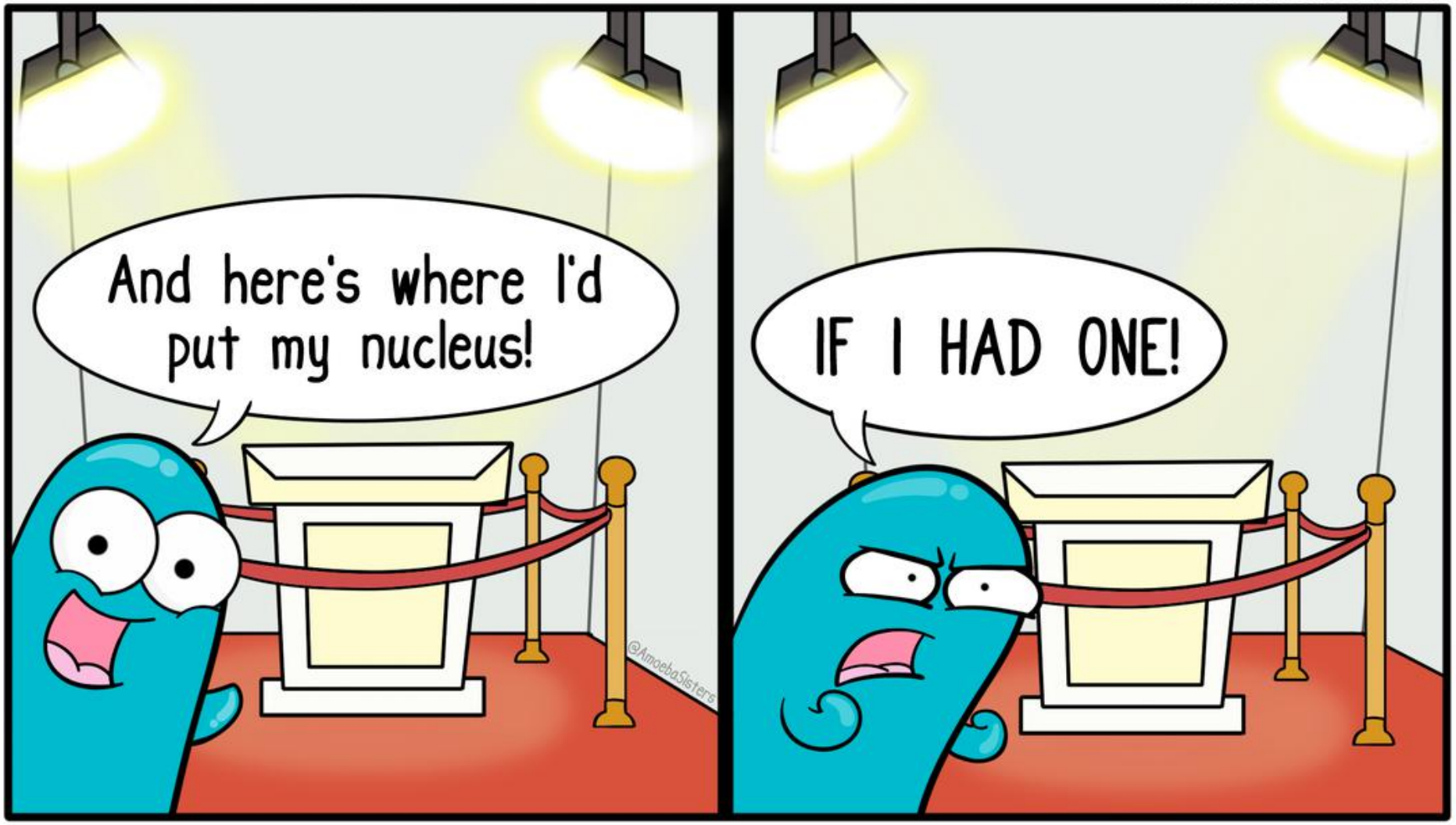
Scanning Electron Microscope Images



Homework

Independent content revision

Workbook questions



The simple lifestyle of the prokaryote did not suit Melvin.

Knowledge Check

The major **cell types** are:

- **Prokaryotes**
- **Eukaryotes**

Prokaryotic and **eukaryotic** cells have many features in common, including:

- Cell membrane
- Nucleic acids
- Proteins
- Ribosomes

Compare the structure of **prokaryotes** and **eukaryotes**.