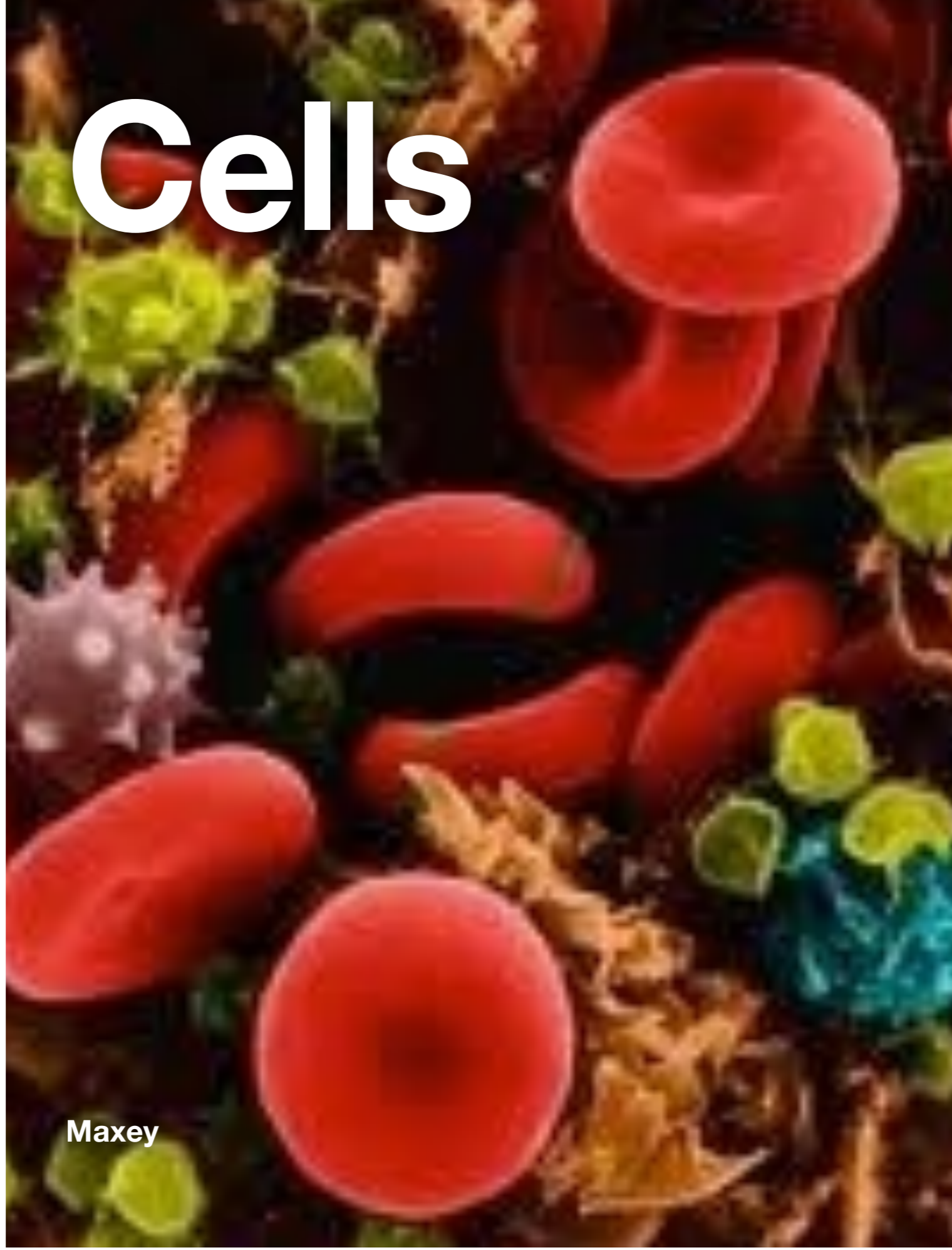


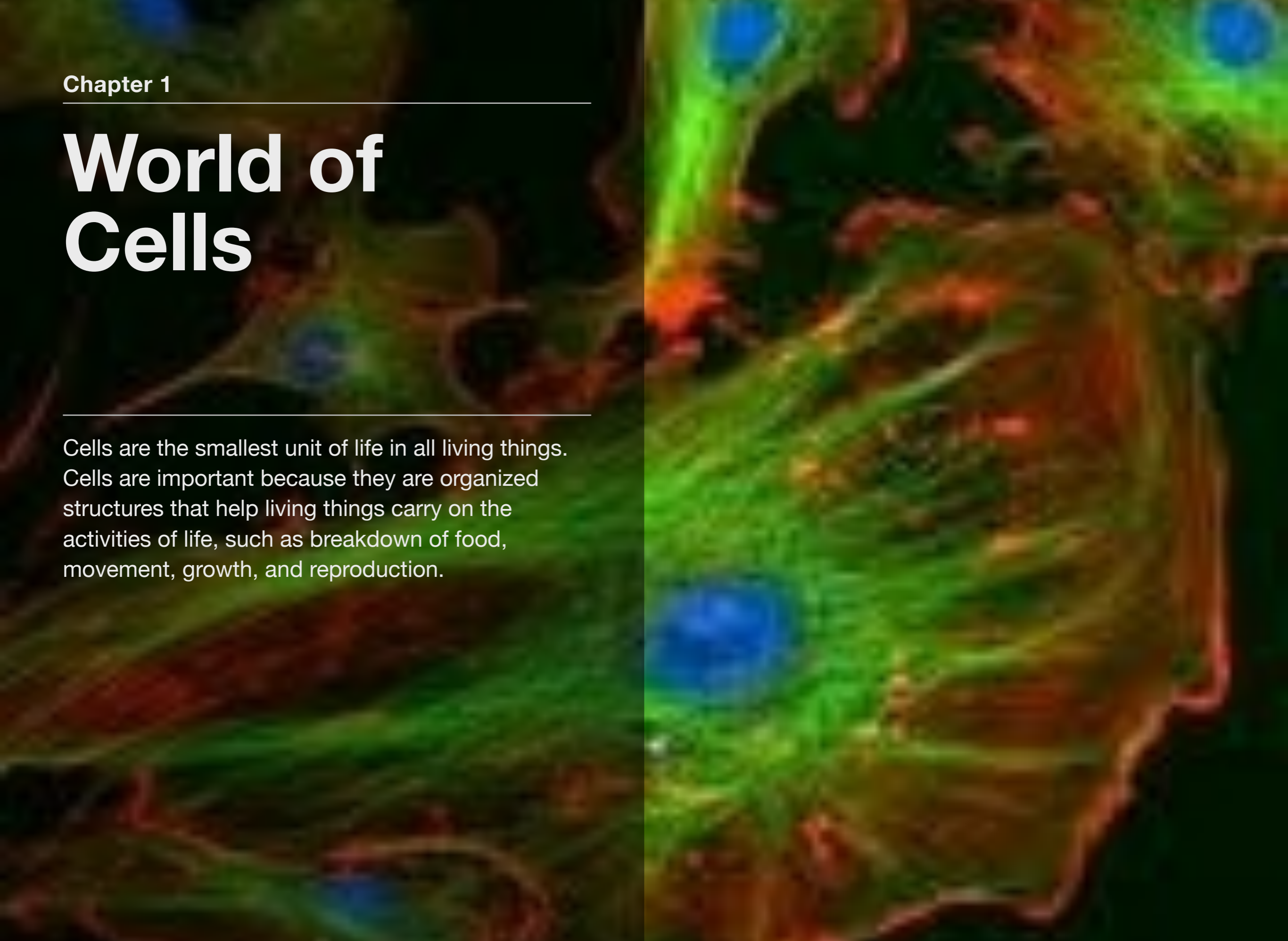
Cells



Maxey

World of Cells

Cells are the smallest unit of life in all living things. Cells are important because they are organized structures that help living things carry on the activities of life, such as breakdown of food, movement, growth, and reproduction.



Cell Theory



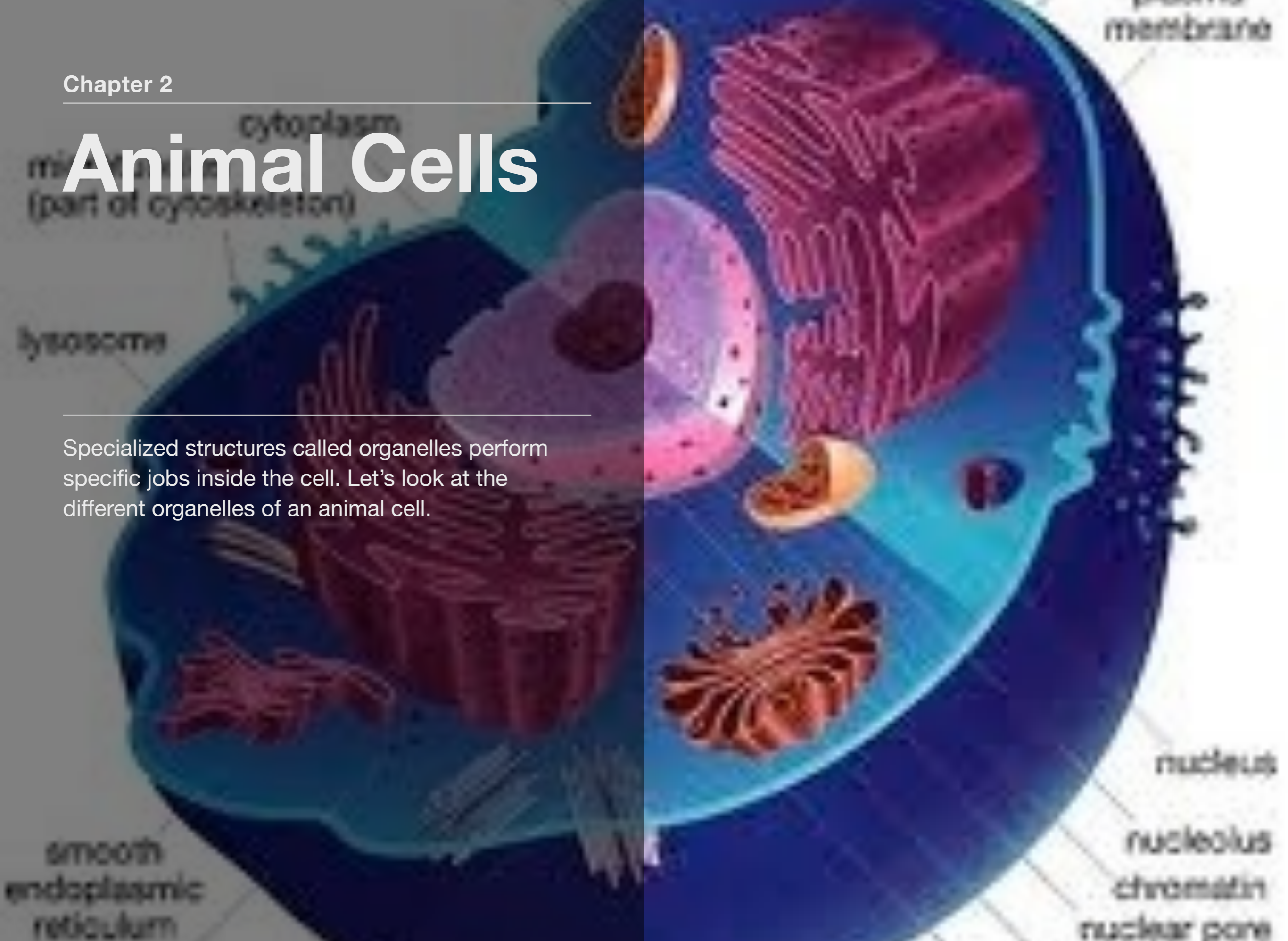
Cells are so small that they were not discovered until the first microscope was invented. In 1665, Robert Hooke used a microscope he developed to observe tiny, boxlike things in thin slices of cork. He called them cells because they reminded him of the small, boxlike rooms, called cells, where monks lived.

Many scientists observed many things using microscopes over the centuries. Their observations led to the development of the cell theory. The cell theory has evolved over the years to what it is the generally accepted modern theory:

1. All living things are made up of one or more cells.
2. All cells come from cells that already exist through division.
3. The cell is the basic unit of life in all living organisms.
4. The activity of an organism depends on the total activity of independent cells.
5. Energy flow occurs within cells.
6. Cells contain DNA which is passed from cell to cell during cell division.
7. All cells are basically the same in chemical composition in organisms of similar species.

Animal Cells

Specialized structures called organelles perform specific jobs inside the cell. Let's look at the different organelles of an animal cell.



Animal Cell Structures

ORGANELLES

1. Cell Membrane
2. Nucleus
3. Vacuole
4. Cytoplasm
5. Mitochondria
6. Chromosomes

Cell membrane - helps control what enters and leaves the cell; flexible structure that holds the cell together; forms a boundary between the cell and its environment (EX: the cell membrane would be similar to the fence around the airport).

Nucleus - dark, round structure near the center of the cell; control center of the cell (EX: the nucleus would be similar to the control tower at the airport).

Vacuole - bubble-like structure; stores food, water, minerals, waste (EX: the vacuole would be similar to the luggage storage areas at the airport).

Cytoplasm - gelatin-like substance that fills the cell; it is made up of chemicals and is about 2/3 water; organelles move around in the cytoplasm to perform their jobs (EX: the cytoplasm would be similar to the grounds around the airport where all the activity takes place).

Mitochondria - the powerhouse of the cell; converts food energy into a form the cell can use; this process is called cellular respiration (EX: the mitochondria would be similar to the fuel tanks at the airport).

Chromosomes - found inside the nucleus; made up of DNA (EX: the chromosomes would be similar to the air traffic controllers inside the control tower at the airport).

More Animal Cell Structures

ORGANELLES

1. Rough ER (endoplasmic reticulum)
2. Ribosomes
3. Smooth ER
4. Golgi Apparatus
5. Nuclear membrane
6. Nucleolus
7. Lysosomes

There are two types of endoplasmic reticulum, also called ER. Both types of ER are close to the nucleus and contain many folds providing a large surface area for their particular jobs.

Rough ER is where proteins for the cell are produced. The Rough ER looks bumpy. Those bumps are the ribosomes.

Ribosomes are the structures that actually make the proteins for the cell.

The Smooth ER looks different in that it is smooth and does not have ribosomes. Smooth ER produces and stores lipids, which includes fats.

Golgi Apparatus (also known as Golgi Bodies, Golgi Complex) looks similar to endoplasmic reticulum except they are individual structures grouped together. The Golgi Apparatus sorts and transports the proteins throughout the cell.

Nuclear membrane is the membrane around the nucleus. It controls what goes in and out of the nucleus.

The nucleolus is the dark structure inside the nucleus and it produces ribosomes.

Lysosomes are the digestive organelles. They digest food, waste, viruses, and bacteria inside the cell.

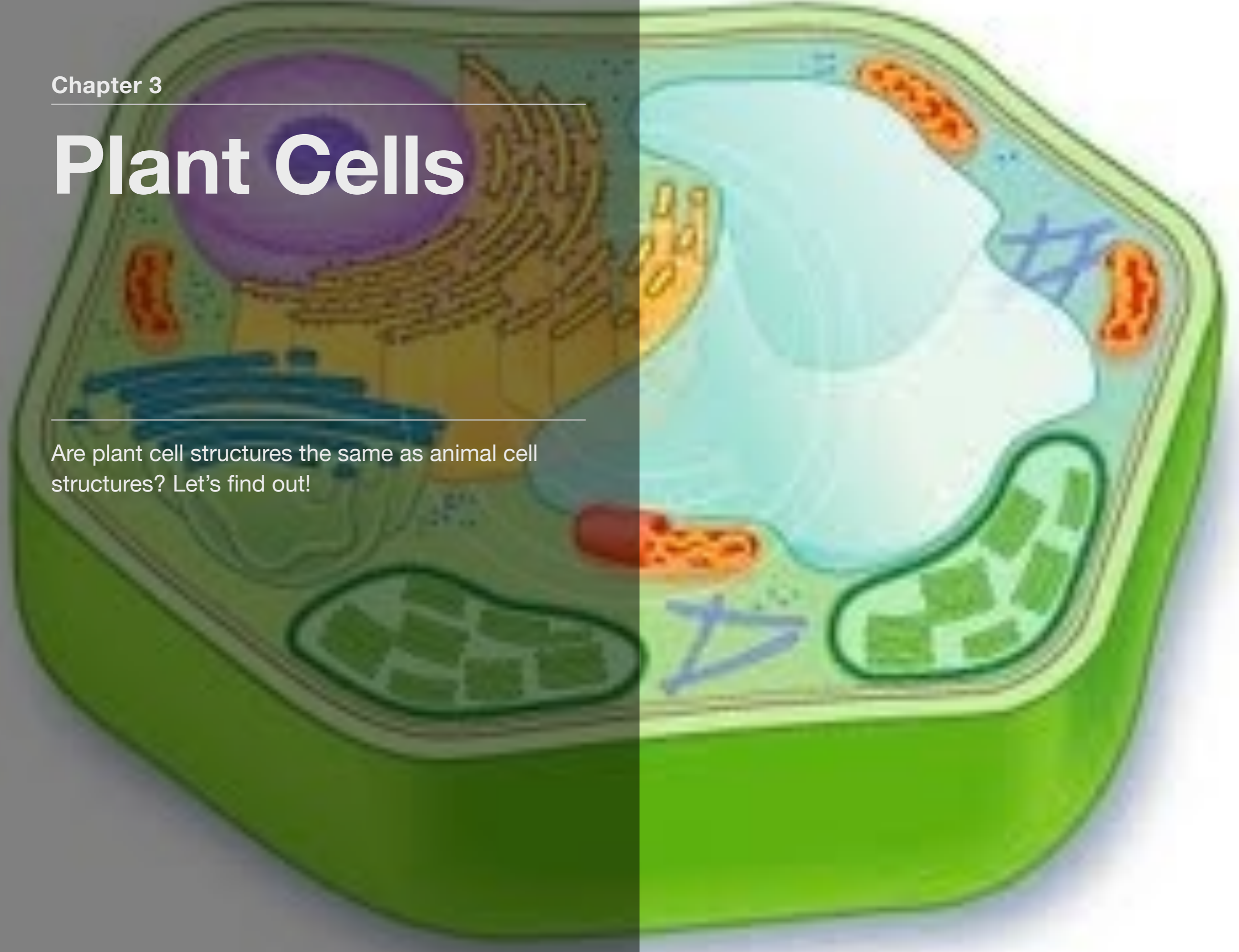
Animal Cell Animation

Movie 2.1 Animal Cell



Plant Cells

Are plant cell structures the same as animal cell structures? Let's find out!



Plant Cell Structures



Plant cells have all the same structures that animal cells have with two exceptions.

Plant cells have a cell wall and chloroplasts; animal cells do not.

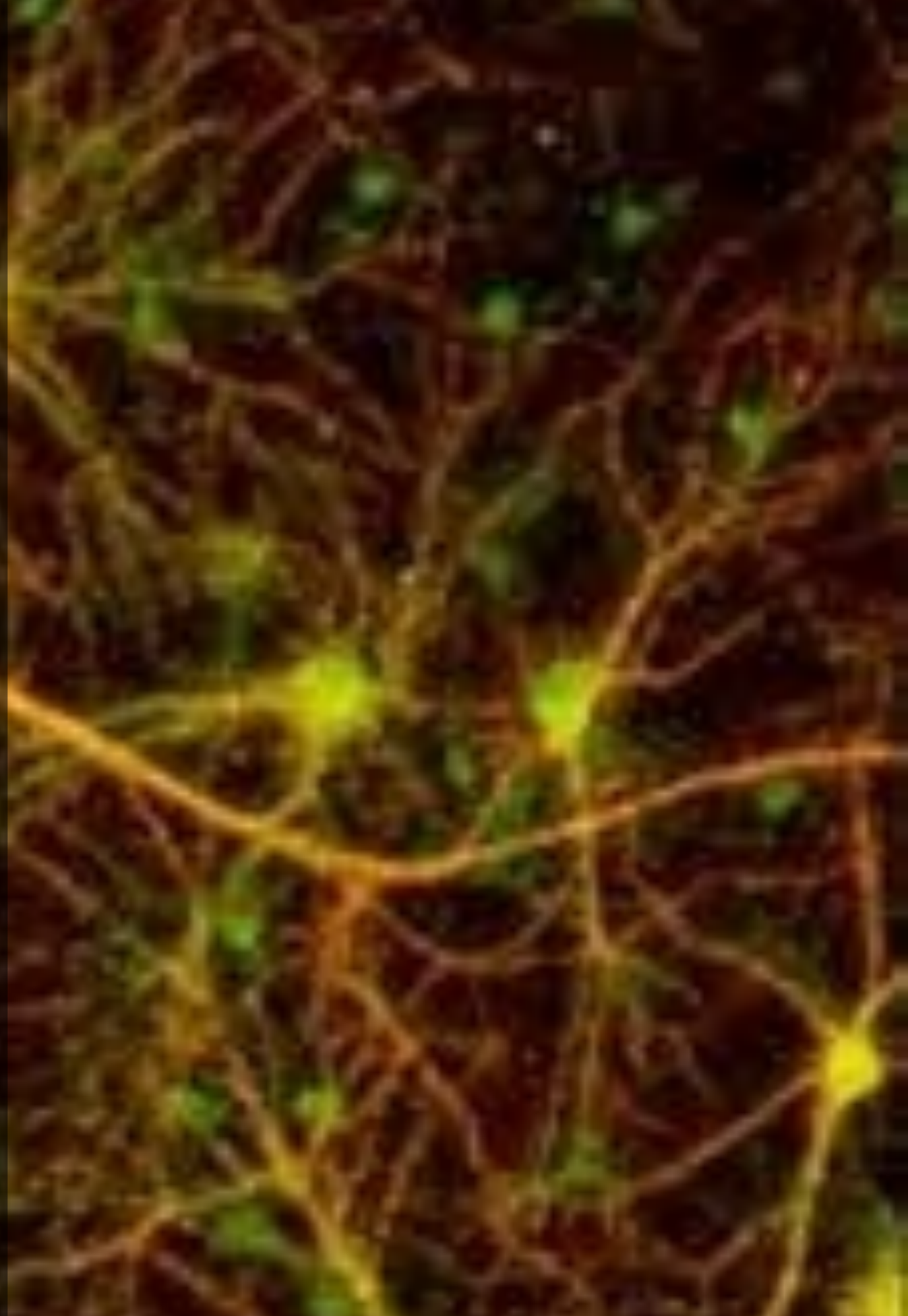
Cell walls provide support and protection to the cell and gives it shape. Why don't animal cells have cell walls? What gives us (humans) our shape?

Answer: Animal cells do not need cell walls because the skeletal system provides the support and shape the body needs.

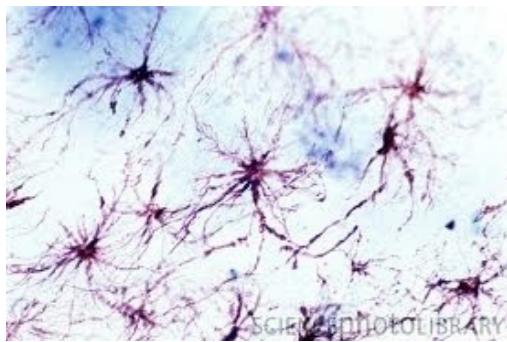
Chloroplasts are the food-making structures inside the plant cell. Chlorophyll is the green colored matter inside the chloroplast that captures the sunlight and converts it into food that the plant can use.

Different Types of Cells

The best tool for the job is the one that has been designed specifically to do that job. For example, you wouldn't use a hammer to saw a board in half. You can think of your body cells and plant cells in the same way. Let's look at some human cells and plant cells.



Types of Human Cells

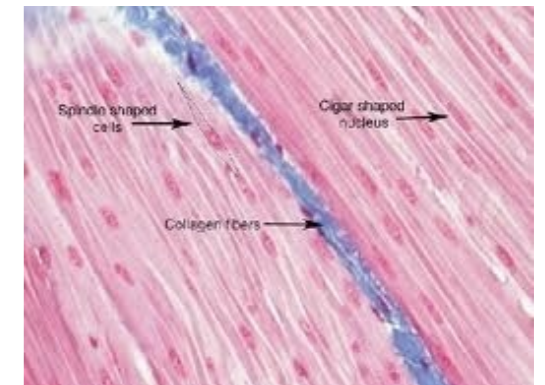


Bone cells are surrounded by hard calcium and phosphorus substance. Bone cells give bones the strength they need to support our bodies.



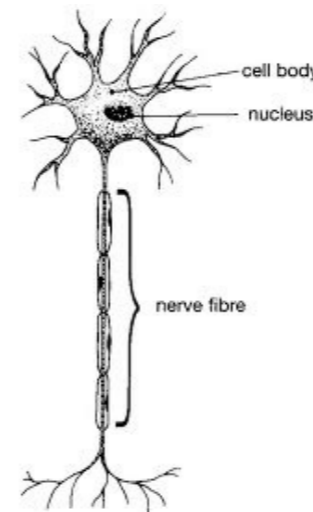
Skin cells are mostly flat and closely together. They overlap and form a protective layer for your body.

Would a bone cell be able to do its job if it was shaped like a fat cell? Would a fat cell be able to do its job if it was shaped like a bone cell?



Muscle cells are usually long and have many fibers that contract and relax to give your body movement.

Fat cells can store so much fat that the nucleus gets pushed against the cell membrane. The purple structure in the picture is the nucleus.

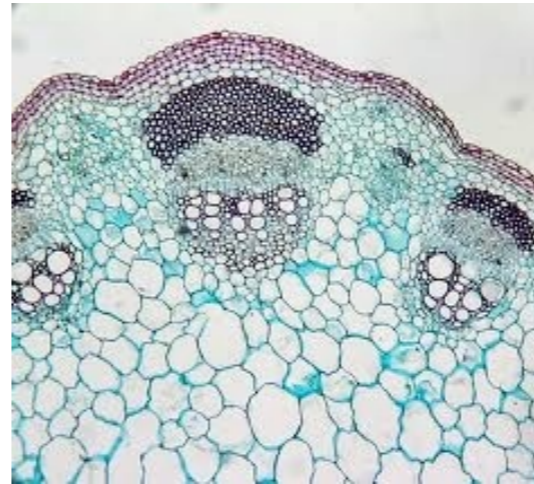


Nerve cells are long and have many branches. This allows them to receive and deliver messages quickly throughout the body.

Types of Plant Cells



Leaf cells are brick-shaped. See how they alternate and are not stacked directly on top of each other. This gives them more support to stand up and capture what? Leaf cells contain many chloroplasts.



Stem cells are long and tube-shaped which allows them to move water and materials through the plant quick and easy.

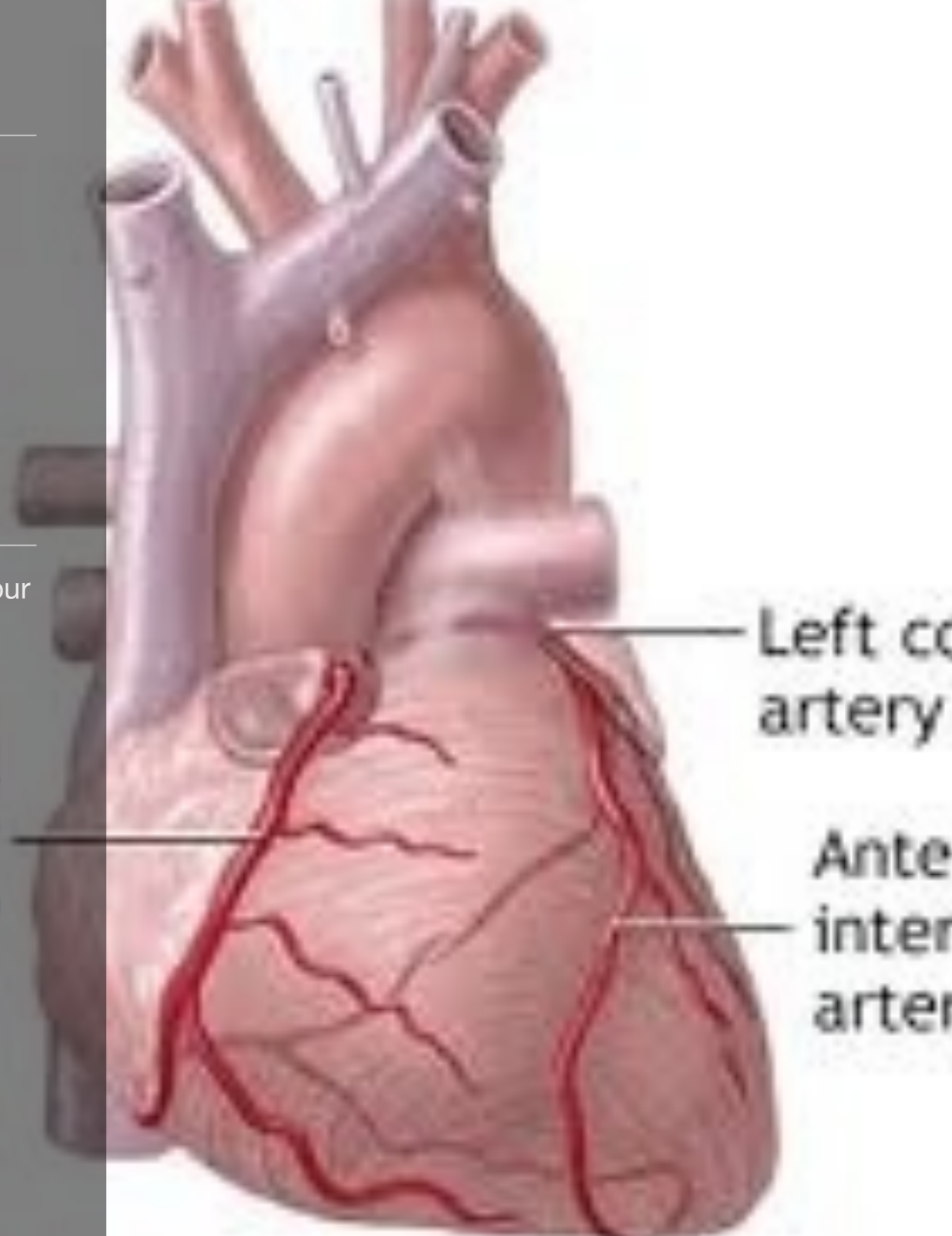
Root cells are block-shaped. See how they are stacked on top of each other. Root cells do not contain chloroplasts. Why do you think that is? Root cells absorb water and materials from the soil.



Cell Organization

How well do you think your body would work if your cells were just all jumbled up and scattered throughout your body? Cells are organized into systems that, together, perform the functions that keep the organism alive and healthy.

Right
coronary
artery



Left coronary artery

Anterior interventricular artery

Levels of Cell Organization

The simplest level is the cell.

Cells are organized into tissues. Tissues are groups of similar cells that all do the same work.

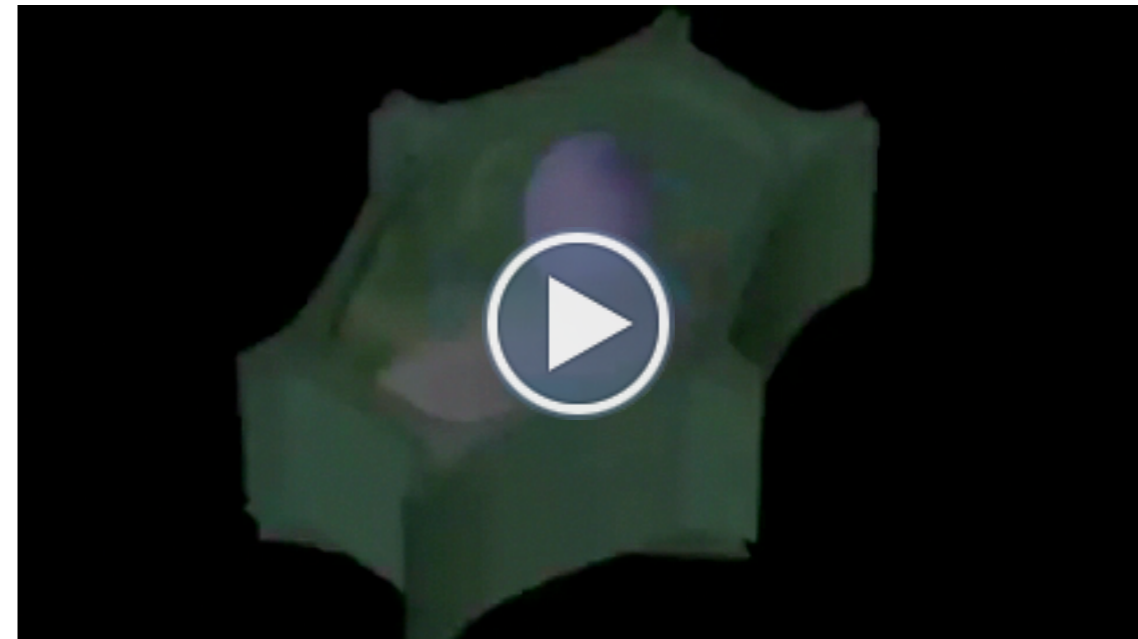
Tissues are organized into organs. Organs are two or more types of tissues working together to do a particular job.

Organs are organized into organ systems. Organ systems are groups of organs working together to do a specific job.

Organ systems together make up the organism.

Watch the video for examples of human and plant levels of cell organization.

Movie 5.1 Levels of Cell Organization



Chapter 6

Let's Review



Cell Review

Review 6.1

Which animal cell structure would be most similar to the bus station?

- A. smooth ER
- B. rough ER
- C. golgi apparatus
- D. lysosome

Check Answer

Review 6.2

Where do the ribosomes go to perform their job?

- A. smooth ER
- B. rough ER
- C. golgi apparatus
- D. lysosome

Check Answer

Cell Review

Review 6.3

This organelle loves to eat!

- A.** smooth ER
- B.** rough ER
- C.** golgi apparatus
- D.** lysosome

Check Answer

Review 6.4

Muscle cells have many more of these organelles than other types of cells.

- A.** nucleus
- B.** vacuole
- C.** mitochondria
- D.** cytoplasm

Check Answer

Cell Review

Review 6.5

This plant cell organelle plants an important role in keeping the plant alive during days without sun or water.

- A. nucleus
- B. vacuole
- C. mitochondria
- D. cytoplasm

Check Answer

Review 6.6

Our bodies have a skeletal system to help give us our shape. What organelle in a plant cell does the same for the plant?

- A. nuclear membrane
- B. cell membrane
- C. cell wall
- D. cytoplasm

Check Answer