Key words and definitions that you should be familiar with before studying the subject CELL BIOLOGY. We assume you know all this based on your earlier studies.

Absorption: Retention (binding) inside a material (e.g. light energy is absorbed by chlorophyll). Also: The process by which nutrients enter the body fluid through the epithelial cells of the intestinal wall. Nutrients are then transported to the organs and and tissues by the body fluid.

Actin: It is a protein found in all eukaryotic cells as a major constituent of the microfilaments (thin filaments) that make up the cytoskeleton. The thin filaments are composed of two intertwining actin filaments, each assembled from small spherical actin units.

Action potential: A characteristic change in voltage between the two sides of the cytoplasma membrane (cell membrane).

Active center: Part of the enzyme where the catalyzed reaction takes place.

Active Immunization: The type of artificial immunization in which the immune system itself provides the elements of defense against the foreign antigens.

Active transport: The flow of material through biological membranes (cytoplasma membrane, intracellular membranes) from the side with lower concentration to the other with the higher concentration*. The transmembrane proteins that perform this transport need energy. During the transport process, the difference in concentration between the two sides of the membrane increases with respect to the actively transported material. The energy demand of the process is usually borne by ATP hydrolysis. (* Besides concentration, the charge of transported particle may also contribute to deterimining the actual direction of transport)

Adaptive (acquired) immunity: Function of lymphocytes (B and T cells) that provides specific protection against foreign materials during the life of an individual, including the establishment of immunological memory.

Adequate stimulus: The type of stimulus for which the receptor in question has the lowest activation threshold.

Adrenal cortex hormones affecting carbohydrate metabolism: Glucocorticoids are steroid hormones, which enhance breakdown of proteins, stimulate conversion of lactic acid (a product of aminoacid metabolism and glycolytic fermentation) to glucose. They inhibit the use of glucose in muscle and adipous (fat) tissue. As a result, they increase blood glucose levels. Their production is controlled by the pituitary gland with negative feedback.

Adrenal cortex sex hormones: The adrenal cortex produces both male and female sex hormones in both sexes, but the androgens (male-type hormones, anabolic steroids) in much larger quantities. Androgens enhance the growth of skeletal muscles and bones and promote the formation of a male body. Their effect is exerted in conjunction with the hormones produced by the gonads.

Adrenaline (epinephrine): An amino acid derivative produced in the medulla of the adrenal gland, a hormone with a general effect, affects almost every cell of the body. It is one major means of the nervous system to produce the fight or flight response of the body. It stimulates breakdown of glycogen in the liver, and fats in adipous tissue. Raises the blood sugar level. Enhances the blood supply to the heart, lungs and working muscles. Its production is regulated directly by the nervous system.

Adsorption: Binding to the surface by primary or secondary chemical bonds (e.g., the protein molecule binds water to its surface to form a hydrate envelope).

Aerobic: A process that requires the presence of oxygen in the air or a living organism whose metabolism requires oxygen.

Albinism: A condition originating from lack of the natural dye melanin. Albino individuals have a homozygous recessive genotype which means that one of the enzymes required for the

synthesis of melanin is absent from their cells, because both copies of the gene coding this enzyme are faulty.

Aldehyde (group): A functional group of organic compounds in which an oxygen (= O) and a hydrogen (-H) atom are each directly bonded to the carbon atom by covalent bond. Between carbon and hydrogen there is one pair of electrons, and two pairs between the carbon and the oxygen.

Alkaloid: Nitrogen containing organic compounds with complex (macrocyclic or polycyclic) ring structures. Natural alkaloids can be extracted from plants.

Allele: A gene variant.

Allergy: An illness caused by excessive immune response to harmless antigens.

Amino acids: Molecules containing amino and carboxyl groups. In α-amino acids, the amino group is attached to the α-carbon of the carboxylic acid chain. The proteins of most living cells are built from 20 different α-amino acids.

Amnion (caul): The inner sack surrounding the fetuses/embryos of reptiles, birds and mammals which protects them during development.

Amoeboid movement: Occurs by generating cytoplasmic protrusions (see also pseudopodia). Extension and retraction of the pseudopodia are due to the reversible polymerization and depolymerisation of actin subunits. Amoeboid movement requires fixing the cell to the substrate at certain points called cell adhesion sites. Adhrerence of the cell membrane to the substrate is strongest at newly formed protrusions, while it is gradually eliminated at the older ones and those opposite to the direction of the movement, allowing the cell to move.

Amphipathic Molecule: Molecules (ions) containing apolar and polar (or ionic) moieties are called amphipathic substances. Such molecules are e.g. the phospholipids. Amphipathic molecules in water (or in other polar solvents) - based on the similar solves similar principle - are turned towards each other by their apolar (hydrophobic) hydrocarbon chains forming a micelle.

Amylase: A digestive enzyme acting in the oral cavity and the small intestine, which can be found in the saliva (salivatic amylase) and pancreas (pancreatic amylase). It hydrolizes starch and glycogen to smaller units: oligosaccharides or maltose. Active in neutral or alkaline solutions.

Anabolic: A process which requires energy and builds up more complex structures from simpler/smaller structures (e.g. in metabolism).

Anaemia: A pathological condition in which there are either too few red blood cells (erythrocytes) in the blood, or the red blood cells do not contain sufficient amount hemoglobin for supply enough oxygen to the tissues.

Anaerobic: A process or a living organism that does not require oxygen from the air.

Anaphase: A phase of mitotic or meiotic cell division. In the anaphase of mitotic cell division, sister chromatids are separated and begin migrating to the opposite poles of the dividing cell. In the first anaphase of meiosis, homologous chromosomes get separated and migrate to the opposite pole. In the second anaphase of meiosis, the sister chromatids are separated, as in the mitosis.

Aneuploid: It is characterized by a nucleus, a cell or an organism in which one or more chromosomes have been lost or added to the entire chromosome assembly, so that the entire chromosome number is not the exact multiple of the haploid number (n), for example 2n + 1 (see trisomy and Down syndrom) or 2n-1 (see monosomy).

Antibiosis: Interaction between populations, which is indifferent to one party and disadvantageous to the other party. There is such a link between antibiotic-producing molds and bacteria

Antibiotic: Compounds produced or synthesized by some microorganisms that inhibit the metabolism of bacterial cells and therefore kill them or inhibit their growth. One of the most well-known antibiotics is penicillin produced by penicillium fungi.
Antibiotic resistance gene: A gene encoding the amino acid sequence of an enzyme destroying a specific antibiotic. The cells containing the gene are resistant to the antibiotic.
Antibody (immunoglobulin): A complex protein produced by B lymphocytes (more precisely plasma cells) during the immune response that specifically binds to a given antigen.
Anticodon: The base triplet (trinucleotide) of the transfer RNA (tRNA) molecule that is capable of forming base pairs (see base pairing) with specific trinucleotide sequences on the messenger RNA (see codon).
Antigens: Substances against which the body's defense system, the immune system, mounts an immune response. They may be bacteria, viruses, cancer cells dividing abnormally, or proteins, cells, tissues, etc. from another organisms. Macrophages and lymphocytes distinguish between their own and the foreign cells based on molecules on their cell surface.
Apolar: A molecule or part of a molecule that does not undergo charge separation. Therefore it does not enter into significant interaction with water.
Asexual reproduction: A form of reproduction when the offspring is not produced from the zygote arising from fertilization. For example, the division of unicellular organisms, or budding. The offsprings inherit the characteristics of the single parent.
ATP (Adenosine triphosphate): A nucleotide containing adenine, which is a vital source of chemical energy in all living organisms. Adenine is bound to a D-ribose (making an adenosine) and the D-ribose also carries three phosphate groups linked with linear covalent bonds. The second and third phosphate groups are linked with a high energy acid anhydride bond. Because of this latter feature, ATP is capable of storing energy, which can be used by cells.
Autotroph: A living entity that produces organic nutrients for its life by using simple energy (light or chemical) from simple inorganic substances (carbon dioxide, water, mineral salts). Autotrophic organisms that utilize light are photosynthetic and those that use chemical energy are chemosynthetic organisms.
Axon: The longest projection of the nerve cell, originating from the axon hillock of the cell. A neuron has only one axon, as opposed to usually having several dendrites. The length of the axon varies greatly depending on the type of neuron: it may be very short and branched (eg, associative neurons in the brain) or very long like in the spinal cord, such as the pyramidal tract from the motor cortex or the nerves running to the extremities from the spinal cord.
Bacteriophages: Viruses that have a bacterial cell as a host cell. There are DNA and RNA-containing bacteriophages.
Basal body: A structure at the base of cilia or flagella of eucaryotic cells which has a dual function. On the one hand, it promotes the assembly of the axoneme – the inner core of the cilium or flagellum – from microtubules and auxiliary proteins. On the other hand, it anchors the cilia and flagella.
Base pairing rule: In nucleic acids, the following bases are paired under natural conditions: G≡C, A=T, A=U.
B-cell (B-lymphocyte): A type of white blood cell (lymphocyte) that is differentiated in the lymph nodes and other lymphatic organs. It is involved in the antibody mediated immune response.
Biological membrane: A phospholipid double layer, with protein, and carbohydrate structures found in every living cell, it both separates and connects the cells to is environment.
Biological oxidation: A degradation process in aerobic (oxygenated) environment, which oxidizes the carbon atoms of organic matter into carbon dioxide, and its hydrogen atoms into water.

Blood: Connective tissue with a fluid intercellular material.This body fluid flows around in a closed circulatory system made of blood vessels. In vertebrates, it consists of blood plasma and cells (red blood cells, white blood cells).
Blood glucose level: The glucose concentration (normally about 5 mmol/dm^3) in the blood plasma.
Blood Serum: Fibrinogen free (fibrin free after clotting) blood plasma.
Blood type: The characteristic feature of red blood cells, provided by multiple types of complex cell surface proteins. Knowing of AB0 and Rh blood groups is essential for blood transfusion.
Carbohydrates: Polyhydroxy oxo compounds: polyhydroxy aldehydes (aldoses) or polyhydroxy ketones (ketoses). Based on their molecular structure they can be divided into three major groups: monosaccharides (which can not be decomposed into simpler sugars with acid hydrolysis), disaccharides and oligosaccharides (complex carbohydrates consisting of two or a few monosaccharide molecules) and polysaccharides (giant molecules consisting of a very large number of monosaccharide molecules).
Carboxylic group: A functional group of organic acids in which a hydroxyl group (-OH) and an oxo (= O) are attached to the carbon atom. It behaves as an acid in water, that is, as a proton donor.
Catabolic: A breakdown (degradation) process.
Catalysts: Materials that facilitate chemical reaction by decreasing activation energy. They are restored to their original state by the terminaton of the reaction. In the living system, they can be proteins (enzymes) and ribonucleic acids (ribozymes).
Cell: The smallest, independent living and reproducing entity of the biosphere.
Cell breathing: The process of degradation of organic matter in cells, in the presence of oxygen. During the process, carbon dioxide, water and various decomposition products are formed. The energy content of organic matter is transformed into the chemical energy and heat needed for life.
Cell cycle: The life of eukaryotic cells, which lasts from the formation of the cell to the next cell division. It can be divided into two phases, the resting period and the subsequent cell division. The resting period can be further divided into three phases: first growth phase (G1), synthesis phase (S), second growth phase (G2).
Cell death: Death of the cells of multi-celled organisms. The two main forms of cell death are necrosis, which is caused by damaging factors, is not genetically programmed and has no developmental significance, and programmed cell death (apoptosis) which occurs with the active involvement of the cell often in a genetically determined manner.
Cell membrane (cytoplasma membrane): Slim, elastic membrane bounding the cell from the outside, consisting of a lipid bilayer. Membrane proteins embedded into or attached o this bilayer regulate the absorption and release of materials. The membrane separates the cell from its environment, but also connects it with it. It is typical of every cell type.
Cell wall: The cellular component on the outer side of the cell membrane, which strengthens and protects the cell. It is characteristic of prokaryotes, cells of plants and fungi. Its most important strengthening component in plants is cellulose.
Cellular immune response: Cellular immune responses is mainly implemented by macrophages, natural killer (NK) and T cells. Upon appropriate stimulus (e.g. the penetration of pathogens, chemotactic substances secreted by activated macrophages) other cellular elements can migrate to the affected tissues and participate in the inflammatory response.
Central dogma: In living systems, the flow of genetic information is unidirectional and follows the path: DNA → RNA → protein → property (phenotype).

Central nervous system: The central nervous system consists of the brain and spinal cord. The brain is protected by the skull, the spinal cord is protected by the spinal coloumn. Both are covered by the meninges.

Centrosome: The centrosome is a cytosolic structure in most cells. It is close to the nucleus and plays a role in cell division. The centrosome consists of two cylindrical centrioles made of 9 × 3 microtubules eachm, perpendicular to each other, surrounded by the pericentriolas material.. Centrosomes are doubled before the cell division, and the mitotic spindle develops between them.

Chemical synapse: The connection of the neuron with another cell (nerve cell or other cell) in which the stimulus is transmitted by chemical substances. As a result of its stimulation, the presynaptic nerve secretes chemicals (neurotransmitters) that pass through the synaptic gap and stimulate or block the postsynaptic cell.

Chemiosmotic theory: It is about ATP synthesis in mitochondria. As the electrons are transported through the electron transfer system in the internal mitochondrial membrane, a proton concentration difference is created between the two sides of the membrane. The movement of protons along their gradient back to the mitochondrial matrix produces ATP.

Chemosynthesis: Autotrophic metabolism. Chemosynthetic organisms gain energy from the oxidation of substances in their environment to build their organic compounds. Nitrifying bacteria, for example, convert ammonia into nitrates. All chemosynthetic organisms are prokaryotic.

Chloroplast: Organelle found in the cytoplasm, which is the site of photosynthesis. Its internal membrane forms an extensive membrane system, which binds chromophores (color substances) that can absorb the energy of light, e.g. the green chlorophyll and the yellow carotenoids. It is present in eukaryotic autotrophic cells, i.e., algae and plants. According to its endosymbiotic origin, chloroplasts also contain DNA, RNA and ribosomes. As a result, they are capable of autonomous protein synthesis and even division within the cell.

Chromatid: It is made up of a DNA double helix and the proteins attached to it. Prior to cell division, the gene pool of the cells is doubled and chromosomes, made of two chromatids are created. In the anaphase of the mitotic cell division and in the anaphase of the second stage of meiotic cell division, these chromatids (sister chromatids) are separated from each other (see mitosis, meiosis), again resulting in single-chromatid chromosomes.

Chromatin: The material in eukaryotic chromosomes. It consists of proteins (mainly histones), DNA, and small amounts of RNA.

Chromatography: A technical process for the chemical analysis and separation of gases, liquids or solutes (such as amino acids).

Chromosome: Basic units of the cell's chromatin. The structure and function of chromosomes vary during the cell cycle. In G0/G1 phase, chromosomes are constituted of one chromatid each, their function is to serves as template for transcription. In S phase, chromosomes with two chromosomes are formed, which during cell division condense to form metaphase chromosomes. The two chromatids are connected at their centromeres. Within a chromosome, the two chromatids have the same DNA sequence since they were produced by replicating the original single chromatid.

Cilium: Thin cylindrical cell protrusions of about10 micrometers in length, covered by the cell membrane, chich occur on the surface of certain unicellular organisms or e.g. of human epithelial cells. They are shorter than the flagellae of eukaryotes, which otherwise has the same microstructure.

Citric Acid Cycle (Szent-Györgyi-Krebs Cycle): The phase of biological oxidation in which the acetyl group is converted into carbon dioxide and hydrogen.

Clone: Individual with the same genetic composition as the parent. It is produced by asexual reproduction.

Coagulation: A process in which colloidal particles aggregate irreversibly.
Codon: A base triplet of mRNA molecules that determines an amino acid of the synthesized protein. The codons constitute codon dictionary.
Coenzyme-A: It is a complex organic compound that co-operates with enzymes that catalyze various biochemical reactions. Coenzyme-A consists of several simpler organic compounds: pantothenic acid (a vitamin B), an adenine base, a ribose and phosphate group.
Collagen: A water-insoluble fibrous protein found among others in the connective tissue of the skin, the tendons and the bones. Most collagen fibrils have high tensile strength, and low elasticity.
Colloidal solution: The type of aqueous solutions in which the dissolved particles have a size between 1 and 500 nanometers (nm). Colloidal particles have a large surface area (unit area per unit weight), so they easily bind on their surface (adsorb) various materials. Colloidal solutions are formed by polar macromolecules such as proteins and nucleic acids in the cell.
Complement system: A group of proteins present in the bloodstream and tissue fluids that are capable of activating one another in a chain reaction and thus help protect the body during immune response. The complement reaction products attract the white blood cells to the place of the immunological conflict in the body.
Complex protein: A protein which has a non-protein component attached to the polypeptide chain. A complex protein is, for example, hemoglobin with an iron containing hem group.
Compound enzyme: Protein (apoenzyme) + non-protein component (cofactor) = holoenzyme.
Compound: The product of binding the atoms of at least two different elements.
Connective tissues: Tissues containing large amounts of intercellular material (extracellular matrix). Connective tissues fill the spaces between the organs, provide for nutrition and material exchange (e.g. blood), store nutrients (e.g. fat). Special connective tissues support and solidify the body, e.g. cartilage and bone.
Covalent bond: A primary chemical bond formed by a shared pair of electrons that occupy a molecular orbital.
Cyanobacteria: Photosynthesizing ancient prokaryotes that first produced oxygen for earth's atmosphere. There are unicellular and multicellular species among them. Their cells lack chloroplasts; their pigments are bound to the cell membrane.
Cyclic AMP (cAMP): Cyclic adenosine monophosphate, a derivative of ATP, which is a secondary messenger, very common in animal and human cells. It is formed from ATP in the reaction catalyzed by adenylate cyclase enzyme which is on the inside of the cytoplasma membrane.
Cytochromes: Complex iron containing proteins, in which the iron is contained in the molecule called hem, similar to haemoglobin. The central iron ion of the hem can undergo redox reactions: reduced by electron capture or oxidized by electron emission ($Fe3^{3+} + e \rightarrow Fe2 +$). Cytochromes are members of the enzyme systems of both the terminal oxidation and of photosynthesis.
Cytolasma (cell plasma): A gelatinous material that fills the cells where the cell's metabolic processes take place. Characteristic of all cells.
Cytoskeleton: It is made up of filamentous proteins that provides mechanical stability for the cells and restricts the organelles. It is involved in intracellular transport processes, cell movement and cell division. It consists of filaments of various thickness (microtubules, microfilaments, intermediate filaments).
Cytosol: The bulk cell plasma, containing the various components of the eukaryotic cell. This includes the cytoskeletal proteins, enzymes used for protein synthesis and glycolysis, etc.. It also contains cell organelles such as nitochondria and the Golgi apparatus.

Cytotoxic (killer) T-Cell: A type of lymphocytes which differentiates in the thymus. It is involved in the cellular immune response. It destroys virus-infected cells, cancer cells, and cells of foreign organs, tissues (e.g. transplanted organs).
Delocalized bond: A covalent bond in which the bonding electron pair belongs not to two, but to more than two atoms.
Denaturation: A change in the spatial structure of proteins that results in the loss of their biological activity.
Dendrite: The branching protusion of nerve cells (neurons). Their internal structure and membrane are the same as for the cell body. Neurons can have one or more dentrites. Most of the axon terminals arriving at the nerve cell form synapses with the dendrites, from which the resulting stimulus spreads to the neuronal body, then possibly also further to the axon.
Deoxyribonucleic acid (DNA): The hereditary material of cells is constructed of two polynucleotide chains, which form a double-helix structure. In the nucleotides constituting the DNA, the sugar is deoxyribose and the nitrogenous bases are adenine (A), cytosine (C), guanine (G) and thymine (T). In the helix, the two chains are bound together by the hydrogen bonds formed between the complementary bases (see base pairing; between A and T there are two hydrogen bonds between G and C there are three). The base order of one strand clearly defines the other. DNA molecules differ in the base sequence of the polynucleotide chains. The role of DNA is the storage and transmission of information into the daughter cells and indirect control of protein synthesis.
Differentiation: The process in which cells evolve into tissue constituting cells that have diverse forms and functions.
Diffusion: A material flow (occurring without external forces) due to the displacement of particles caused by thermal movement. In solutions and in gaseous mixtures, if there is a difference in concentration and / or temperature, it is erased by diffusion.
Diploid: The cell or organism in which the chromosome set is double, i.e., there are 2 copies of each chromosome in the nucleus, which can be arranged in homologous pairs. The body (somatic, non-germ) cells of higher organisms are diploid. Human diploid body cells contain $2n = 46$ chromosomes.
Disaccharide: A sugar molecule consisting of two simple sugars (monosaccharides) linked together with glycoside bonds. Maltose and cellobiose (the base unit of cellulose) is formed by the binding of two glucose molecules. A glucose and a fructose are linked to form sucrose (also called cane sugar) and a glucose binds to a galactose to form lactose.
Dispersion: Scattering the material into smaller parts.
Dispersive Interactions: Weak secondary bonds between nonpolar molecules or parts of molecules.
DNA biosynthesis (semiconcavative replication): The process in the nucleus, in which the DNA molecules are duplicated, producing two identical chromosomes of the same sequence in an semi-conservative manner. The latter means that during the process, along both DNA strands, a new complementary DNA strand is created using the old one as a template. The steps of the process are: 1. Activation of nucleotides using ATP. 2. unwinding of DNA strands (formation of the replication fork). 3. Incorporation of activated nucleotides following the base pairing rule. 4. DNA polymerase cleaves the two phosphates to link the nucleotide to the previous one (progresses in 5 ' to 3' direction). 5. Corrective enzymes eliminate any possible defects. 6. The DNA molecules assume their superhelical structure. The process is completed on the entire length of DNA. This process is the basis for transferring information from one generation to the next.
DNA: See deoxyribonucleic acid
Dominant allel: A variant of a gene that clearly defines the allelic phenotype in a living being with heterozygous genotype.

Dorsal horn: The part of the grey matter of the spinal cord facing the back of the body. This is where the sensory fibers of the dorsal root arrive and are switched over to interneurons.
Down syndrome: Cause by an additional chromosome 21. This is the most common of chromosome number disorders (see also aneuploidy). The consequence is abnormal development of various organ systems (cardiac problems, weak immune system, low muscle tone, etc.).
Dynamic equilibrium: If different types of processes that have different directions and affect each other each proceed at an appropriate rate, an observed quantity, even though it may continuously change to some extent, will fluctuate around a constant value.
Electric synapse: In electric synapses the stimulus (as an electrical signal) directly spreads from one neuron to another as the two cellular membranes are very close to each other and between them connections of very low electrical resistance (gap junctions) are formed.
Electron transport system: A series of redox enzymes that converts the energy of the transported electron to ATP (in terminal oxidation, and the light phase of photosynthesis).
Electrophoresis: A group of methods for analyzing and separating mixtures of various molecules, based on the movement of charged particles and molecules in an electric field. The rate of particle migration depends on the charge, size and shape of the particles, in addition to the electric field strength.
Embryo: The name of the developing offspring from fertilization to the 12th week of development (ontogenesis). By the end of this period, the final form of the body and the internal organs are formed.
Embryonic development: The stage of animal development (ontogenesis) that begins with fertilization, that is, the formation of the zygote, to birth or emergence from the egg.
Emulsification: Dispersion of liquid in liquid (e.g, oil in water). The result of this operation is the emulsion.
Endocrine signaling: The form of communication (signaling) inside the multicellular organism which is mediated by hormones secreted into the blood stream by glands to reach also the distant cells of the body. The glands are called endocrine glands.
Endocytosis: Inclusion of foreign material by eukaryotic cells in which the substance to be taken up is packaged in a portion of the cell membrane. During the process, the cell membrane invaginates (folds inwards), then pinched off to form a membrane-bound vesicle in which a piece of the outer world is contained inside the cytoplasm. The process of engulfing dissolved substances into the cells is called pinocytosis. If the particles incorporated are larger, such as cells or cellular debris, we talk about phagocytosis. A special form of endocytosis is receptor-mediated endocytosis when the substances are bound to their receptor in the cell membrane and are thus selectively taken up by the cell.
Endoplasmic reticulum (= ER): Intracellular membrane system characteristic of eukaryotic cells located in the cytoplasm near the nucleus. The surface of the rough ER (RER) binds ribosome, which synthesize proteins that need to be in the membrane or in the interior (=lumen) of the RER, where their final structure is obtained, and are further modified. Then they are packaged into vesicles and transported to the Golgi apparatus. The smooth ER (SER) lacks ribosomes, it is important for metabolic reactions, including the synthesis of phospholipids and fatty acids, and various detoxification processes.
Endosymbiosis theory: Evidence supports the idea that mitochondria have evolved from ancient aerobic bacteria endocytosed by primitive eukaryotic cells and establishing a long-lasting symbiosis with each other, while the origin of the chloroplasts followed the same principles, but with incorporation of ancient cyanobacteria.
Enzyme (biocatalyst): A protein that assists in carrying out a particular biochemical reaction or reaction type.

Epithelial tissues: Epithelial tissues cover the outer and inner surfaces of the body. Their cells closely attach to each other with hardly any intercellular material. Their nutrition originates from the underlying connective tissue. Depending on the structure they can be single-layered and multilayered. Regarding their function, they can be protective, glandular, absorbing and sensory epithelia.
Esters: Compounds formed from compounds with a hydroxil group (alcohols, carbohydrates) and organic or inorganic acids in a condensation reaction (water is a side product of addition).
Estrogen: A steroid hormone produced in the follicular epithelium of the ovaries and in the carcinomas and the corpus luteun. During sexual maturation, it contributes to the development of a feminine body (secondary sex characteristics). In adults, in addition to sexual function, it also regulates cellular metabolism. At the beginning of the menstrual cycle, it causs the epithelial cells of the uterus to divide.
Euchromatin: Euchromatin is a type of chromatin with a looser structure, mostly centrally located in the nucleus. It contains transcriptionally active genes that are transcribed into mRNA.
Eukaryote: Those living organisms that have in their cells a nuclei separated from the cell plasma by a membrane, have a structured internal membrane system (nuclear membrane, endoplasmic reticulum, mitochondria, etc.) and cytoskeleton. Most of the organisms belong to this group (unicellular eukaryotes, plants, animals, fungi).
Excitatory synapse: In excitatory synapses, the presynaptic cell releases excitatory neurotransmitters (e.g. acetylcholine) that induce the depolarization of the postsynaptic cell membrane and thus promote the propagation of the action potential.
Excretion: Elimination of metabolic byproducts that cannot be further utilized by the organism.
Exocrine: The substance produced by a gland is secreted into the outside world.
Exocrine gland: A gland whose secretion is discharged (through a discharge tube) into the lumen of a hollow body (e.g. gut) or to the surface of the body (e.g. sweat glands).
Exocytosis: An excretion process in which membrane vesicles containing the substance to be excreted are bound to and then merge with the cell membrane to dumpt their contents into the extracellular space.
Exon: Exons are sequences of genes that code part or all of the gene product. In eukaryotes, the exons are separated by non-coding sequences called introns. During transcription, the introns are also transcribed as messenger RNAs, but are subsequently cut out from the transcript before translation.
Extracellular digestion: The process of breaking down into their building blocks the larger organic molecules ingeted with food in the intestinal cavity using excretion of digestive glands. It is typical for animals with tissues and organs.
Facilitated diffusion: Specific proteins help transfer certain substances (e.g. ions, glucose, some medicines) through biological membranes (cell membrane, membrane of cell organelles). The process does not require direct energy input from the cell. The process allows for the transfer of materials through the membrane that otherwise would not pass through.
Fatty acids: Long chain (C12-24), saturated or unsaturated carboxylic acids (naturally occurring ones have an even number of carbon atoms).
Fertilization: The process where the sperm and the oocyte are united during sexual reproduction. The offspring begins to develop from the zygote, the cell created by the fusion of the gametes.
Fetus: The name of the offspring from the 12^{th} week until birth.
Flagellum: Provides motility for certain cell types. Compared to the size of the cell, it is rather long and there is one, or at most a few per cell. The flagella of eukaryotic and prokaryotic cells are different in their structure and composition.

Fruit fly: Belongs to the genus Drosophila. In classical genetics it is a popular experimental subject, as it is rapidly reproduced, easy to maintain, and examine. It has only four pairs of chromosomes in its body (somatic) cells.
Functional group: The part of organic compounds that contributes to determining the properties of the molecule.
Gamete: Sperm or egg. A cell created for sexual reproduction by multicellular organisms that, during fertilization, merges with its counterpart to create the zygote. Gametes are haploid (n), therefore they contain only half of the chromosome number of the somatic cells.
Gel state: A gelatinous state in which the colloidal size macromolecules / particles form a three dimensional structure supported by primary or secondary chemical bonds and the gaps within this structure are filled with molecules of the medium (e.g. water). An example would be jelly.
Gene: A section of the cell's hereditary substance, DNA, which determines the amino acid sequence of a protein, and thereby a property of the organism.
Genome: The total genetic material stored in a living being.
Genotype: The sum of the information stored in the genetic material of the cell or organism. Also referred to as a genotype is the ensemble of individual alleles in an individual that determine a given trait.
Gland cell: A cell that produces some secretion and dumps it into its environment.
Glial cell: The cells of the nervous system that support the neurons. They form insulating myelin sheaths around the axons of the central nervous system, preventing the unwanted transmission of impulses between adjacent neurons. The functions of glial cells include the nourishing of neurons and maintaining the biochemical composition of the cerebral fluid.
Globular structure: The spatial shape of protein molecules (their tertiary structure) can be globular (spherical) or fibrous (fibrillar). Globular proteins are sufficiently compact, rounded molecules and are usually water-soluble. They may include alpha-helices and / or beta-sheets. Proteins of globular structure include enzymes, immunoglobulins, hemoglobin, casein in milk or albumin in egg white, as well as certain hormones (such as growth hormone).
Glycogen: One of the homogeneous polysaccharides (glycans) in which glucose molecules polymerize with 1,4- and 1,6-glycosidic bonds; therefore its chains are branching. Small amounts are found in almost all animal tissues, but larger glycogen stores are found only in liver and muscle cells.
Glycolysis: A common stage of degradation processes in which pyruvic acid is formed from glucose. It is an oxidizing process in the cytoplasm of the cell which yields ATP and NADH.
Golgi: An organelle usually located near the nucleus consisting of stacked flat membrane bags and cisterns. It has polarized, well-segregated sub-compartments with distinct sets of enzymes. Its function is to further modify the proteins that arrive from the endoplasmic reticulum (post-translational modification, e.g. N-glycosylation, O-glycosylation), and to sort them before forwarding them to various destinations (lysosomes, cell membrane, secretion to the extracellular space).
G-Proteins: Proteins that can bind GTP and GDP and hydrolyze GTP to GDP. The GTP-bound protein can activate various effector molecules while the GDP-protein complex cannot. G proteins often take signals from the hormone receptors embedded into the cell membrane and forward it towards the inside of the cell.
Granulocytes: Granulocytes are white blood cells with segmented nuclei. They are able to move around with their pseudopodia. One of their types is phagocytic. It engulfes foreign materials (antigens) that got into the body and digests them in its lysosomes.
Gray matter: Greyish areas of the central nervous system. Its main mass is given by the cell bodies of neurons. On the surface of the cerebellum and the cerebrum, it forms the cerebral

cortex, inside the brain it forms nuclei. In the spinal cord, the gray matter is divided into horns and is located centrally.

Haploid: The cell which contains one each of the chromosomes with distinct shape and genetic composition in its nucleus. There are n = 23 chromosomes in human haploid (gamete) cells.

Helper T-Cell: A type of lymphocytes that differentiates in the thymus. It is indispensable for recognizing foreign antigens and specific activation of the immune system.

Hemoglobin: Red colored, iron-containing blood component serving to bind and transport oxygen. In humans, hemoglobin consists of four subunits, all of which are constructed of a globular protein which tightly binds a non-protein hem group. In vertebrates hemoglobin is located in red blood cells, in some invertebrates it is in the blood plasma.

Hemolysis: Placing red blood cells into a hypotonic solution, in the solution is sufficiently dilute, the cells swell and blast (lyse).

Heterochromatin: Heterochromatin is the type of chromatin which is transcriptionally inactive. Because of the tight binding of histone proteins to DNA, the RNA polymerase (which performs the transcription of DNA into RNA) does not have access to DNA in the heterokromatin. Heterocromatin is usually peripheral in the nucleus.

Heterotrophic: Living organisms that absorb organic matter from their environment in order to pursue their metabolic processes. The degradation of these materials covers their energy needs and serves building blocks for varius cellular components. Consumers feed on the materials of other living beings while decomposers use the materials of dead organisms.

Heterozygous: The name of a genotype. An individual whose cells have different alleles on the homologous chromosomes regarding a given trait. If the two alleles of the gene are B and b, the heterozygous genotype is Bb.

High energy (macroergic) bond: has more than 25 kJ/mol binding energy (e.g. in ATP).

Homeostasis: The dynamic stability of the internal environment. Factors are: the amount of body fluids, the ionic composition, osmotic pressure, pH, temperature of the body fluids and cells, the balance of the nutrients and degradation products, as well as breathing gases, furthermore the existence of defense mechanisms.

Homologous chromosomes: Chromosomes of the same shape and size, carrying the genes defining each property in the same order.

Homozygous: The name of a genotype. An individual whose cells have identical alleles on the homologous chromosomes regarding a given trait. If the two alleles of the gene are B and b, the genotype of the homozygous individual or cell is either BB or bb.

Hormones: Compounds (proteins, amino acid derivatives, steroids) produced in endocrine secretory glands or neurosecretory cells that reach the target cells through the blood stream to regulate their function.

Hormones acting on the salt and water homeostasis: Steroid hormones, which increase the retention of Na^+ ions and, depending on their concentration, the release of K^+ and H^+ ions in the kidney. As a result of the re-absorption of the Na^+ ions, the osmotic concentration of the blood is increased, and water is also reabsorbed. Their production is stimulated by the low Na^+ and high K^+ plasma concentrations. Their main representative is aldosteron, but glucocorticoids also have equivalent effects.

Humoral immune response: The type of immune response that is not mediated by cells (see cellular immunity), but indirectly protects against foreign cells, antigens by antibodies that are produced by immune cells (see antibody).

Hydrogen bond: The strongest secondary bond, which is formed between a hydrogen and another atom. When bound to an atom with high electronegativity (O, N, Cl) , a hydrogen forms this bond with another highly elecronegative atom that has a free electron pair if their distance is adequate.

Hydrolysis: A chemical reaction in which a chemical bond is desintegrated in the presence of water in such a way that the hydroxyl group of the water molecule is incorporated into one of the two products, while its hydrogen atom is incorporated into the other. For example, the degradation of proteins to amino acids or of starch to glucose are hydrolyses.
Hyperpolarization: If the membrane potential temporarily assumes a more negative value than that of the resting value of the given cell type.
Hypoxia: Oxygen-deficient state, the body's abnormal condition when the body (general hypoxia) or part of it (tissue hypoxia) is deprived of adequate oxygen supply. It may be caused by insufficient oxygen content of the environment, but may also be caused by inadequate (external) breathing: inadequate functioning of the respiratory tract (eg hypoventillation), or insufficient amount or abnormal structure of red blood cells in the blood or of hemoglobin in the red blood cells.
Inhibitory synapse: The messenger molecule in inhibitory synapses causes hyperpolarization of the cell membrane of the postsynaptic cell receiving the message. This cell can then only be stimulated by a stronger stimulus. A characteristic messenger molecule of inhibitory synapses is γ-aminobutyric acid.
Intercellular material (extracellular matrix): The material filling the space between the cells of a tissue. Its composition is the main determinant of the physical properties of tissues in the case of connective tissues.
Interferon: Interferons are proteins that are released by cells of an organism attacked by various pathogens (viruses, bacteria, parasites, or tumor cells). Interferons belong to signal molecules called cytokines. They act to activate the immune system and the protective mechanisms of surrounding cells.
Intermediate Metabolism: The sum of the biochemical processes occurring in the cell between the absorption and the release of the material. Intermediate metabolism of cells in the body takes place in harmony with the functioning of the other cells of the body.
Intron: A nucleotide sequence in a gene that does not participate in encoding the protein product. Introns occurring in eukaryotes are transcribed in messenger RNS, but are subsequently removed from the transcript before translation.
Isomers: Molecules with the same molecular formula but different structures.
K-channel: A protein molecule embedded in the cell membrane (a so-called transmembrane protein), capable of selectively allowing K^+ ions through the membrane by passive diffusion (i.e., no energy is needed). During the transport process, the difference in K^+ concentration between the two sides of the membrane is reduced.
Ketone: A functional group of organic compounds in which an oxo (= O) is attached to a carbon within the chain.
Lethal allele: The allele that renders the individaul unviable. If the lethal allele is recessive, only the homozygous recessive genotype will die. If the lethal allele is dominant, both the homozygous dominant and heterozygous individuals are unviable.
Life phenomena: Essential properties of living organisms: metabolism, reproduction, excitability, movement, growth, and development.
Lipase: The lipid degrading enzyme produced by the pancreas. It hydrolyses the ester bonds in the molecules of neutral fats. Usually it cleaves only the two peripheral fatty acid molecules from glycerol. Active in alkaline media.
Lipids: Organic compounds formed in living organisms with varying composition and structure that have a common feature that they are well soluble in apolar solvents.
Lymphocytes: A group of white blood cells (leukocytes), which have a distinctly large nucleus surrounded by little cytoplasm. In humans, they account for about a quarter of all white blood cells in the blood. Their two basic populations are B- and T-lymphocytes.

Lymphocytes: Lymphocytes protect the body against foreign substances (antigens). B cells produce antibodies (immunoglobulins). Helper T-cells take part in the recognition of antigens, the activation of the immune system. Cytotoxic (killer) T-cells produce substances that destroy those cells that carry the antigen they recognize.

Lysosome: Membrane bound organelles in animal cells and unicellular eukaryotes. They contain hydrolytic cleavage enzymes that are active at the acidic pH of lysosomes. Lysosomes break down the aging or damaged cellular components or material taken up by the cell from the environment, such as nutrient particles or bacteria.

Macromolecule: A molecule, ususaly a polymer in the colloidal size range,that has a molecular weight greater than 10 kDa (ten thousand daltons).

Macrophages: Large phagocytic cells that differentiate from circulating monocytes. They recognize and take up foreign materials inside the body. After digestion in lysosomes, they present pieces of peptide antigens bound to their MHC II molecules expressed in their cell membrane to helper T-cells.

Major histocompatibility complex (MHC): Proteins on the surface of cells that allow the immune system to detect / recognise the their own and foreign cells and tissues. MHC proteins play a vital role in lymphocyte immune reactions because they allow T cells to identify foreign antigens. MHC proteins have two different classes. Class I proteins are virtually found on the surface of each cell of the body, they determine the rejection of transplanted tissue (graft) and help cytotoxic T cells to detect virus-infected cells. The class II proteins are limited to certain cell types of the immune system: macrophages, B-cells, and activated T-cells.

Meiosis: Cell division which reduces the number of chromosomes. The number of chromosomes of the 4 progeny cells is half of the parent cell, and their genetic constitution is a mixture of the parents. Meiosis consists of two divisions, the first (after crossing over) separates the homologous chromosomes, while the second splits the sister chromatids of each chromosome.

Memory cells: A specific immune response generates lymphocyte "committed" against a specific antigen. Of these, memory cells are long-lived, which allows a much faster detection of the antigen and activation of the immune system upon a repeated encounter with the antigen. Thus the pathogen cannot proliferate in the body, and does not cause disease.

Messenger RNA (mRNA): The function of mRNA is to mediate the conversion into proteins of the information stored in DNA. During transcription, one strand of DNA is transcribed into RNA by the RNA polymerase enzyme following the sequence of DNA. In prokaryotes, this product is mRNA. In eukaryotes, further processing is needed to produce mRNA from this. mRNA is then translated into proteins by the ribosomes.

Metabolism: The coordinated processes of material uptake, conversion of materials and excretion of substances taking place between the living system and its environment, which provides the living being with adequate building materials and energy.

Metaphase: A phase of mitotic or meiotic cell division. In the metaphase of mitotic cell division, chromosomes are lined up in the equatorial plane of the cell, and microtubuls are connected on both sides of the centormere of the chromosome. In the first metaphase of meiotic cell division, each of the homologous chromosomes is connected only to microtubules from one of the two poles of the cell. In the second metaphase of meiosis, similar to the mitosis, microtubules are connected to the centromere of chromosomes from both sides.

Microelements: Microelements in cells are extremely rare (0.01%). As components of various enzymes and hormones, they are indispensable for the healthy functioning of the cells. Microelements include, for example, zinc (Zn), manganese (Mn), and iodine (I).

Miller experiment: A model experiment that proved that organic substances could be formed from simple inorganic molecules under the physical circumstances of ancient geological history (chemical evolution).
Mitochondrium: The energyproducing organelle of all eukaryotic cells, in which the common pathway of biological oxidation - the citric acid cycle and the terminal oxidation - take place. Mitochondria, similarly to chloroplasts are organelles of endosymbiotic origin (see endosymbosis theory).
Mitosis: Cell division maintaing chromosome number, in which the sisted chromatids of chromosomes are separated. The number and genomic composition of chromosomes of the 2 progeny cells resulting from the division are identical to the parent cell.
Mitotic spindle: An array of microtubules that function in the process of cell division. Some of them bind to the centromeric region of chromosomes in metaphase and shorten in anaphase to separate the sister chromatids.
Molecule: A structure formed by the interconnection of two or more atoms.
Monocytes: Monocytes are large white blood cells with kidney shaped nucleus. Upon leaving the blood stream, they can transform into macrophages (see there), capable of endocytosis.
Mucosa: The epithelium of the wall of inner organs and the underlying connective tissue.
Muscle tissues: Those tissues that contain contractile cells. Cells contain protein-based muscle fibers. The movement of fibers relative to each other results in a change of the length of the cell. There are three types, smooth muscle, striated or skeletal muscle, and caridac muscle.
Mutation: A change in the base sequence of DNA, which is passed on to the daughter cells during cell division.
Myosin: A protein that plays a key role in the movement of cells and muscles. It can interact with the actin. Movement of actin and myosin relative to one another creates cell movement and muscle contraction.
Na channel: Transmembrane protein in the cell membrane, which lets Na^+-ions pass through by facilitated diffusion. During transport the concentration difference between the two sides of the membrane decreases. It has a fundamental role in generating action potential.
Na^+-K^+-pump: Sodium/potassium (Na^+/K^+) ATPase, which is a plasma membrane transport ATPase. It exchanges Na^+ ions with K^+ ions by using the energy of ATP hydrolysis, which maintains the ion concentration differences between the two sides of the plasma membrane.
NAD^+ (nicotinamide adenine dinucleotide): A coenzyme that is a derivative of nicotinic acid (vitamin B3). It is involved in many biological dehydrogenation (oxidation) reactions.
Natural (innate) immunity: A coherent defensive system of phagocytic cells and proteins that act immediately upon the appearance of any foreign (dissimilar to the own) substance inside the organism.
Necrosis: A passive, pathological form of cell death that is caused by an external effect.
Negative Feedback: Changes the functioning of the system by reversing the direction of actual change (increases causes decrease, decrease causes increase). For example: regulation of blood pressure.
Nerve cell (neuron): The smallest cellular unit of the nervous system is the neuron. Neurons are the combination of the cell body and all its projections. The nerve cell and its projections are bordered by a contiguous cell membrane. Neurons are excitable cells that specialize in receiving and conducting stimulus. Neurons are found in the brain, spinal cord and nerve ganglions.
Nerve fiber: An assortment of axons surrounded by myelin sheath.
Nerve: The bundles of nerve fibers running int he peripheral nervous system. The brain nerves connect the brain, while spinal nerves connect the spinal cord with other parts of the body.

Neuroendocrine system: The dual - hormonal and neuronal - regulating system of certain activities in the body of higher organisms.
Neuromuscular junction (synapse): The site where a muscle cell or muscle fiber is directly in contact with a motor neuron that transmits to it impulses from the central nervous system. Impulses from the neuron are transmitted to the muscle cell by a neurotransmitter.
Non-coding strand: The one of the two polynucleotide chains of the DNA of a gene whose base sequence is not transcribed into RNA.
Normal distribution curve: Symmetric, bell-shaped curve, also known as the Gaussian distribution. Quantitative features (eg body height) show such distribution in the population. The proportion of individuals with average abilities is the largest, the proportion of individuals with greater differences from the central tendency (extreme values) is lower.
Nuclear membrane: The dual membrane that separates the nucleoplasma from the cell's cytoplasm. This membrane consists of two lipid bilayer layers separated by the perinuclear space. The outer membrane is continuous with the rough endoplasmic reticulum and is structurally and functionaly different from the inner membrane.
Nucleases: Nucleases hydrolyze molecules of nucleic acids to smaller nucleotides. RNases break down RNA, DNAses break down DNA.
Nucleic Acid: The collective name of complex organic compounds in living organisms. These are polymers of nucleotides in which the nucleotides are coupled with phosphodiester bonds. Nucleic acids have two basic types: DNA (deoxiribonucleic acid) and RNA (ribonucleic acid) depending on the type of sugar, ribose or reoxiribose contained in their nucleotides.
Nucleolus: An intensively stained area in the nucleus of eukaryotic cells. It contains large amounts of RNA and protein. This where ribosomal RNA is synthesized, and the ribosomal subunits are also assempled here (but not the whole ribosome).
Nucleoside: Organic compound consisting of a purine or pyrimidine nitrogen containing base bound to a 5-carbon sugar (ribose or deoxyribose).
Nucleotide: Phosphorylated derivatives of nucleosides in which the phosphate group esterifies the hydroxyl group at the 5’ carbon atom of the 5-carbon sugar (ribose or deoxyribose).
Nucleus: The cell organelle that contains the genetic information and orchestrates the porcesses inside the cell. The nucleus is separated from the cytoplasma by the nuclear membrane. The nucleus is typical of eukaryotic cells.
Operon: It is mainly a system for regulating bacterial gene expression. A typical example is the lac operon which takes part in regulating the lactose metabolism of E. coli bacteria. In the operon, the operator region is located directly upstream of the structural genes. If its repressor protein binds to it, then the transcription of structural genes is interrupted. In the operon, a regulatory region typically controls the synthesis of multiple proteins coded in the downstream DNA stretch sequentially. Generally, the proteins thus synthesized are required to perform a given (series of) task(s).
Organic substances: Compounds formed by joining several carbon atoms. Organic substances of high energy content formed through metabolism in living organisms include carbohydrates, fats and proteins.
Osmosis: Diffusion of solvent (usually water) through a semipermeable membrane from the lower concentration solution to the larger.
Oxidation: Process in which the oxidation number grows or electrons are lost.
Oxitocin: A peptide hormone formed in certain neurosecretory cells of the hypothalamus. Its most important effect is to stimulate the contraction of uterine smooth muscle during delivery. During breastfeeding, it also contracts the smooth muscles of the mammary gland, helping the

explusion of milk. In addition, it plays an important role in defining maternal behavior patterns.

Pancreas: The pancreas is an exocrine gland with endocrine islets (of Langerhans) found in vertebrates. As an exocrine gland, the pancreas produces pancreatic juice, which contains many important digestive enzymes, such as lipase for breaking down lipids, amylase for degrading starch, tripsin and chymotripsin for degrading proteins. In terms of its endocrine function, it produces many very important hormones such as insulin, glucagon and somatostatin.

Parasite: Parasite organisms feed on the materials of other living beings. External parasites reside on the body's surface, internal parasites are located inside the body. Parasitism usually does not involve the destruction of the host.

Parasympathetic nervous system: Part of the vegetative nervous system in which nerves originating from the brain stem and the sacral region of the spinal chord reserve and help recollect the energies of the body at certain localized areas of the body.

Passive Immunization: The type of artificial immunization that protects the body agains foreign materials using antibodies created in other living beings, thus substituting or supplementing the function of the immune system.

Passive transport: A material flow through biological membranes (cell membrane) that does not require cellular energy because the concentration difference between the two sides of the membrane and the electric potential fifference together provied the driving force for the flow of material. Transport is carried out through the membrane lipid bilayer or through membrane proteins (e.g. ion channels).

Peptide bond: The peptide bond is formed between the carboxyl (-COOH) group of on amino acid and the amino (-NH2) group of another amino acid upon the exit of a water molecule. Peptide bonds are most often created on the ribosome during protein synthesis (translation).

Peripheral nervous system: Neural structures (nerves, sensory and vegetative ganglions) that provide connection between the central nervous system and the body's organs and tissues.

Phagocytes: A cell capable of taking up and degrading foreign particles, cell debris and pathogenic microorganisms. Some protists (e.g. the giant amoeba) and some mammalian cells (e.g., macrophages and monocytes) belong to this group of cells. Phagocytes are important elements of the natural (innate) defense system of most animal organisms.

Phenotype: An observable, measurable, detectable property of an individual, or a cell. The phenotype is determined by the genotype, in close interaction with the environment (see also Central dogma).

Photolysis: Decomposition of water using the energy of light (related to the operation of Photosystem II in plants). The oxygen content of the atmosphere originates mainly from photolysis.

Photosynthesis: Autotrophic metabolic process, using light energy using organic substances from carbon dioxide, water and mineral salts. Oxygen is also formed during photosynthesis by cyanobacteria and plants. Organic dyes (eg chlorophyll) are used to capture light energy.

Physiological saline (isotonic solution): A solution with the same osmotic pressure as that of the cell. For humans, it can be a 0.9% NaCl (0.166 mol/L). A solution containing dissolved particles at higher concentrations is hypertonic, and at lower concentrations it is hypotonic.

Placenta: The placenta is in part of maternal, in part of fetal origin which nourishes placental mammals in fetal life. The fetus is connected to the placenta by the umbilical cord.

Plasmid: A ring-shaped DNA molecule occurring in prokaryotic cells, which is substantially smaller than the bacterial chromosome containing all cellular information. Plasmids are duplicated independently of the bacterial chromosome, and do not occur in all cells.

Polar: Molecules or parts of molecules with unequal charge distribution (dipoles). The polar particles interact with water, i.e., they are "water-lovers", hydrophilic.
Poliploid: A cell containing many homologous sets of chromosomes, or a living organism made up of such cells (e.g. tri-, tetra-, hexaploid, etc.).
Polypeptide: A molecule (eg insulin, glucagon) formed by the joining of many alpha-amino acid molecules with peptide bonds. Longer (more than 50, or in other definitions more than 300 amino acid subunits) polypeptides are referred to as proteins.
Positive feedback: Changes the functioning of the system by promoting a change in the direction of the actual change (increases causes increase, decrease causes decrease). For example: controlling the ejection of the oocyte.
Post-embryonic development: The time period from the birth to death.
Primary biogenic elements: Primary biogenic elements include carbon (C), hydrogen (H), oxygen (O), nitrogen (N) and phosphorus (P). They constitute 98% of the cells which is explained by the fact that these elements form the bulk of the organic matter of living organisms, and H and O also form water.
Primary germ layer: A membrane-like layer of cells in an animal embryo at the gastrulation stage, from which the various organs of the body develop later. There are two or three such layers in the embryos of animals: an outside layer (see ectoderm), an inside layer (see endoderm) and in most animals also a middle layer (see mesoderm).
Primary structure: Usually, the order of attachment of monomers in the polymer molecule. In the case of proteins, it means the sequence of amino acids in the polypeptide chain.
Progesterone: Steroid hormone formed in the ovary, more specifically in the corpus luteum formed after the ejection of the oocyte. It increases the blood supply of the uterus, thickens the endometrium to make it fit for the developing embryo. During pregnancy, it also provides proper blood supply to the uterus wall, prevents uterine contraction and thus abortion.
Programmed (natural) cell death (apoptosis): Cell death occurring in a programmed manner in the organism.
Prokaryote: The cell in which there is no real cell nucleus separated from the cytosol by a nuclear membrane. The genetic material of the cell is found in the cell plasma, there are no cell membrane bound organelles or cytoskeleton. Bacteria and cyanobacteria are prokaryotes.
Protein: Proteins are polymer molecules built from amino acids that have their own distinct spatial structure. In proteins, the amino acids are linked together by peptide bonds. Most of the proteins contained in the cells are enzymes whose function is to catalyze the chemical processes in the cells.
Pseudopodium: A protrusion of the cytoplasma observed in unicellular orgnisms and some specialized cells, such as white blood cells, in multicelluar organism as well. Pseudopodia perpetually disappear and re-emerge, ensuring the movement of the organism. Such movement requres a solid base (also called a solid substrate) and is called amoeboid, based on the unicellular organism amoeba which moves in this manner.
Quaternary protein structure: The protein structure formed by connecting two or more polypeptide chains. For example, the hemoglobin molecule consists of 4 subunits.
Receptor: A transducer that converts the characteristic stimulus to a specific response. There are receptor cells, including sensory receptors that are modified neurons that sense signals from the external or internal environment, convert them into electric signals. There are receptor molecules, which specifically bind hormones or other transmitters (signal molecules). These receptor molecules are proteins in the cell membrane or the cytoplasm that modulate the cell's function after binding the signal molecule (e.g. by opening an ion channel in the cell membrane).
Recessive allele: Only individuals with a homozygous genotype exhibit the phenotypic character defined by them.

Red blood cells: The most abundant cell type in the blood, which contains hemoglobin, a red pigment, responsible for oxygen transport. In humans (and in mammals) the red blood cells lose their nucleus (and some other cellular organelles) during maturation. There are 4.5 to 5.5 million / mm^3 plasma.
Reduction: A process that decreases the oxidation number or causes the gain of electrons.
Regulation: The direction and magnitude of the signal coming from the control center to the system is based on the actual state of the system and the state that is targeted.
Response: The response of a living system to a stimulus, the manifestation of general excitability of living organisms.
Resting Potential: The voltage (potential difference) between the two sides of the cell membrane of the rest.
Ribosomal RNA: Ribosomal ribonucleic acid (rRNA) is one of the constituents of the ribosome. It is not only a structural component of the ribosome but also plays a role in the formation of the peptide bond and in the movement of the finished polypeptide streth within the ribosome.
Ribosome: A two-subunit cellular constituent built up from proteins and RNA (ribosomal RNA, rRNA). It is found in both prokaryotic and eukaryotic cells. It catalyses the synthesis of proteins (polypeptides).
RNA biosynthesis (gene transcription): Transcription of genetic information from DNA into RNA. It is performed by the enzyme RNA polimerase.
RNA: A polymer molecule composed of ribonucleotide units. There are three main types, messenger RNA (mRNA), transfer RNA (tRNA), and ribosomal RNA (rRNA).
Saturated compound: An organic compound having only one covalent bond between each pair of carbon atoms - a single pair of binding electrons.
Secondary biogenic elements: The proportion of secondary biogenic elements in cells is about. 2%. This group includes, amon others, sulfur (S), iron (Fe), chlorine (Cl), sodium (Na), potassium (K), and calcium (Ca).
Secondary protein structure: The linear amino acid sequence of the polypeptide may form a helical structure (see α-helix) or create a plate-like structure (see β-sheet). The spiral α-helix is usually formed from aminoacids with longer residues, while the β-sheet is composed of aminoacids that have shorter reisdues. The secondary structure is maintained by hydrogen bonds between the –C=O and –NH groups of the constituent amino acids
Secretion: Secretion refers to the activity of various glands. During secretion, chemical substances, such as hormones, are excreted from the appropriate cells of the glands, which contain information about the glands that produce them and which can influence the function of other cells. The secreted products can be, for example, digestive enzymes in e.g. bile or saliva produced by exocrine glands (see exocrine), and hormones produced by endocrine glands (see endocrine).
Selection: An evolutionary process in which less-viable or reproducible individuals in a given environment are less likely to carry over their genes to the next generation. During the selection, alleles that produce a disadvantageous property in the given environment tend to get sparser, and the alleles that produce beneficial properties become more frequent.
Semi-permeable membrane: Semipermeable membranes (such as cell membranes) are freely penetrated by certain substances, while others cannot pass through them.
Sex chromosomes: Chromosomes of a species's species that play a vital role in determining gender. In human chromosome sets, cell of females contain XX, cells of males contain XY sex chromosomes.
Sex-linked inheritance: The inheritance of genes located on sex chromosomes. In male mammals, the cells contain X and Y sex chromosomes, so genes of sex chromosomes are present in only one copy. Therefore, the effects of their genes will definitely bemanifested.

Sexual reproduction: A form of reproduction when the offspring develops from the zygote resulting from the union of the male sperm and the ovum. The offspring resulting from sexual reproduction combines the characteristics of the two parents.
Sol state: Liquid state, colloidal particles can be displaced individually together with their own hydrate shells.
Somatic chromosomes: Chromosomes of individuals of a species that are found in both genders and have no fundamental role in the definition of gender.
Somatic nervous system: A part of the nervous system that voluntarily directs the skeletal muscles and is responsible for sensory perception of external stimuli (touch, vision, hearing).
Starch: A homogeneous polysaccharide containing, in different proportions, two glucose polymers, amylose and amylopectin. This is the main stored carbohydrate of plants. Starch is therefore one of the main sources of energy for animals as well.
Start codon: The starting base triplet (AUG) of protein synthesis on mRNA, which codes the amino acid methionine.
Stem Cell: Cell that does not differentiate itself, but it can undergo unlimited divisions to create other cells that either remain stem cells or differentiate into specialized cells.
Stimulus threshold: The smallest stimulus that can still excite a receptor. The smallest change (depolarization) of the membrane potential of the excitable cell (nerve, muscle) that triggers an action potential.
Stop codon: Signals the end of protein synthesis in the mRNA template. It does not define an amino acid as there is no anticodon-containing tRNA that is associated with it.
Stress: The sum of all physiological reactions to stimuli that strain/burden the body. In common colloquial terms, it means continuous or recurring tension which leads to the stabilization of the stress reaction. Sporadic stress situations are normal features of life, however, sustained stress can lead to serious health impairment.
Stress proteins (also known as chaperons, or heat shock proteins): Provide the ability of other proteins to function by supporting their folding and through that acquisition of their proper spatial structure. Their name originates from their increased amount during stress, enabling the cell and the organism to remain alive under changing circumstances.
Substrate: Starting material in the catalyzed reaction.
Superhelix: A form of DNA spatial structure in which the double helix is further wrapped around itself creating a tightly twisted superstructure.
Suspension: Dispersion of solid in a liquid (eg bacteria in water). The product of this operation is a suspension.
Symbiosis: Population interaction, which is mutually beneficial for both parties.
Sympathetic Nervous System: The part of the vegetative nervous system that calls up the power reserves of the entire body through nerves leaving the thoracic and lumbar spine.
Sympatico-adrenal system: The regulatory system in which the sympathetic nervous system is connected to the adrenal medulla, regulating the release of adrenal medulla hormones (such as epinephrine and norepinephrine).
Synapse: The junction of a neuron with another cell. The stimulation from the neuronal cell (presynaptic cell) to the other cell (postsynaptic cell) can be spread through chemical agents (neurotransmitters), see chemical synapses, or directly through gap junctions of adjacent cell membranes (see electric synapses).
T lymphocytes: The type of lymphocytes (which are a subset of white blood cells) that are the main mediators of cellular (cell-mediated) immunity. T cells originate from the bone marrow but their maturation occurs in the thymus. The two main subpopulations of T cells are helper and killer (cytotoxic) T cells.
Telophase: A phase of cell division. During telophase, the chromatids that were separated in anaphase migrate to the opposite poles of the mitotic spindle. The nuclear membrane is re-

formed around both groups. This is how two daughter cell nuclei with the same number and quality of chromosomes that are identical to those of the original cell nucleus are formed.
Tendon: Strong, high tensile strength formation that links the muscles to the bones.
Terminal oxidation: The last stage of degradative metabolism, during which the hydrogen atoms binding to NAD^+ in the citric acid cycle are oxidized to water. The process takes place in the mitochondria. The process involves the oxidative phosphorylation of ADP.
Tertiary protein structure: The third-order structure of proteins is the final conformation of the whole polypeptide chain, i.e., the relationship between the various secondary structures that are stabilized by interaction between the amino acid residues that end up close to each other (dispersion, dipole- dipole, hydrogen-, ionic and disulfide bonds).
Testosterone: The steroid hormone produced in the connective tissue cells of the testicles. Enhances the formation of sperm cells in the testicles. Has an important role in the development of a masculine body (secondary sex characteristics) and psychological behavior. In addition to sexual functions, it also regulates cellular metabolism.
Thymus: An organ that can only be found in the vertebrates; its main function is the differentiation and maturation of the lymphoid cells. Maturation of lymphocytes contributing primarily to the cellular immune response (see T-cell) takes place here primarily. Lymphoid stem cells from the bone marrow migrate into the thymus where they begin to divide and differentiate into several subpopulations of T-cells. In mammals it is a two-lobed organ located in the chest just behind the sternum. The regression of this organ begins after birth, but it is only completed towards the end of adolescence.
Thyroxine: Thyroxine or 3,5,3',5' tetraiodothyronine (abbreviated T4) is produced by thyroid follicular cells. T4 regulates the metabolic rate and growth of the body.
Tissue: Cells of eukaryotic multicellular organisms that work together to perform certain tasks. The different tissues are specialized for providing specific, diverse tasks in the body.
Transcription: The process in living cells in which the genetic information in DNA is transferred into a messenger RNA molecule (mRNA) as a precondition of protein synthesis (see also genetic code). In eukaryotic cells, transcription mostly takes place in the nucleus and is regulated by transcription factors. (It also occurs in mitochondria and chloroplasts.)
Transfer RNA: Transfer RNA, in short, tRNA plays an indispensable role in protein synthesis. During protein synthesis, tRNA performs the transport of amino acids to the ribosomes.
Translation: In the living cells, a biochemical process in which the genetic information encoded in messenger RNA in nucleotide triplets (codons) is "translated" into the sequence of amino acids in a polypeptide chain during protein synthesis. Translation is done on ribosomes.
Transport processes: Material pick-up and release through membranes (plasma membrane and membrane of intracellular organelles).
True solution: The type of aqueous solution in which the dissolved particle does not exceed 1 nanometer (nm) in size. For example, a solution of sodium chloride, amino acids and simple carbohydrates (glucose, fructose, etc.).
Trypsin: Pproteolytic enzyme found in pancretic juice. The peptide bonds between the amino acids are hydrolyzed by it. As a result, protein molecules are broken down into smaller units, oligopeptides. Active in alkaline media.
Turgor pressure: The hydrostatic pressure of the cell plasma on the cell wall.
Unsaturated compound: An organic compound having between two or more carbon atoms multiple covalent bonds - two or three binding electron pairs.
Van der Waals forces: Forces generating weak secondary (non-covalent and non-ionic) binding, which can arise between polar and nonpolar molecules and be attractive or repulsive. They can be classified as electrostatic, induction and dispersion based interactions.

Vasopressin: Peptide hormone produced in certain neurosecretory cells of the hypothalamus. It increases water reabsorption in the kidney, thus reducing the amount of urine excreted. Its production is enhanced by increased osmotic concentration in the blood. It is also called antidiuretic hormone (ADH).
Vegetative nervous system: That part of the nervous system which regulates the internal organs, largely independently of will. Also called the autonomous nervous system.
Vegetative reflexes: Reflexes in which action is implemented by smooth muscle, heart muscle (myocardium), or a gland. Their development is largely independent of will. The cell body of vegetative motor neurons that directly induce the function of the implementing cells is found in vegetative (autonomic) ganglia or nuclei.
Virus: A macromolecular system carrying genetic information, which can only function and reproduced in a host cell.
White matter: Whitish areas of the central nervous system, in which the axons of the neurons are mainly clustered. It is located inside the cerebral cortex, and outside in the spinal cord. Specific axon bundles running in defined directions form tracts.
Zygote: The fertilized egg. It is generated in sexual reproduction, and from it develops the new specimen.
α-helix: The most common secondary structure of proteins in which the polypeptide chains are twisted into a spiral. The structure of α-helix is maintained by weak hydrogen bonds between the overlapping N-H and C=O groups positioned in consecutive turns of the spiral.
β-sheet: β-fold is a common secondary structure of proteins. Hydrogen bonds are formed between, rather than within the polipeptide chains, which are not wrapped up in a spiral but form sheets. Depending on the orientation of the participating chains, the beta sheets may run parallel or antiparallel.