

Wikijunior:Biology/Printable version

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Wikijunior:Biology	
Printable version	Cells

Biology is the study of *Life*. It helps us understand such things as how our body works, how our body keeps warm, what we are made of and many other things. Biology is very important to know. Some subjects in Biology are Genetics, Zoology, Botany, and Ecology.

What is life?

Living things are not like things that are not alive.

Living things are like each other. They share some things.

Living things can change and grow.

Living things need nutrition.

Living things can move.

Living things can reproduce.

Living things can respond to stimulation (touch).

Living things can excrete.

Living things can breathe.

Examples of living things are animal and plants.

Cars and tables are not living things because they cannot satisfy the above 7 statements of living things.

Levels of Life

Living things can be many sizes. A living creature is called an organism. From small to large, these are how living things are grouped.

- Cell
- Tissues
- Organs
- Organ systems
- Organisms
- Populations
- Communities
- Ecosystems
- Biomes
- Biosphere

Wikijunior:Biology		
Introduction	Printable version	Tissues

Cells

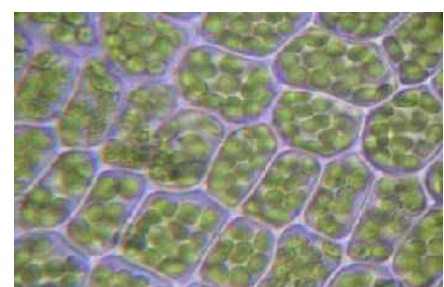
All living things are made of cells. They are the components and building blocks of life.

What is a cell?

A cell is a bag of water that holds in the stuff of life.

A **cell** is the smallest unit of life. If you look at living things under a microscope, you will see that they are made of small squares or balls.

Robert Hooke, a biologist from England, saw small squares in cork with a microscope. They looked like rooms. Small rooms are sometimes called *cells* so he named them that.



Plant cells

What types of cells are there?

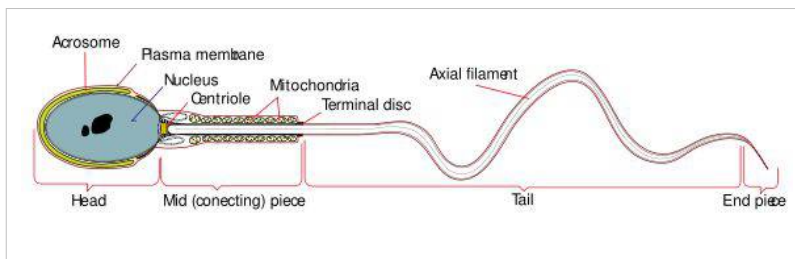
There are two kinds of cells. **Eukaryotes** which have a large ball in them called a *nucleus*, and **Prokaryotes** which do not.

Most prokaryotes are very small. Prokaryotes include the two **kingdoms**: **Bacteria** and **Archea**. All of the rest of the kingdoms are Eukaryotes: **Animals**, **Plants**, **Fungi**, and **Protists**.

What do cells look like?

Cells are surrounded by a thin oil layer called the *cell membrane*. It separates the inside of the cell from the outside. Some cells also have a firm box around them called a *cell wall* that keeps it from breaking. The water that fills a cell is called the *cytoplasm*. Inside a cell knowledge is stored in a thing called a *chromosome*. It tells the cell how to work, like steps in a book.

Eukaryotic cells hold their chromosomes in a structure called a **nucleus** which has its own oily membrane around it. Cells also have many other membrane bound things called **organelles** which means little organs. Some organelles found in eukaryotic cells are called *ribosomes*, *vacuoles*, *mitochondria*, and *chloroplasts*.



Cells that do different things have different shapes. A plant leaf cell takes light and uses it to make sugar. To do this, it has green organelles called *chloroplasts*. To get the most light it pushes cytoplasm in circles around a hollow bubble of water in the center of

the cell called a *vacuole*.

A human sperm cell carries its chromosomes, found in the nucleus, to an egg cell in order to make a new baby. It has a large tail called a *flagella* that helps it to swim. It also has many organelles called *mitochondria* that give it power like gasoline gives power to a motor.

Words

nucleus - A ball in the middle of the cell that holds the chromosomes.

chromosomes - Things that hold the knowledge of the cell.

prokaryote - A cell without a nucleus.

eukaryote - A cell with a nucleus.

organelles - Little things inside a cell.

cytoplasm - The water in a cell.

membrane - An oil bag that holds water.

vacuole - An organelle full of water inside a cell.

mitochondria - An organelle that makes power in a cell

chloroplast - An organelle that makes sugar found in a plant or protist.

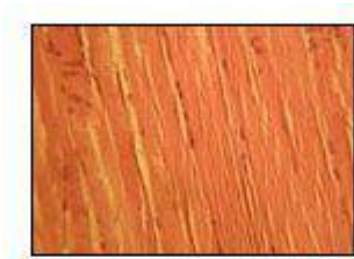
ribosomes - An organelle that makes things called proteins.

flagella - A tail on a cell that makes it swim.

golgi body - An organelle which helps in secretion.

ribosome - An organelle which helps in synthesis of proteins.

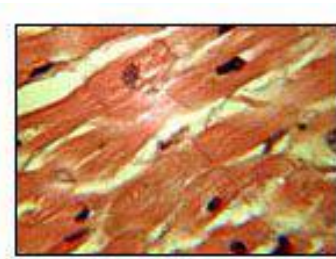
Cells	Printable version	Organs
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Skeletal muscle



Smooth muscle



Cardiac muscle

Tissues

Organisms are made of tissues. Tissues are groups of cells that work together. Plant leaves have tissues that capture light and make sugar. Most animals have **muscle** tissues that help them move.

When two or more tissues work together to do one thing they make up organs.

In plants, there are two types of tissues:

- **Meristematic tissue:** This has actively dividing cells.
- **Permanent tissue:** This type of tissue has developed cells. They do not divide.
 - **Simple permanent tissue:** This type of permanent tissue has only one kind of cells.
 - **Parenchyma:** They have loosely packed cells. The cells do not have a particular function.
 - **Collenchyma:** They have cells which have layers called pectin. They contain chlorophyll.
 - **Sclerenchyma:** They have dead cells. Between the cells, there are layers called lignin.
 - **Complex permanent tissue:** This type of tissue contains different kinds of cells.
 - **Xylem:** This type of tissue contains mainly dead cells. They help to move water from the roots to leaves.
 - **Phloem:** This type of tissue contains mainly living cells. They help moving food materials from leaves to other parts.

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Tissues	Printable version	Systems

Organs

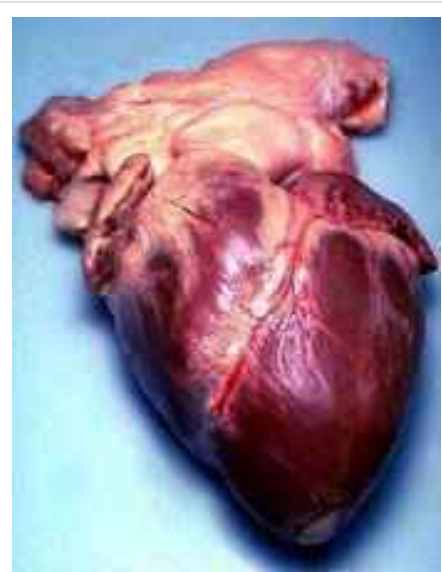
Many living things have **Organs**.

Your Heart, Brain, Lungs, Liver, and Kidneys are organs.

Organs are made of two or more tissues.

Organs each have something that they do. The heart pumps blood. The lungs give you air.

Organs work together in groups called Organ systems.



A heart

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Organs	Printable version	Circulatory System

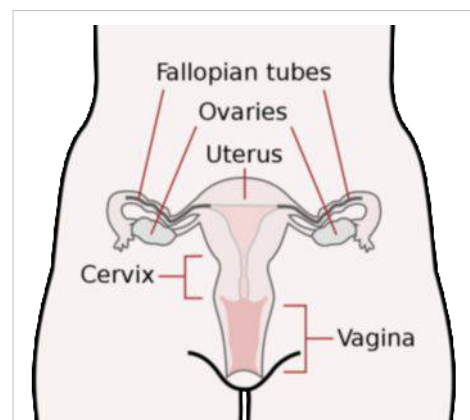
Organ systems

Two or more organs that work together make an **organ system**.

Organ systems are found in all different kinds of living things.

Some of the organ systems found in humans include:

- The Circulatory System
 - The Respiratory system
 - The Digestive System
 - The Endocrine System
 - The Reproductive System
 - The Urinary System
-
- The Immune System
 - The Nervous System
 - The Integumentary System
 - The Muscular System
 - The Skeletal System



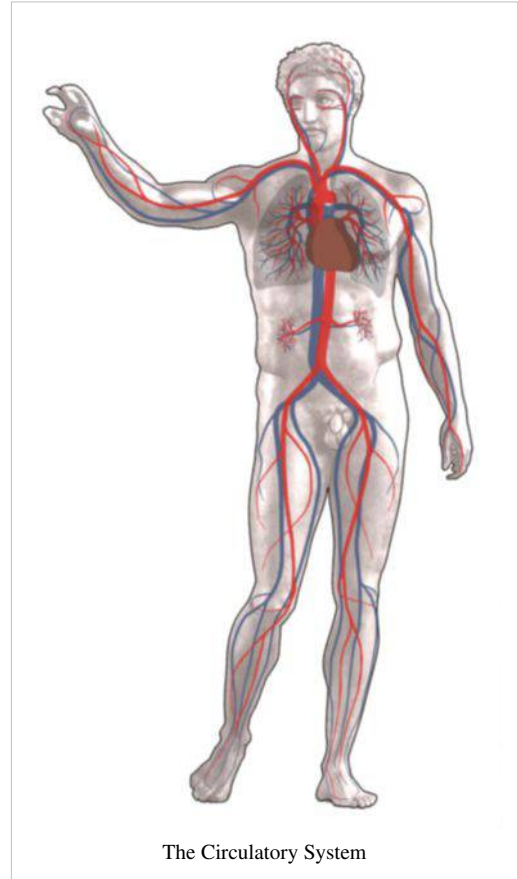
Reproductive system in women

Wikijunior: Biology		
Systems	Printable version	Respiratory system

The Circulatory System

The **Circulatory System** moves blood around your body. This blood carries food and *oxygen* around to all of the cells of the body. It also carries signals called **hormones** that help the body work together.

The major organ of the circulatory system is the **heart** which pumps the blood. Blood goes away from the heart in tubes called **arteries** and comes back to the heart in tubes called **veins**. The smallest tubes are called **capillaries**.



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Circulatory system	Printable version	Digestive system

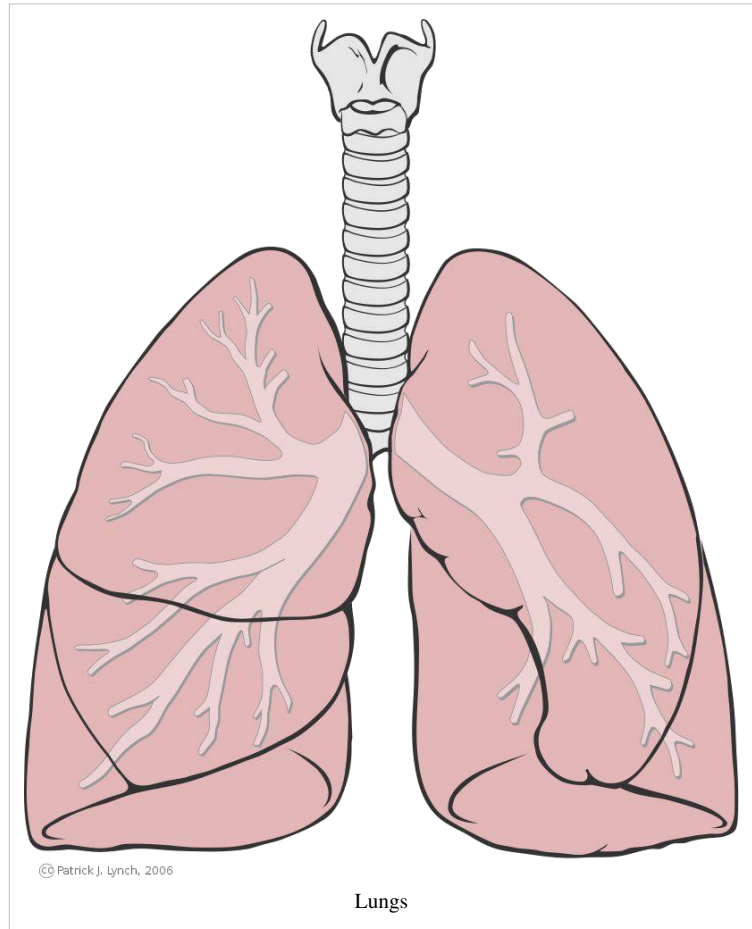
The Respiratory System

The **Respiratory System** is how air gets into our bodies. We breathe in and out with our **lungs**. The air we breathe in has something called *oxygen* that our cells need. Cells make *carbon dioxide* which can poison our bodies. Our lungs push this out of our bodies.

The respiratory system works together with the circulatory system to make sure that air gets to each cell of the body.

Parts of the respiratory system are the nose, pharynx, larynx, trachea, bronchi, bronchioles and alveoli.

- Air comes in through the nose and mouth.
- Dust is removed by the hair in the nose.
- Air goes through the pharynx (in the back of the mouth), the larynx or the voice box, and down the trachea (windpipe).
- The trachea splits into two major bronchi, one for each lung.
- This further splits into smaller bronchi, then into smaller tubes called *bronchioles* which lead into the air sacs called *alveoli*.
- This is where the oxygen goes into the blood and carbon dioxide comes out.



Wikijunior:Biology		
Respiratory system	Printable version	Endocrine system

The Digestive System

The **digestive system** is what a human uses to eat. Food comes in through our *mouth* is broken down in our *stomach* and our body takes the food in through the *intestines*. Then the waste goes out through the *anus*.

The digestive system is made of many organs. Here are some of the organs and their functions:

Esophagus - Pushes food down into the stomach.

Stomach - Breaks down food with acid and by squeezing.

Liver - Makes a thing called *bile* that breaks down fat.

Gallbladder - Stores the bile and adds it when it is needed.

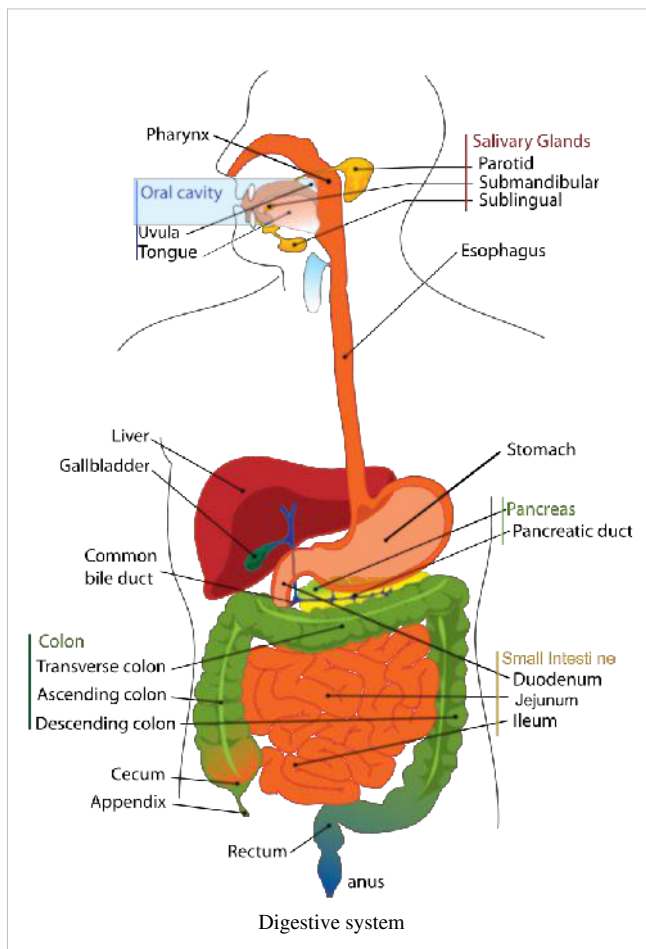
Pancreas - Makes chemicals that break down food.

Small intestine - Absorbs food for body.

Large intestine - Absorbs water and salt.

Rectum - Stores waste.

Appendix - Holds bacteria that can break down food and make vitamin K.



Wikijunior:Biology		
Digestive system	Printable version	Reproductive system

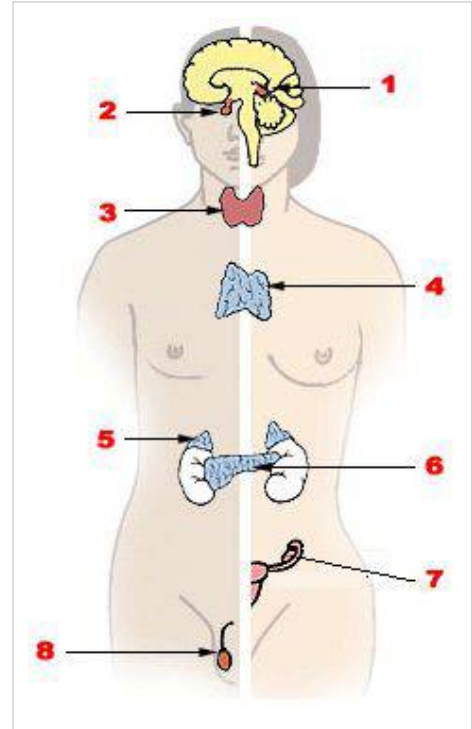
The Endocrine System

The human body is made of many, many cells. To make the cells work together, the body sends signals through the blood called *hormones* that tell the cells in the body what to do.

The **Endocrine System** is the organ system made of the organs that make hormones.

The endocrine system organs:

1. Pineal gland
2. Pituitary gland
3. Thyroid gland
4. Thymus
5. Adrenal gland
6. Pancreas
7. Ovary
8. Testis



Wikijunior:Biography		
Endocrine system	Printable version	Urinary system

How are babies made?

In humans there are two sexes: *Men* and *Women*. Babies are made when cells called *sperm* (produced by men) get together with cells called *eggs* (produced by women) in a process called **fertilization**. When the cells combine, they form a new cell, called a **zygote** (*zy* sounds like *eye*. *gote* sounds like *goat*) which has all it needs to make a new man or woman. The zygote will make a baby like his mother and father.

Where do babies come from?

Babies come from their mother. To make a baby, the father must put his sperm into the mother's body. This is called *having sex*. The man puts his *penis* into the woman's *vagina* and the sperm cells swim into the mother's body. Fertilization happens in the mother. The new zygote grows into a ball which will stick to the mother's **womb**. This ball grows into a baby.

Nine months later (266 days after fertilization) a new baby will come out of the mother's vagina in a process called **birth**.

Words

cell - Things that are alive are made of little boxes called cells.

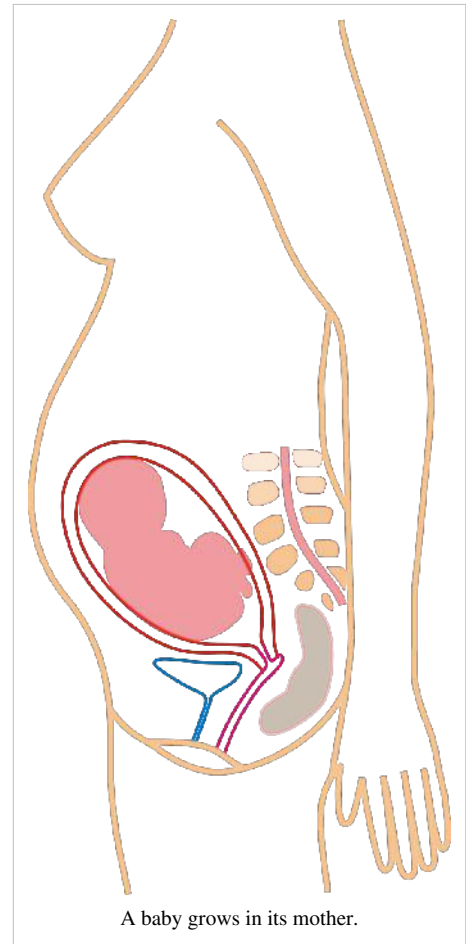
womb - The place in a body where a baby grows. The word *woman* means man with a womb.

zygote - The one cell made from a sperm cell and an egg cell that will grow into a person.

sperm - A sex cell made by a man.

egg - A sex cell made by a woman.

fertilization - When sperm and egg get together and make a zygote.



Wikijunior:Biology		
Reproductive system	Printable version	Immune system

The Urinary System

The **Urinary system** takes bad things out of the blood and washes it out of the body. This liquid waste is called **urine**. Without the urinary system, poisons would fill up the blood and kill a person. The **kidneys** are organs that filter the blood and remove poison. Urine is stored in a bag called the **bladder** and it leaves the body through a tube called the **urethra**.

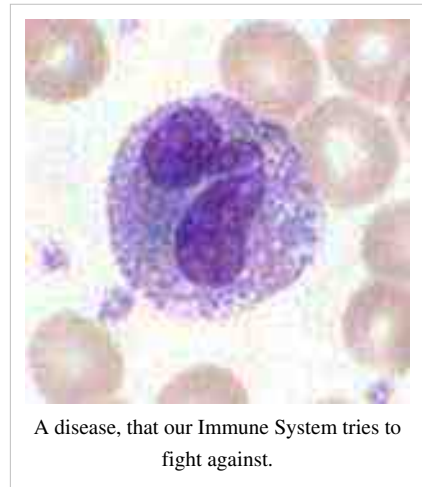
Wikijunior:Biology		
Urinary system	Printable version	Muscular system

Immune system

The **immune system** protects our bodies from disease. Cells called *white blood cells* found in our blood are able to kill bad things such as bacteria and viruses.

There are many different types of white blood cells. Some of them make things called **antibodies** that stick to things that enter our bodies making them easy to find. Other white blood cells get rid of bacteria and stop viruses like the flu.

When our immune system does not work well, we are vulnerable to disease caused by bacteria and viruses. Problems with the immune system include **allergies** where white blood cells attack things are not bad like pollen in our eyes or cat dander. **AIDS (Acquired Immunodeficiency Syndrome)** a disease caused by a virus that kills some white blood cells leaving our bodies vulnerable to bacteria or viruses.



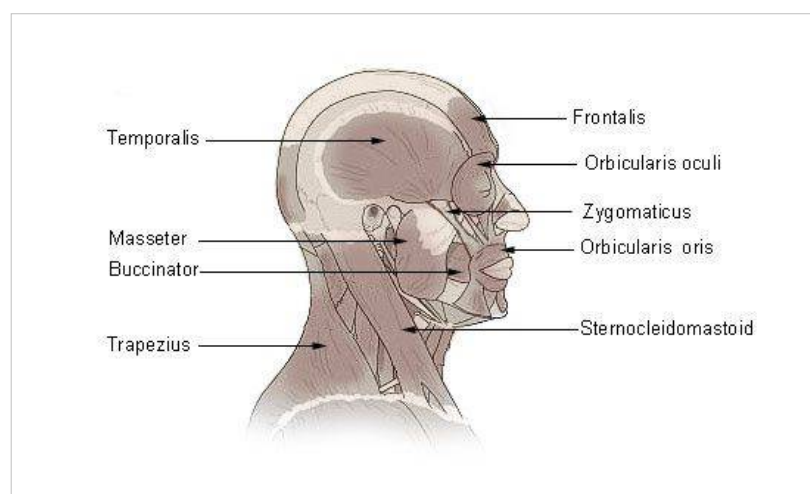
Wikijunior:Biology		
Immune system	Printable version	Skeletal system

Muscular system

The *muscles* of the body are what make the body move. They are made of muscle tissues.

All of the muscles of the body together make up the **muscular system**.

Signals from the nervous system tell the muscles when to move. The muscles are attached to the skeleton which holds them up.

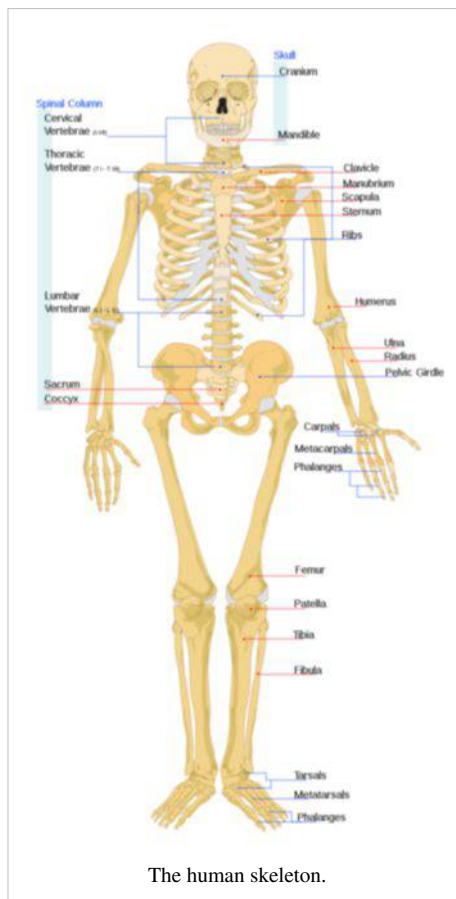


Wikijunior:Biography		
Muscular system	Printable version	Integumentary system

The Skeletal System

The **Skeletal System** is made of all of the bones in the body. It protects the reproductive organs and is a place for muscles to attach. Bones are a very important part of the human body. Without them, we would simply collapse, and be very unstable. They support all of our tissue and muscles, and they are very difficult to break.

The inside of the bones is called the *bone marrow*. This is where most blood cells are made.



Wikijunior:Biography		
Skeletal system	Printable version	Nervous system

The Integumentary System

The **Integumentary System** is the system of the body made up of the skin, the nails, and the hair.

Skin keeps you cool by sweating. It also protects you by keeping things out of your body. The hair on your body keeps you warm. Skin also holds nerves that we use to touch and hold and kiss. Your nails help you pick up things.

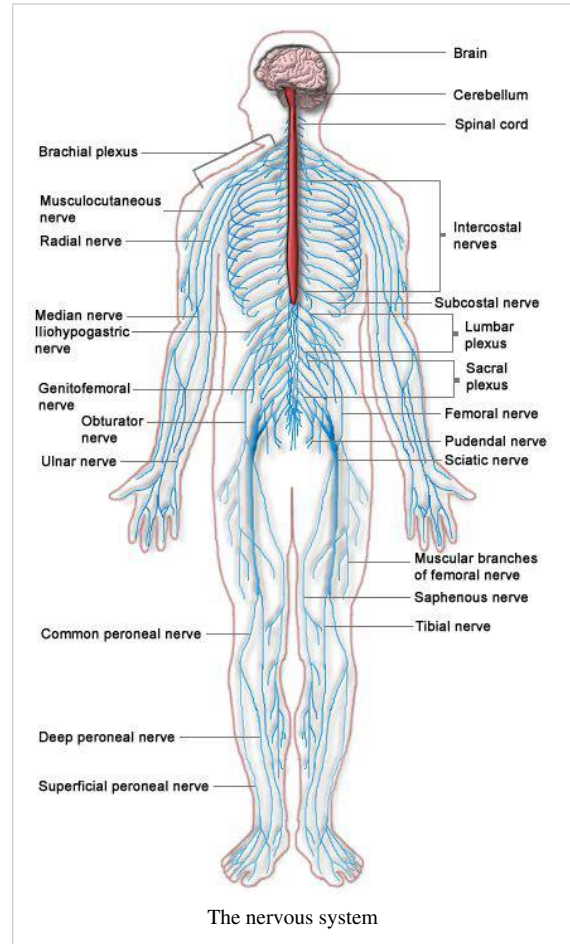


Wikijunior:Biography		
Integumentary system	Printable version	Senses

The Nervous System

The *nervous system* helps you sense the world around you. It includes the *brain* and the *nerves* as well as the senses.

The nervous system can sense changes inside and outside the body through specialized cells called *receptors*. This information in the form of small electric currents, is analyzed and responses are generated in the nervous system. These responses again, in the form of small electric currents are conveyed to the appropriate organs such as muscles or glands at a great speed.



Wikijunior:Biology		
Nervous system	Printable version	Kingdoms

The Senses

Your five **SENSES** are: *smell* (with your nose), *taste* (with your tongue), *touch* (with your fingers, etc.), *sight* (with your eyes), and *hearing* (with your ears).

If living organisms couldn't smell, they probably would it would be difficult for them to smell their food. If they couldn't taste, they would probably like to eat everything. If they couldn't see, they'd probably bump into a few things or so the first few days of being blind. And if they couldn't hear, they cannot talk to each other easily.



Wikijunior:Biology		
Senses	Printable version	Archaea

Kingdoms

When we look at living things we divide them up and give them names. This is called **classification**.

Living things are classified into groups. The biggest groups contain almost everything. The smallest groups will have only a few types of animals in it.

The groups are from Large to small:

Domain

Kingdom

Phylum

Class

Order

Family

Genus

Species

The domains are *Bacteria*, *Archea*, and *Eukarya*, but most people still find it easiest to divide things by **Kingdom**.

The six kingdoms are

/Archea/

/Bacteria/

Animalia (Animals)

Plantae (Plants)

Fungi (Funguses and mushrooms)

Protista (Protists and Algae)

Wikijunior:Biology		
Kingdoms	Printable version	Bacteria

Archea

Archea are creatures made up of single cells. They have been on Earth for a long long time. Their name means old.

Archea have no nuclei. They were once called bacteria, but they were taken out of the kingdom bacteria because they are so different.



Colorful archea

Wikijunior: Biology		
Archaea	Printable version	Protists

Bacteria

Bacteria are single celled creatures with no nucleus. They are very, very small. They grow all over the Earth, in the ground, in the water, and even in our bodies.

Some bacteria can cause diseases, but most do good things like break down waste and make *oxygen*.



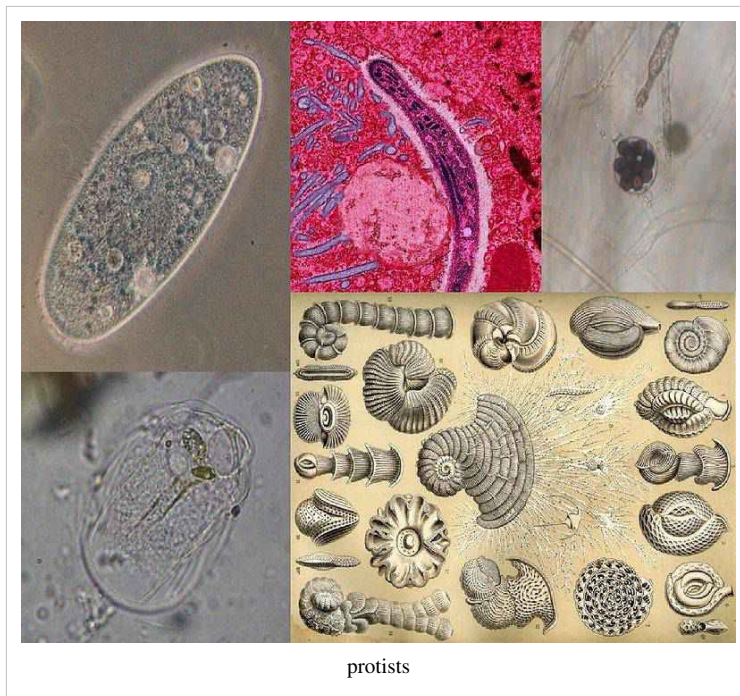
Wikijunior: Biology		
Bacteria	Printable version	Fungi

Protists

Most **protists** are made of single cells. They are bigger than archaea and bacteria, and protist cells have a nucleus.

There are many different kinds of protist cells. Most live in the water, but some live in the soil or in animals. Some protists can cause diseases.

Green Algae is in the family protista. These can be small single cells or very large with many cells. *Sea weed* is algae and is in the kingdom protista.



Wikijunior: Biology		
Protists	Printable version	Plants

Fungi

Fungi are mostly made of many cells. Fungi made of single cells are called *yeasts*.

Fungi are very important because they break down waste. The leaves on the bottom of a forest would get higher and higher if fungi were not there to eat it.

Fungi are also important producers of food for humans. Mushrooms are fungi. Also yeasts are used to make wine, beer, and bread. Some fungi are bad for our food, however, such as mould.



Shiitake mushroom

Wikijunior: Biology		
Fungi	Printable version	Photosynthesis

Plants

Plants are made of many cells. Plants are usually green. Plants make their food from the sun. They use the light to make sugar. Animals, Fungi, some bacteria, and some protists eat plants for food.

Plants make *oxygen* which humans breathe. They also provide shade. We make our houses from plants and make clothes from plants. Most food that we eat are plants. Without plants, animals could not survive.



Banana plant

Wikijunior: Biology		
Plants	Printable version	Animals

What is photosynthesis?

Photosynthesis is making sugar using the energy of light.

Why are plants green?

Plants are green because they have green Chloroplasts.

But why are Chloroplasts green? Chloroplasts are green because they contain the green pigment *chlorophyll* in their thylakoid membranes. Chlorophyll is a pigment that absorbs red and blue light.

Wikijunior: Biology		
Photosynthesis	Printable version	Viruses

Animals

Animals are made of many cells. They eat things and digest them inside. Most animals can move.

Animals are found all over the earth. They dig in the ground, swim in the oceans, and fly in the sky.

Humans are a type of animal. So are dogs, cats, cows, horses, frogs, and fish.

Animals can be divided into two main groups, vertebrates and invertebrates. Vertebrates can be further divided into mammals, fish, birds, reptiles and amphibians. Invertebrates can be divided into insects, and more.



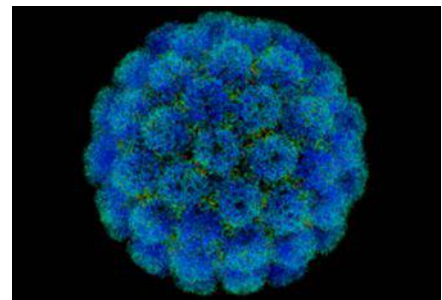
Ocelot, a cat

Wikijunior:Biography		
Animals	Printable version	Conclusion

Viruses

Viruses are much smaller than other living things like bacteria. Viruses are not alive. They do not do all of the things that living things do. They can only make more copies of themselves when they are inside living cells.

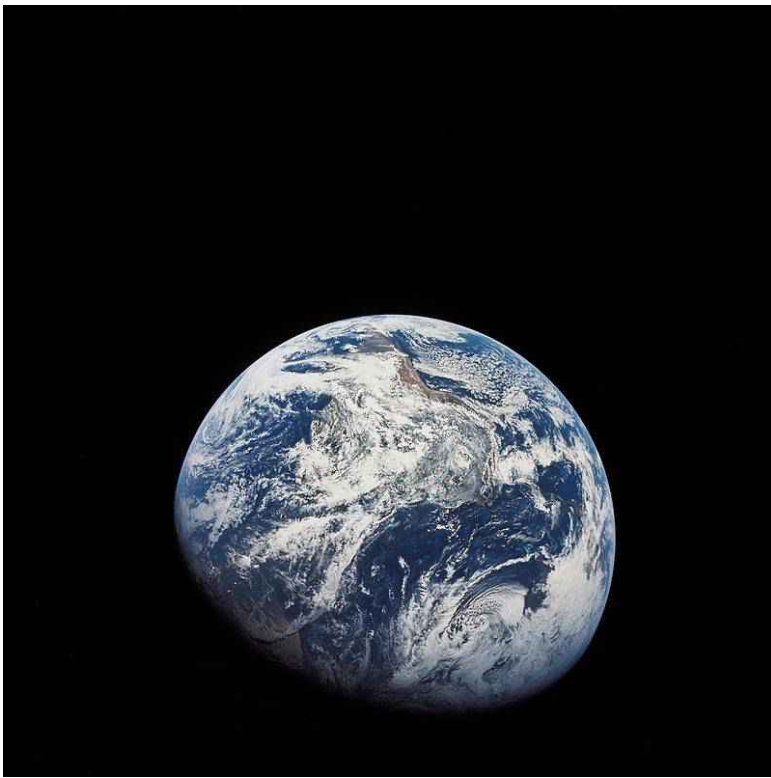
Viruses often kill cells. Many diseases are caused by viruses.



Virus

Wikijunior:Biography	
Viruses	Printable version

The End



The Earth is the home of life

Biology is the study of Life. Life is all around us.

It is good to learn about living things.

Know Life and know the world!

Know Life and know yourself!

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