

# Cells

Have you ever seen a cell? Cells are the smallest unit of life. They are called the building blocks of life. We cannot see single cells with just our eyes. We must use a microscope to see them.

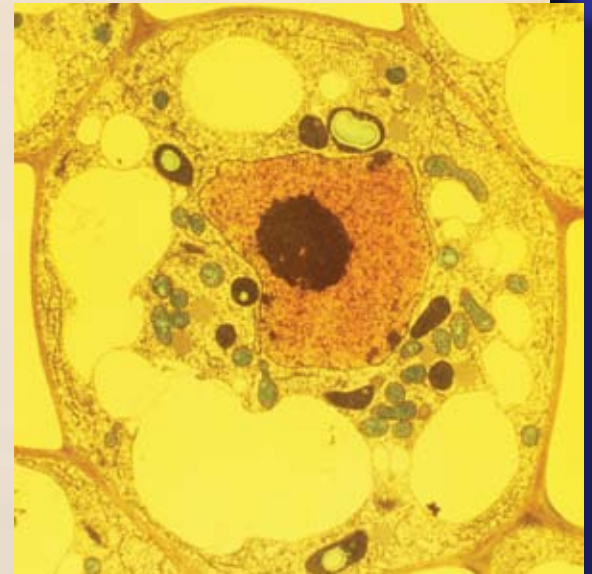
## Cell Theory

Cells are the main point of Cell Theory. This tells what living things are made of. Three men once worked on cells at about the same time. One was Matthias Schleiden (mah-TEE-ahs SHLAHYD-n). The second was Theodor Schwann (TEY-oh-dawr shvahn). The last was Rudolf Virchow (ROO-dawlf FIR-koh). They came up with the three parts of Cell Theory.

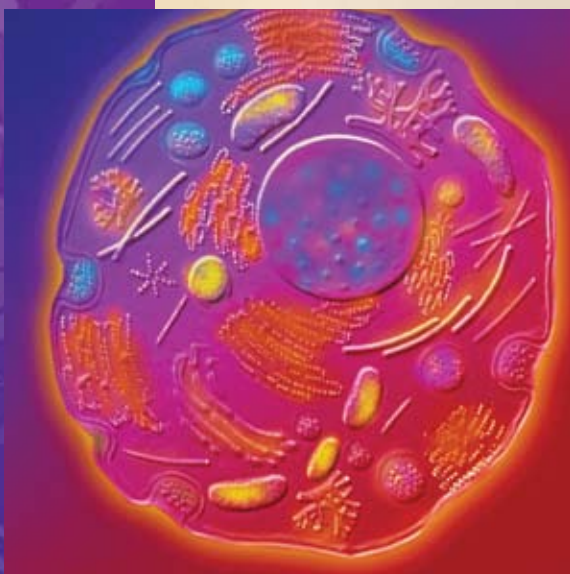
Schleiden worked with plant cells. Schwann worked with animal cells. One night, they had dinner. They talked about their work. They found that the cells they both studied were the same in many ways. They found that plants and animals were both made of cells.

They went to the lab and looked at cells. Then they wrote a paper about cells. They said two big things in this paper. First, all living things are made of cells. Second, a cell is the smallest part of a living thing that is itself alive.

There was one thing they did not know. They did not say where cells came from. Twenty years later, Rudolf Virchow solved the puzzle. Cells, he said, come from other cells. This became the third part of Cell Theory.



**plant cell**



**animal cell**

## Cytoplasm and Organelles

Cells are filled with a fluid like gelatin. It is called cytoplasm (SY-toh-plaz-uhm). It is made of cytosol (SY-toh-sawl). Cytosol is like a special soup. It has all the things the cell needs to live.

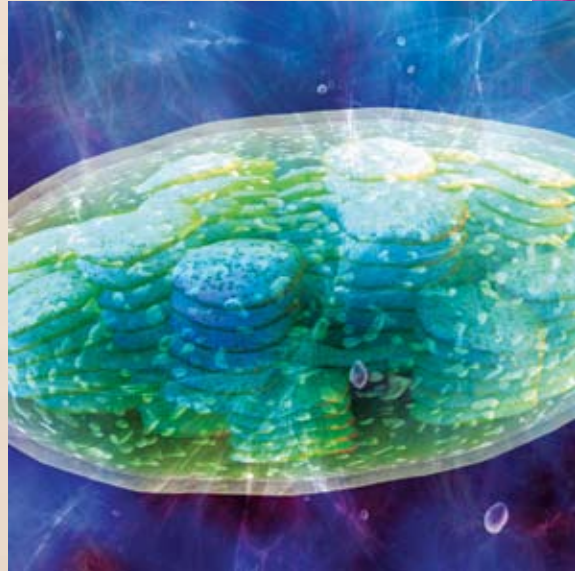
A cell must do many things to stay alive. Inside the cell, there are many parts. The parts are called organelles (or-guh-NELS). Each one does a job. Some turn food into energy. Some store water. The organelles float in the cytosol. A membrane keeps the fluid out. The membrane is like a skin. It only lets in what the organelle needs. Everything else is kept outside.

## Energy in Cells

Every day, we use energy. We use it to move, eat, and sleep. It comes from cells. Mitochondria (my-tuh-KON-dreeuh) are a kind of organelle. They change food into energy that cells can use. This is called respiration. The process needs oxygen. It breaks apart bits of food. This pulls energy out of the food. Then the cell uses the energy in many ways. The cell uses it to build new things. It uses it to move things through the cell. The cell uses it to make more cells.



**mitochondrion**



**chloroplast**

Both plant and animal cells have mitochondria. Plant cells have chloroplasts, too. These are organelles. They use light to make food. They have a pigment. It is called chlorophyll (KLOR-uh-fil). Chlorophyll takes energy from the sun or other sources of light. It uses that energy to make food. It makes the food from water and carbon dioxide. This way of making food is called photosynthesis (foh-tuh-SIN-thuh-sis). The green pigment is what makes plants green.

## Comprehension Question

What are cells made of?



# Cells

Have you ever seen a cell? Cells are the smallest unit of life. They are called the building blocks of life. We can't see individual cells with our eyes alone. We must use a microscope to see them.

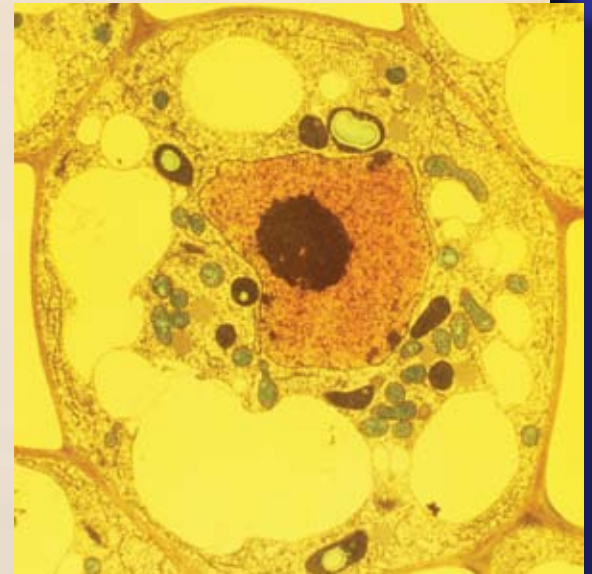
## Cell Theory

Cells are the main point of Cell Theory. This is a way of thinking about living things. Three scientists worked on cells at about the same time. Their names were Matthias Schleiden (mah-TEE-ahs SHLAHYD-n), Theodor Schwann (TEY-oh-dawr shvahn), and Rudolf Virchow (ROO-dawlf FIR-koh). They came up with the three parts of Cell Theory.

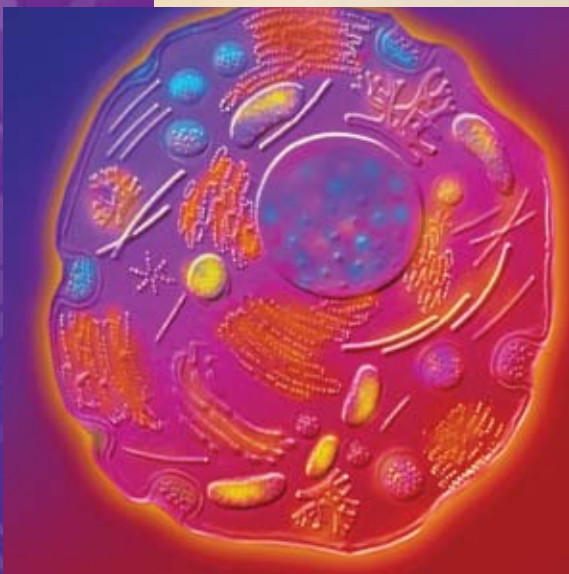
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They went to the lab and looked at cells. Then they wrote a paper on their findings in 1839. They said two important things in it. First, all living things are made of cells. Second, cells are the smallest part of a living thing that is itself alive.

The one thing that they weren't sure of was where cells came from. Almost 20 years later, Rudolf Virchow solved the puzzle. Cells, he said, come from other cells. This became the third part of Cell Theory.



**plant cell**



**animal cell**

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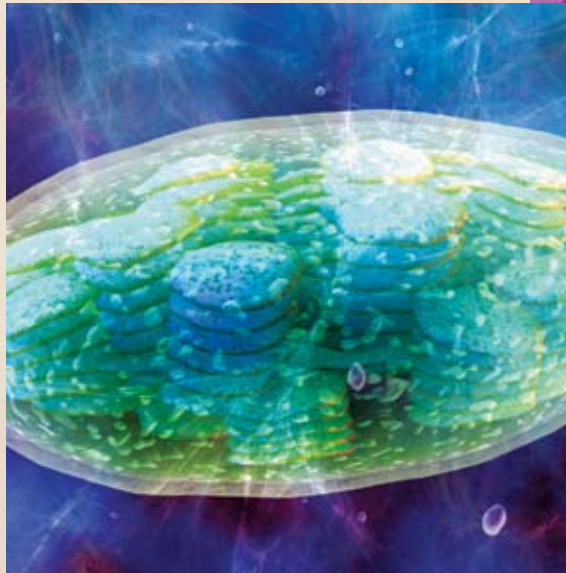
A cell must do many things to survive. Inside the fluid, there are many cell parts called organelles (or-guh-NELS). Each one does a different job. Some turn food into energy. Others store water. Most organelles are kept apart from the cytosol by a membrane. The membrane is like a skin that only lets in what the organelle needs. Everything else is kept outside.

## Energy in Cells

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**mitochondrion**



**chloroplast**

Both plant and animal cells have mitochondria. Plant cells have chloroplasts, too. Both are organelles. They use light to make food. They have a pigment called chlorophyll (KLOR-uh-fil). Chlorophyll takes energy from the sun or other sources of light. It uses that energy to make food. It makes it from water and carbon dioxide. This way of making food is called photosynthesis (foh-tuh-SIN-thuh-sis). The green pigment is also what makes plants green.

## Comprehension Question

What are cells?



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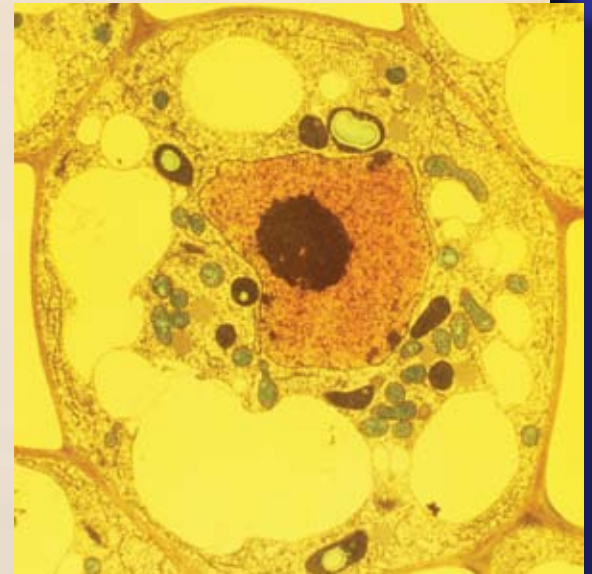
## Cell Theory

The importance of cells is outlined in Cell Theory. Three scientists were working on cells at about the same time. Their names were Matthias Schleiden, Theodor Schwann, and Rudolf Virchow. Together, their work became known as Cell Theory.

Schleiden worked with plant cells. Schwann worked with animal cells. One night, they had dinner together. They talked about their work. They realized that the cells they both studied were very similar. Plants and animals were both made of cells.

They went to the laboratory and looked at cells. Then they published their findings in 1839. They said two important things. First, all living things are made of cells. Second, cells are the smallest part of a living thing that is itself alive.

The one thing that they weren't sure of was where cells came from. Almost 20 years later, Rudolf Virchow solved the puzzle. Cells, he said, come from other cells. This became the third part of Cell Theory.



**plant cell**

## Cytoplasm and Organelles

Cells are filled with fluid that is like gelatin. The fluid is called cytoplasm. It is made of cytosol. Cytosol is like a special soup that has everything the cell needs to live.

A cell must do many different jobs to survive. Inside the fluid, there are many different cell parts called organelles. Each organelle does a different job. Some organelles turn food into energy. Other organelles store water. Most organelles are separated from the cytosol by a membrane. The membrane is like a skin that only lets in what the organelle needs. Everything else is kept outside.



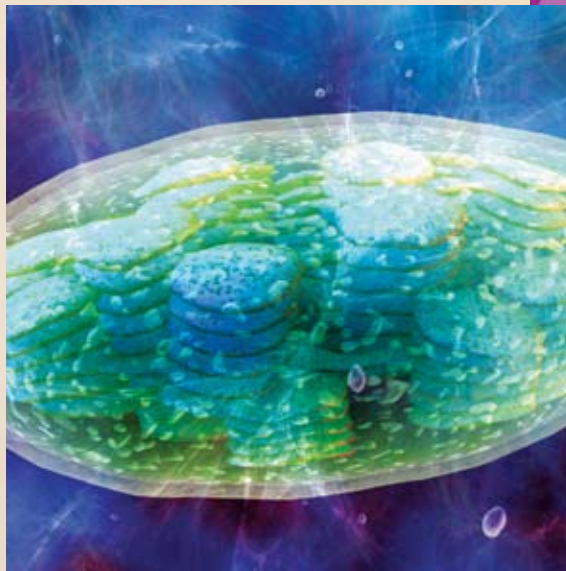
**animal cell**

## Energy in Cells

Where do we get the energy we need to move, eat, and sleep? It comes from cells. Mitochondria are organelles that change food into energy cells can use. This is called cellular respiration. Cellular respiration needs oxygen. Mitochondria break apart molecules of food and release the energy. Then the cell uses the energy to build new proteins, move molecules around the cell, and make more cells.



**mitochondrion**



**chloroplast**

Both plant and animal cells have mitochondria. Plant cells have chloroplasts, too. These are organelles that use energy from light. Chloroplasts contain a pigment. It is called chlorophyll. Chlorophyll absorbs energy from the sun or other sources of light. The chloroplast uses that energy to make food from water and carbon dioxide. This process of making food is called photosynthesis. The green pigment is also what makes plants green.

## Comprehension Question

How do organelles keep cells alive?



# Cells

Have you heard of cells? Cells are the smallest unit of life, and they are the building blocks that all organisms are made of. Individual cells cannot usually be seen with the naked eye, but only with a microscope.

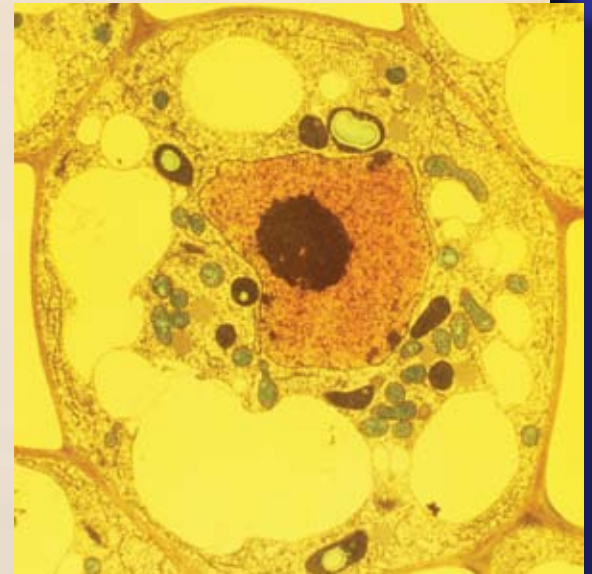
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Schleiden studied plant cells; Schwann studied animal cells. One night over dinner, they talked about their work and they realized that there were many similarities between the cells they studied. Plants and animals were both made of cells.

They went to the laboratory to verify their theory, then published their findings in 1839. They made two propositions: first, all living things are made of cells; second, cells are the smallest part of a living thing that is itself alive.

Schleiden and Schwann didn't have the whole picture, though, because they could not explain the origin of cells. Almost 20 years later, Rudolf Virchow solved the puzzle. Cells, he said, come from other cells. This became the third part of Cell Theory.



**plant cell**

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Cells are filled with fluid called cytoplasm, which is made of a gelatin-like substance called cytosol. Cytosol is a chemical soup that has everything the cell needs to live.

A cell must do many different jobs to survive. In the cytoplasm, there are many different cells parts called organelles. Each organelle does a different job: some organelles turn food into energy; other organelles store water. Most organelles are separated from the cytosol by a membrane. The membrane is like a skin that only lets in what the organelle needs and keeps everything else outside.



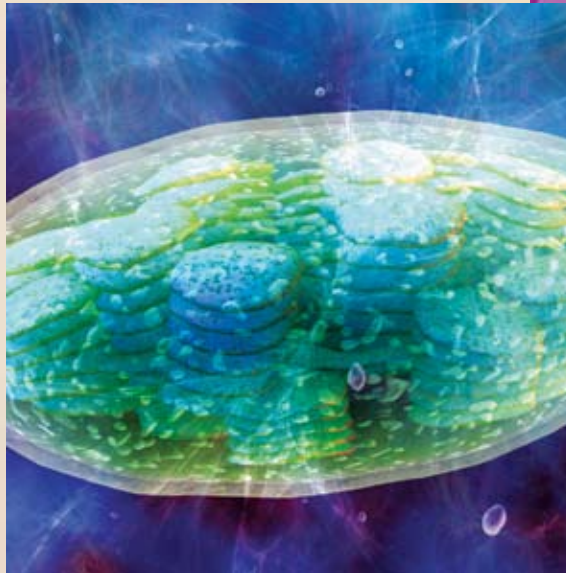
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Both plant and animal cells have mitochondria, but plant cells have chloroplasts, too. These are organelles that use energy from light. Chloroplasts contain a green pigment called chlorophyll. Chlorophyll absorbs energy from the sun or other light sources. The chloroplast uses that energy to make food from water and carbon dioxide. This process of making food is called photosynthesis. Since chlorophyll is green, plants are green, too.

## Comprehension Question

Describe the relationship between organelles and cells.