

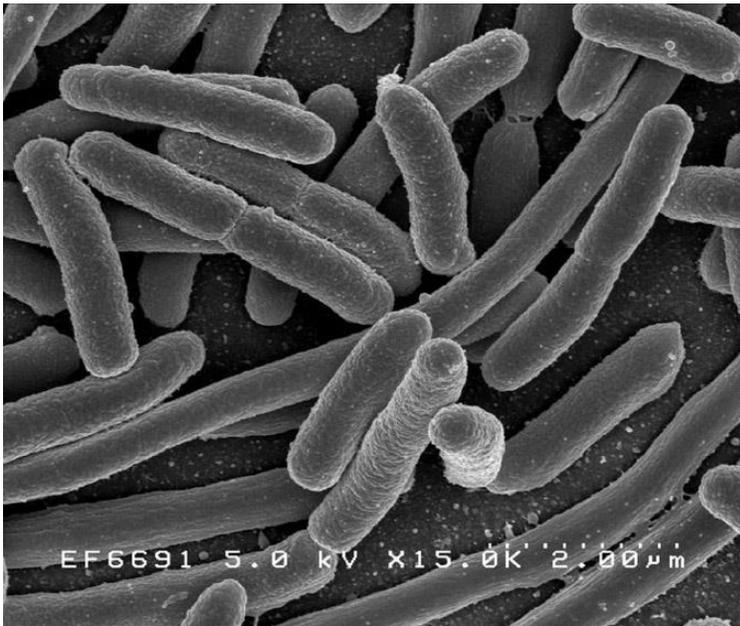
Lesson 07: Inside Cells

Lesson Objectives:

- Student will compare prokaryotic and eukaryotic cells.
- Student will continue to learn about cell structure.
- Student will learn about the following parts of cells: Vacuoles and vesicles, endoplasmic reticulum and golgi apparatus, and lysosomes.
- Student will continue studying DNA.

1. Types of Cells

(1.1) As mentioned last lesson there are two types of cells, **prokaryotic** cells (prokaryotes) and **eukaryotic** cells (eukaryotes). Prokaryotic cells are the earliest cell types we've discovered, and are virtually unchanged from way back then to now. The only prokaryotic cells you'll find today are bacteria and archaea.



Escherichia coli: Scanning electron micrograph of Escherichia coli, grown in culture and adhered to a cover slip. This image was taken at Rocky Mountain Laboratories, NIAID, NIH. As a work of the U.S. federal government, this image is in the public domain.

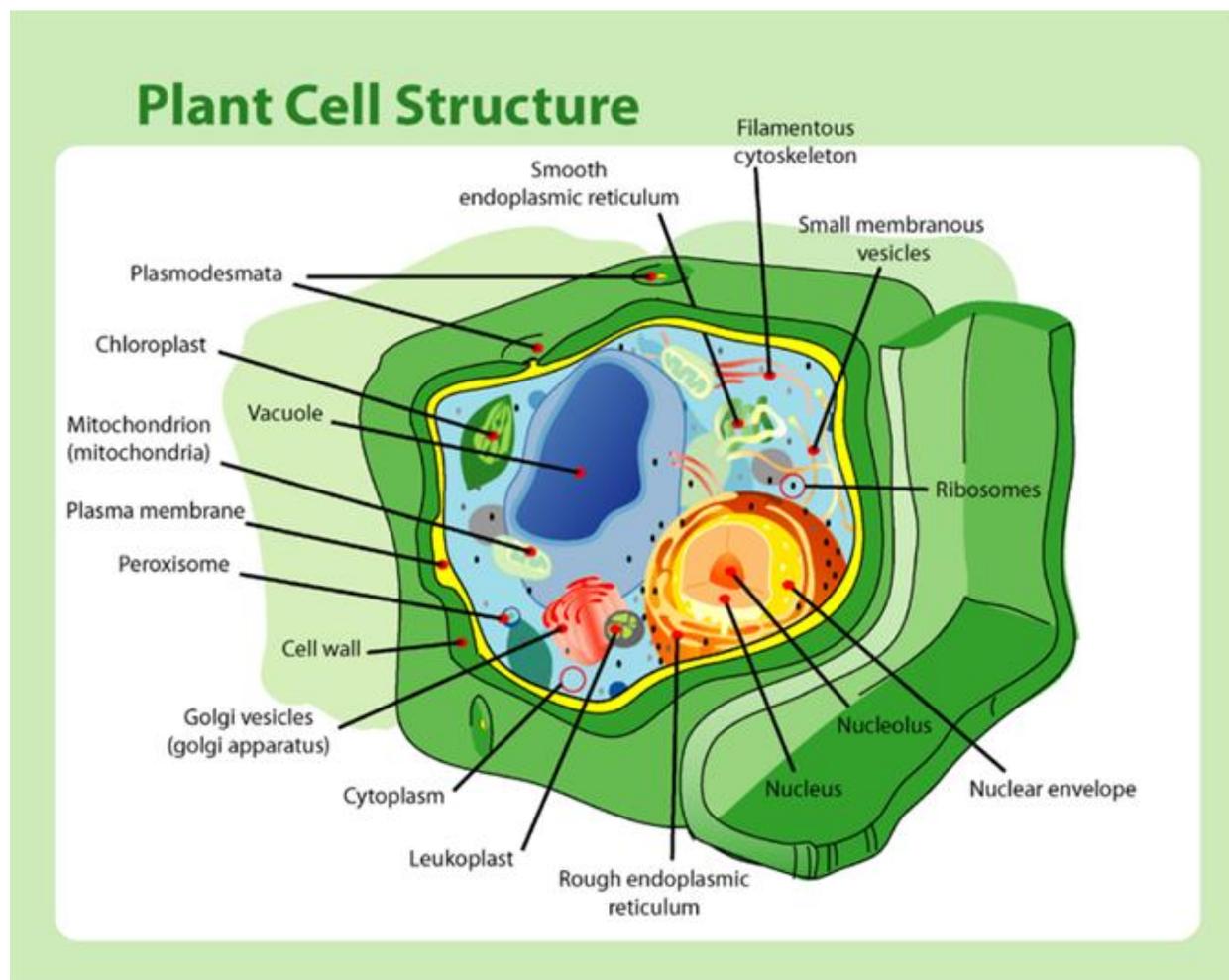


(1.2) Eukaryotic cells, on the other hand, are much more varied and complex, and make up most living things. They will be different dependent upon what kind of cells they are: plant cells will be different from human blood cells; muscle cells will be different from bone cells. Eukaryotes contain a nucleus and other membrane-bound organelles.

(1.3) The study of cells is called cytology. Let's take a moment to learn a little more about the parts that make up the insides of cells--particularly eukaryotic cells. There will be a lot of unfamiliar terms in this lesson, take your time in reading each section--some parts of cells will only be mentioned now, and will be discussed in more detail later.

2. Parts of Cells: Structure and Protection

(2.1) Starting from the outside in, the first part of the cell is the **cell wall**. Not every type of cell will have a cell wall--it is a special cell component usually found in plants, fungi, and bacteria. Cell walls in plants are made chiefly of cellulose; fungi use chitin to make their cells walls; while bacterium use a substance called peptidoglycan. The cell wall is located outside the cell membrane.



(2.2) Since we learned a lot about the **cell membrane** last lesson, the next cell-part we'll talk about is the **cytoskeleton**. This is the framework of the cell, containing small



microfilaments and larger microtubules which help in both the anchoring and the movement of the organelles. Microtubules are also important for cell division.

3. Vacuoles and Vesicles

(3.1) Finally we're getting to some of the organelles we keep mentioning! **Vacuoles** are single-membrane organelles, sacs that help in food digestion or helping the cell maintain its water balance. In plant cells they are known as tonoplasts. Many organisms will use vacuoles as storage areas. **Vesicles** are smaller serve as transport sections both inside and to the outside of the cell.

4. Endoplasmic Reticulum and Golgi Apparatus

(4.1) In the last lesson we learned a little about ribosomes and the **endoplasmic reticulum** (occasionally shortened to ER). There is both smooth and rough endoplasmic reticulum. Rough ER is rough because of all the ribosomes it contains. This type of ER releases newly made proteins into the cell. The smooth ER is ribosome free, and functions in poison detoxification.

(4.2) The **golgi apparatus** works with what the ribosomes and endoplasmic reticulum pump out: It is a series of flattened sacs that modifies, packages, stores, and transports materials out of the cell.

5. Lysosomes

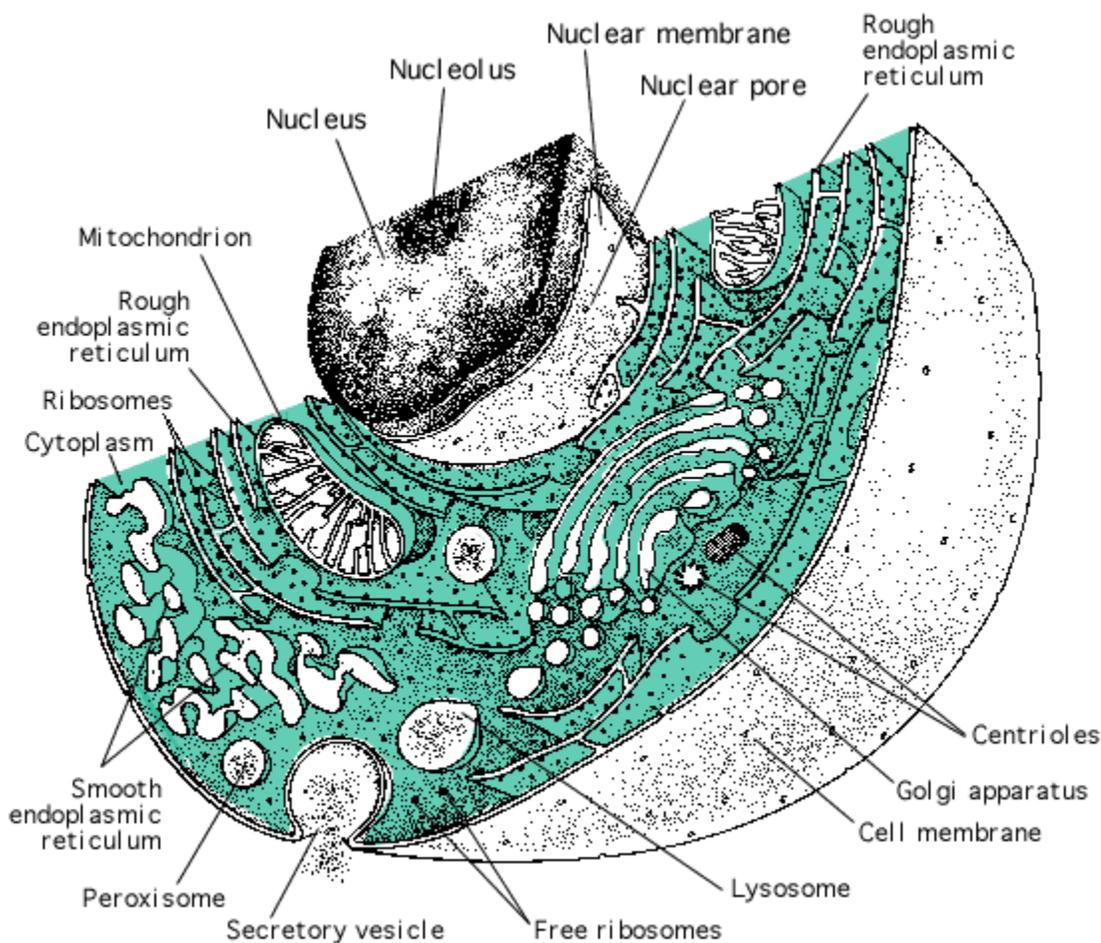
(5.1) The golgi form vesicles called **lysosomes**. The lysosome is a membrane bound organelle containing a variety of enzymes. They help digest food particles inside or out side the cell, helping the cell to create energy needed to live. They are also instrumental in recycling cellular debris.

6. DNA

(6.1) The center of cellular activity is the **nucleus**. The nucleus occurs only in eukaryotic cells and controls the shape and features of the cell. The nucleus is bordered by a porous membrane, and contains thin fibers of DNA and protein called **chromatin**. It also contains the **nucleolus**, which is the area where ribosomes are constructed.

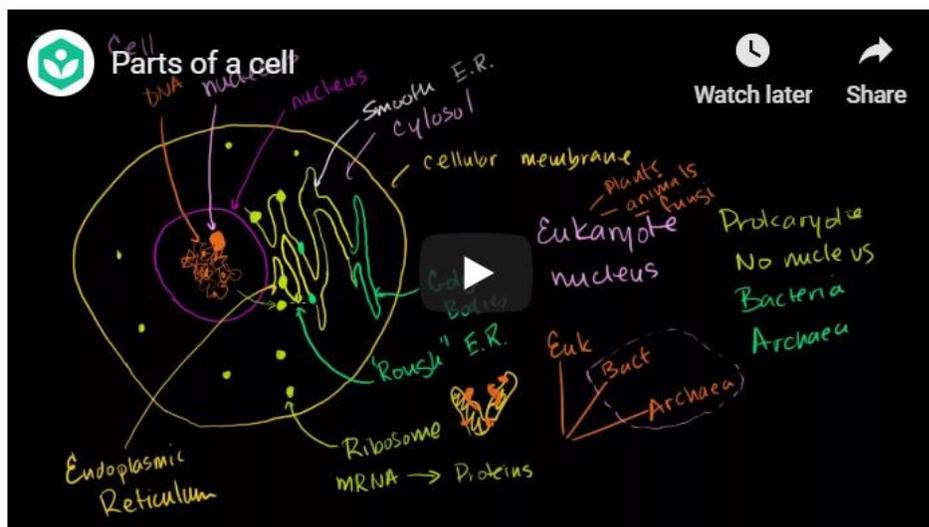
(6.2) **Mitochondria** contain their own DNA (termed mDNA) and may have come from bacteria-like organisms incorporated into eukaryotic cells over 700 million years ago. They create the high-energy compound ATP. Mitochondria are bounded by two membranes. The inner membrane folds into a series of cristae, which are the surfaces on which ATP is generated.

(6.3) **Plastids** are also membrane-bound organelles that only occur in plants and photosynthetic eukaryotes. (Chloroplasts, leukoplasts, and chromoplasts are some types of plastids.) Like mitochondria, chloroplasts have their own DNA, termed cpDNA, and contains a double membrane. The center section of chloroplasts contain stacks of coin-like grana, which make up the thylakoid. The thylakoid contains the light sensitive chemicals that allow photosynthesis to take place. The grana is surrounded by a gel-like material called the stroma.



A three-dimensional cross-section of an animal cell. This image is from a web publication of the NIH. As a work of the U.S. federal government, this image is in the public domain.

Watch this video explaining the cell:





Grading Rubric:

To get a 10: All answers are correct the first time, or within first revision. You can have no grammatical or structural errors, within the first revision. Answer in complete sentences; all lesson requirements have been met.

To get a 9: You can have 1 incorrect answer. You can have 1 grammatical errors (spelling, punctuation, capitalization, wrong word, etc.) Answer in complete sentences; all lesson requirements have been met.

To get an 8: You can have 2 incorrect answers. You can have 2 grammatical errors (spelling, punctuation, capitalization, wrong word, etc.). Answer in complete sentences; all lesson requirements have been met.

To get a 7: You can have 3 incorrect answers. You can have 3 minor grammatical errors (spelling, punctuation, capitalization, wrong word, etc.). Answer in complete sentences; all lesson requirements have been met.

To get a 6: You can have 4 incorrect answers.

To get a 5: Reserved for plagiarism - purposeful or mistaken, which will lower your final grade for the course (so be very careful when posting your work!); lack of effort, disrespect, or attitude (we are here to communicate with you if you don't understand something); or 6 or more errors of any kind. Lesson requirements have not been met.

Note: For this class it is necessary to post the questions over each answer. Failure to do so will result in asking for a revision. You will also be given two chances to revise your work after your initial post. No grade will be given for incomplete work.

Assignment:

You are to answer the following questions in your own words. Please post the questions with your answers in the text box below to submit your work. Remember to use complete sentences, use proper grammar, and don't forget to proofread and spell check your work before submitting it. This may require additional internet research, so be sure to cite your sources.

Do not submit text that you have copied from sources, including websites. All of your work should be in your own words. Using copied text would be considered plagiarism. For more information, review our page on [Plagiarism and Citation](#).

1. What are the different types of cells?
2. What sorts of living things are made up of prokaryotic cells? Find two specific examples online and tell me a little about them, be sure to cite your sources.
3. What cell components did you learn that are most likely to occur only in plants? Tell me about two of them and their functions.
4. The text describes several organelles in eukaryotic cells that seem to operate like bacterium. What relationship does this suggest between prokaryotes and eukaryotes?



This suggests an endosymbiotic relationship between prokaryotes and eukaryotes caused eukaryotes to evolve from prokaryotes. Tell me how this evolution happened and what evidence supports this theory. (Cite any sources you consult.)

5. Using everything you've learned, tell me what you would look for to tell whether a cell was prokaryotic or eukaryotic. Be specific.

Use complete sentences to define the following terms or phrases in your own words. (Not all the terms are in the lesson. Using a dictionary or outside site for help is fine, and sometimes necessary, but be sure to use your own words and cite your source!)

Do not submit text that you have copied from sources, including websites. All of your work should be in your own words. Using copied text would be considered plagiarism. For more information, review our page on [Plagiarism and Citation](#).

6. Chitin (include what organisms have chitin and what purpose it serves)

7. Nuclear envelope

8. Ribosomes (what does it do and what type of RNA is it made of?)

9. Photosynthesis (include where it happens)

10. RNA (make sure to list the three types of RNA and their functions)

Materials on this page are © Compuhigh unless otherwise noted, and may not be reused without express written permission.

Some materials on this page are copyrighted to [TEACHINGpoint](#) and may not be re-used without permission.