

The building blocks of life

This week's Pop-up Science edition is about cells!

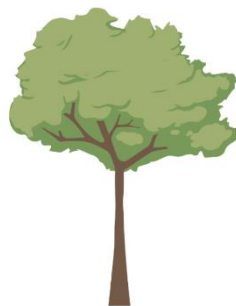
Did you know you can hear cells?

Not only living organisms like animals, humans or plants consist of cells, but also fruits and seeds. We can even hear cells in fruits!

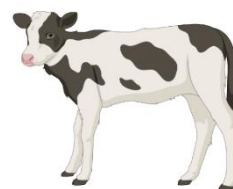
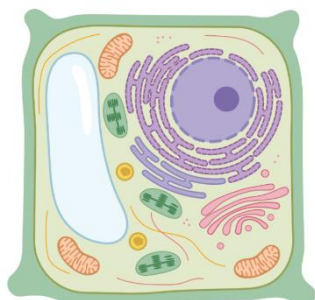
When you bite into an apple, you destroy the apple skin with your teeth. In addition, you bite off a part of the flesh of the fruit. The noise you hear is caused by the rupture of the connections between the cells. Also, many cells burst at the same time!



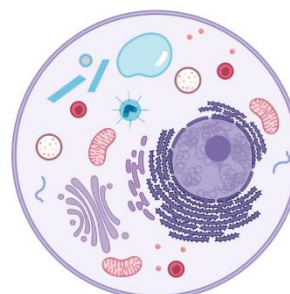
And here you can see how cells look like under the microscope:



This is how a
plant cell looks like:



This is how an
animal cell looks like:



A. Read the following text and underline the most important pieces of information.

Many living beings, such as animals or plants, consist of millions of cells. These creatures are also called multicellular organisms. The human body is composed of about 100 trillion cells. That is a one with 14 zeros!

Imagine a brick house. A house can only be built through the cohesion of many bricks. You can never build a whole house from a single brick! In the same way, many cells are needed when humans, animals or plants form.

But sometimes cells also occur all alone and form living creature on their own! The cell is then called a unicellular organism or single-celled organism.

Cells are the smallest building blocks of living beings. You can think of a cell as a peach. On the outside is the skin, that is the cell membrane. The peach stone is the nucleus. This is where the genetic information, the DNA, is stored. Where the flesh of a peach is, there is the cell plasma of the cell. This is a liquid in which other parts of the cell are stored, which provide energy or have other tasks.

Let us take a closer look at a unicellular organism. The bacterium *Escherichia coli*, for example, is a single-celled organism. Its name is often shortened to *E. coli*. In research, a lot of work is done with it. The reason is that it has a modest and relatively simple structure and it reproduces quickly. These are good properties for working with it in the laboratory.

Our small bacterium consists of only one cell. It does not even have a nucleus, but it can live independently! But what does *E. coli* need to survive?



- **Spatial organization.** Atoms and molecules in the bacterium form individual structures, such as flagella, which serve the bacterial cell as propellers for swimming.
- **Metabolism.** The bacterium needs energy to live. This energy is provided from food through chemical reactions and is used, for example, for growth.
- **Self-regulation.** Just as we need certain conditions to live, so does a bacterial cell. To a certain extent, it can take care of this itself, for example by transporting harmful substances to the outside.
- **Growth.** Just as you grow bigger and bigger, so can a single bacterial cell grow!
- **Reproduction.** When *E. coli* has grown enough, it divides in the middle. Through this, one cell becomes two cells!
- **Boundary to the outside.** Our body is covered by a protective layer. For example, our skin protects our organs from airborne germs. The unicellular *E. coli* has a so-called cell membrane and a thin cell wall instead of the skin as a protective layer to the outside. This is important because the bacterial cell is filled with cell plasma. If it had no cell membrane, the fluid would leak out!
- **Evolution.** Living beings sometimes change randomly. Over time, this helps species to adapt better to the environment.

Did you know that single-celled organisms were the first and only living beings on earth for a long time? Only after several billion years did some unicellular organisms merge to form multicellular organisms. With time, larger and larger multicellular organisms appeared, such as large plants, animals and also humans!

B. Try to answer the following questions.

Tick the correct answers.

1. How many cells does the human body consist of?

- Of about 100 thousand cells. That is a one with 5 zeros.
- Of about 100 million cells. That is a one with 8 zeros.
- Of about 100 trillion cells. That is a one with 14 zeros.

2. What do you call the smallest building blocks of life?

3. What is the full name of *E. coli*?

- Escherichia coli*
- Eukaryota coli*
- Enterobacter coli*

4. What do bacterial cells transport to the outside?

- flagella
- nucleus
- harmful substances

5. Multicellular organisms were the first living beings on earth.

- true
- false

6. Special question: Can you remember what is NOT a living being? We covered this topic in the Pop-up Science program about six weeks ago!

What is NOT a living being?

- a plant
- a virus
- an insect

C. Word search

Can you find all the hidden words in our word search this time?

UNICELLULAR

GROWTH

LIVINGBEING

MULTICELLULAR

REPRODUCTION

SELFREGULATION

ORGANIZATION

FLAGELLA

ESCHERICHIACOLI

METABOLISM

EVOLUTION

BUILDINGBLOCKS

Circle each word! Have fun!

S	B	V	S	H	E	D	N	Z	Z	I	O	A	R	U	U	T	X	E	L
L	Y	L	M	I	G	J	G	F	U	E	K	W	N	C	O	P	C	A	D
E	M	F	W	H	J	O	C	R	I	P	S	J	Y	G	G	T	H	A	A
N	F	I	L	O	C	A	I	H	C	I	R	E	H	C	S	E	P	N	W
K	U	S	E	A	H	D	C	C	F	T	B	J	M	L	F	E	N	O	C
Z	G	K	A	R	G	A	Y	X	G	I	E	J	R	P	F	H	T	I	I
Z	N	C	X	B	S	E	A	B	F	Z	N	E	Z	F	Z	X	M	T	K
M	I	O	D	O	H	X	L	B	L	M	X	V	S	H	T	S	U	C	C
S	E	L	F	R	E	G	U	L	A	T	I	O	N	U	L	D	L	U	P
L	B	B	E	G	U	V	R	I	A	R	N	L	Q	L	X	Q	T	D	U
Z	G	G	D	A	T	N	I	O	T	X	S	U	S	Q	W	M	I	O	M
L	N	N	G	N	J	L	I	E	W	J	N	T	B	M	D	F	C	R	I
E	I	I	M	I	H	N	U	C	N	T	Z	I	Z	S	K	E	E	P	P
C	V	D	P	Z	A	L	B	L	E	N	H	O	D	Q	C	V	L	E	F
U	I	L	I	A	K	G	G	I	O	L	Y	N	O	Y	M	H	L	R	S
Y	L	I	B	T	T	K	D	W	N	Y	L	D	D	Q	N	A	U	G	G
H	R	U	K	I	A	A	Q	E	Q	W	K	U	H	I	G	D	L	Z	E
S	A	B	O	O	V	O	H	Z	S	Y	H	L	L	Z	Z	C	A	H	R
H	Y	N	K	N	I	K	M	S	S	X	N	U	K	A	F	L	R	Q	L
T	A	L	N	M	E	T	A	B	O	L	I	S	M	L	R	S	Z	W	T

D. Color the cells. Have fun!

