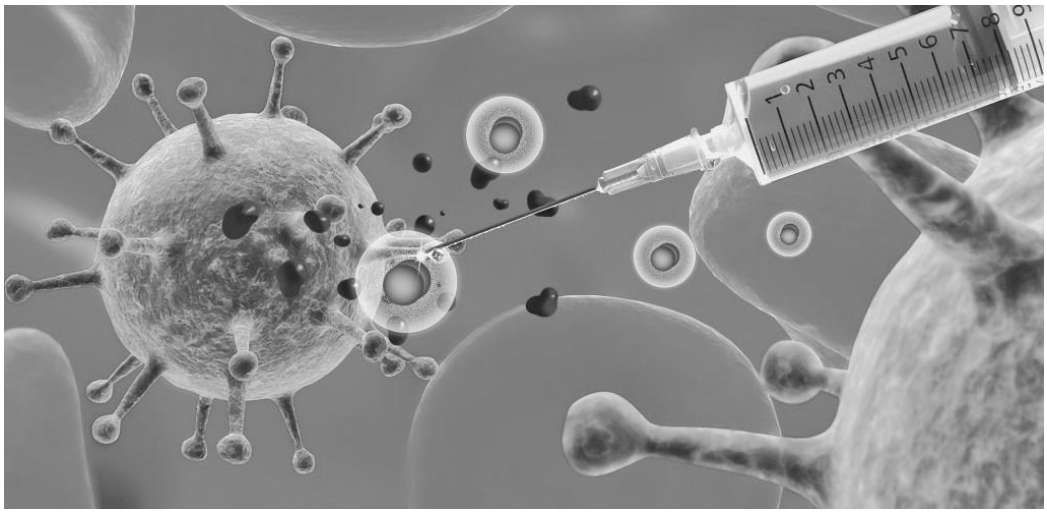
УНИВЕРСИТЕТ ИТМО

А.А. ПУЧКОВСКАЯ

АНГЛИЙСКИЙ ЯЗЫК

INTRODUCTION TO A CELL
PART 1



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МИНИСТЕРСТВО ОБРАЗОВАНИЯ И НАУКИ РОССИЙСКОЙ ФЕДЕРАЦИИ

УНИВЕРСИТЕТ ИТМО

А.А. Пучковская

АНГЛИЙСКИЙ ЯЗЫК

INTRODUCTION TO A CELL
PART 1

РЕКОМЕНДОВАНО К ИСПОЛЬЗОВАНИЮ В УНИВЕРСИТЕТЕ ИТМО
по направлению подготовки (специальности) «Биотехнология»
в качестве учебного пособия для реализации основных профессиональных образовательных программ высшего образования бакалавриата

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В подготовке материалов к пособию участвовали студенты Маслова А.Ю., Башарова К.С., Бунакова А.П., Игнатьева Е.Ю., Каменская М.А., Кубанычбек улу Р., Прохорова В.А., которым автор выражает огромную благодарность.

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Цель пособия – подготовить студентов к чтению оригинальной литературы по специальности «Биотехнология».

УНИВЕРСИТЕТ ИТМО

Университет ИТМО – ведущий вуз России в области информационных и фотонных технологий, один из немногих российских вузов, получивших в 2009 году статус национального исследовательского университета. С 2013 года Университет ИТМО – участник программы повышения конкурентоспособности российских университетов среди ведущих мировых научно-образовательных центров, известной как проект «5 в 100». Цель Университета ИТМО – становление исследовательского университета мирового уровня, предпринимательского по типу, ориентированного на интернационализацию всех направлений деятельности.

ВВЕДЕНИЕ

Цель данного учебного пособия – подготовить бакалавров к чтению оригинальной литературы по специальности. Пособие состоит из десяти уроков, включающих словарный минимум, текст, лексические и грамматические упражнения, которые заканчиваются контрольным заданием, направленным на выявление остаточных знаний студентов и закрепление пройденного материала. В каждом контрольном задании предлагаются упражнения, отвечающие современным стандартам обучения иностранному языку, способствующие более глубокому пониманию предмета и развитию творческого воображения. Заканчивается учебное пособие двуязычным словарем трудной и специальной лексики, с которой сталкивается студент, работая с текстами и упражнениями.

Основной упор при работе с заданиями должен быть сделан на работу с неадаптированным текстом. Тексты подобраны таким образом, чтобы дать представление об основных понятиях, концепциях и процессах, относящихся к специальности «Биотехнологии».

За текстом следуют упражнения двух видов. Лексические упражнения призваны расширить словарный запас студентов, активизировать имеющиеся знания и научить морфологическому членению слов изучаемого языка.

Грамматические упражнения отражают все трудности, необходимые для правильного перевода технических текстов в данном пособии и последующего самостоятельного чтения научно-технической литературы. Целью упражнений является, с одной стороны, активизировать приобретенные ранее знания по грамматике, то есть развить способность студентов видеть грамматические явления в тексте и легко их переводить; с другой стороны, привлечь внимание студентов к явлениям многозначности и многофункциональности отдельных наиболее употребляемых слов, перевод которых, как показывает практика, вызывает затруднения.

При работе с данным учебным пособием рекомендуется пользоваться следующими словарями:

1. В.К. Мюллер — Полный англо-русский и русско-английский словарь, изд. Славянский дом книги, 2012.
2. Современный англо-русский политехнический словарь. Сост. В.В. Бутник, М.: Вече, 2012.
3. Электронный словарь ABBYY Lingvo 12.
4. Электронный словарь Мультитран

Список дополнительной литературы и Интернет-ресурсов:

1. Understanding stem cells by the National Academies of Sciences, Engineering and Medicine
2. What is a Cell? URL: https://www.nature.com/scitable/topicpage/what-is-a-cell-14023083
3. What is DNA? URL: https://ghr.nlm.nih.gov/primer/basics/dna
4. What is RNA? URL: https://study.com/academy/lesson/what-is-rna-lesson-quiz.html
5. Biological Molecules. Fats and Proteins by Anthony Carpi, Ph.D. URL:https://www.visionlearning.com/en/library/Biology/2/Fats-and-Proteins/62
6. Biological Molecules. Carbohydrates by Anthony Carpi, Ph.D. URL:https://www.visionlearning.com/en/library/Biology/2/Carbohydrates/61
7. TED Talk. It is time to question bio-engineering by Paul Root Wolpe. URL: https://www.ted.com/talks/paul_root_wolpe_it_s_time_to_question_bio_engineering

UNIT 1

Vocabulary

External environment – внешняя среда
Permeable – проницаемой
Boundary – граница
Framework – структура
Gatekeepers – привратники
Cellular machinery – так называют химические компоненты клетки, которые функционируют вместе для различных нужд клетки
Nonetheless – тем не менее
Blood serum – сыворотка крови

What Defines a Cell?

Cells are considered the basic units of life in part because they come in discrete and easily recognizable packages. That's because all cells are surrounded by a structure called the **cell membrane** — which, much like the walls of a house, serves as a clear boundary between the cell's internal and external environments. The cell membrane is sometimes also referred to as the **plasma membrane**.

Cell membranes are based on a framework of fat-based molecules called **phospholipids**, which physically prevent water-loving, or hydrophilic, substances from entering or escaping the cell. These membranes are also studded with proteins that serve various functions. Some of these proteins act as gatekeepers, determining what substances can and cannot cross the membrane. Others function as markers, identifying the cell as part of the same organism or as foreign. Still others work like fasteners, binding cells together so they can function as a unit. Yet other membrane proteins serve as communicators, sending and receiving signals from neighboring cells and the environment — whether friendly or alarming.

Within this membrane, a cell's interior environment is water based. Called **cytoplasm**, this liquid environment is packed full of cellular machinery and structural elements. In fact, the concentrations of proteins inside a cell far outnumber those on the outside — whether the outside is ocean water (as in the case of a single-celled alga) or blood serum (as in the case of a red blood cell). Although cell membranes form natural barriers in watery environments, a cell must nonetheless expend quite a bit of energy to maintain the high concentrations of intracellular constituents necessary for its survival. Indeed, cells may use as much as 30 percent of their energy just to maintain the composition of their cytoplasm.

Exercises

1. **Choose the correct option from a, b or c.**

A plasma membrane is permeable to specific molecules that a cell needs. Transport proteins in the cell membrane allow for selective passage of specific molecules from the **1** _____. Each transport protein is specific to a certain molecule (indicated by matching colors). Cells are considered the basic units of life in part because they come in discrete and easily recognizable packages. That's because all cells are surrounded by a structure called the cell membrane — which, much like the walls of a house, serves as a clear boundary between the cells internal and external environments. The cell membrane is sometimes also referred to as the plasma **2** _____. Cell membranes are based on a framework of fat-based **3**_____ called phospholipids, which physically prevent water-loving, or hydrophilic, substances from entering or escaping the cell. These membranes are also studded with proteins that serve various **4**_____. Some of these proteins act as gatekeepers, determining what substances can and cannot cross the membrane. Others function as markers, identifying the cell as part of the same organism or as foreign. Still others work like fasteners, binding cells together so they can function as a unit. Yet other membrane **5**_____serve as communicators, sending and receiving signals from neighboring cells and the environment — whether friendly or alarming.Within this membrane, a cells interior environment is water based. Called cytoplasm, this liquid environment is packed full of cellular machinery and structural elements. In fact, the concentrations of proteins inside a cell far outnumber those on the outside — whether the outside is ocean water (as in the case of a single-celled alga) or blood serum (as in the case of a red blood cell). Although cell membranes form natural barriers in watery environments, a cell must nonetheless expend quite a bit of energy to maintain the high concentrations of intracellular constituents necessary for its **6**_____. Indeed, cells may use as much as 30 percent of their energy just to maintain the composition of their cytoplasm.

1. A. internal environment B. other organisms C. external environment
2. A. membrane B. phospholipids C. boundary
3. A. molecules B. cells C. cytoplasm
4. A. employments B. functions C. abilities
5. A. cell membranes B. proteins C. components

6. A. death B. survival C. development

2. Fill in the gaps and choose the correct definition.

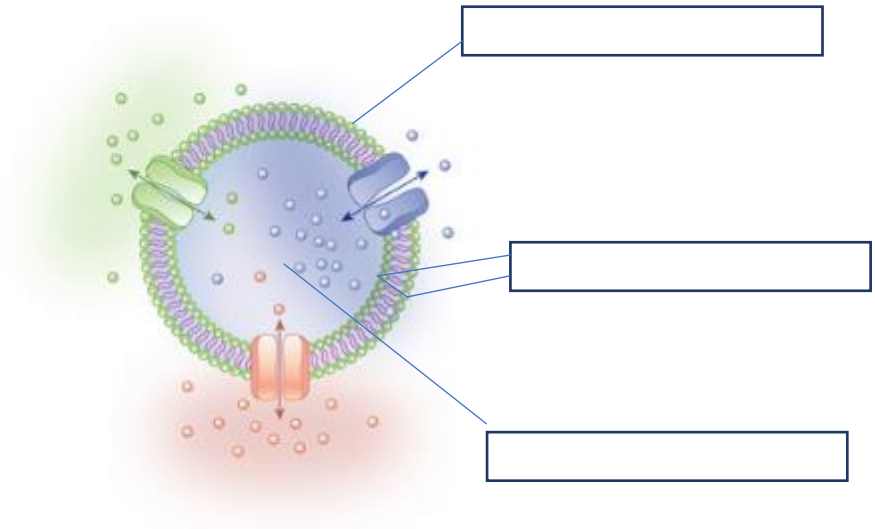


Figure 1: Transport proteins in the cell membrane

1. ☐ Cytoplasm.
2. ☐ Phospholipids.
3. ☐Cell membrane (plasma membrane).

A. Major component of all cell membranes that based molecules.
B. Material within a living cell.
C. Biological barrier that separates the interior of all cells from the outside environment biological barrier.

UNIT 2

Vocabulary

Cytoplasm – цитоплазма
Organelles – органоиды
Intracellular organic molecules – внутриклеточные органические молекулы
Nucleic acids – нуклеиновые кислоты
Proteins – протеины
Carbohydrates – углеводы
Lipids - жиры
Deoxyribonucleic acid (DNA) – дезоксирибонуклеиновая кислота (ДНК)
Ribonucleic acid (RNA) – рибонуклеиновая кислота (РНК)
Replicate the genome – репликация генома
Cell division – деление клетки
Amino acids – аминокислоты
Catalytic function – каталитическая функция
Structural function – структурная функция
Enzymes – энзимы
Starch – крахмал
Plasma membrane – плазматическая мембрана
Bloodstream – кровообращение
Mitochondrion – митохондрии
Energy-producing chemical reactions – химические реакции образования энергии

What Other Components Do Cells Have?

As previously mentioned, a cell's cytoplasm is home to numerous functional and structural elements. These elements exist in the form of molecules and organelles — picture them as the tools, appliances, and inner rooms of the cell. Major classes of intracellular organic molecules include nucleic acids, proteins, carbohydrates, and lipids, all of which are essential to the cell's functions.

Nucleic acids are the molecules that contain and help express a cell's genetic code. There are two major classes of nucleic acids: **deoxyribonucleic acid (DNA)** and **ribonucleic acid (RNA)**. DNA is the molecule that contains all of the information required to build and maintain the cell; RNA has several roles associated with expression of the information stored in DNA. Of course, nucleic acids alone aren't responsible for the preservation and expression of genetic material: Cells also use proteins to help replicate the genome and accomplish the profound structural changes that underlie **cell division**.

Proteins are a second type of intracellular organic molecule. These substances are made from chains of smaller molecules called **amino acids**, and they serve a variety of functions in the cell, both **catalytic** and structural. For example, proteins called

enzymes convert cellular molecules (whether proteins, carbohydrates, lipids, or nucleic acids) into other forms that might help a cell meet its energy needs, build support structures, or pump out wastes.

Carbohydrates, the starches and sugars in cells, are another important type of organic molecule. **Simple carbohydrates** are used for the cell's immediate energy demands, whereas **complex carbohydrates** serve as intracellular energy stores. Complex carbohydrates are also found on a cell's surface, where they play a crucial role in cell recognition.

Finally, **lipids** or fat molecules are components of cell membranes — both the plasma membrane and various intracellular membranes. They are also involved in energy storage, as well as relaying signals within cells and from the bloodstream to a cell's interior.

Some cells also feature orderly arrangements of molecules called **organelles**. Similar to the rooms in a house, these structures are partitioned off from the rest of a cell's interior by their own intracellular membrane. Organelles contain highly technical equipment required for specific jobs within the cell. One example is the **mitochondrion** — commonly known as the cell's "power plant" — which is the organelle that holds and maintains the machinery involved in energy-producing chemical reactions.

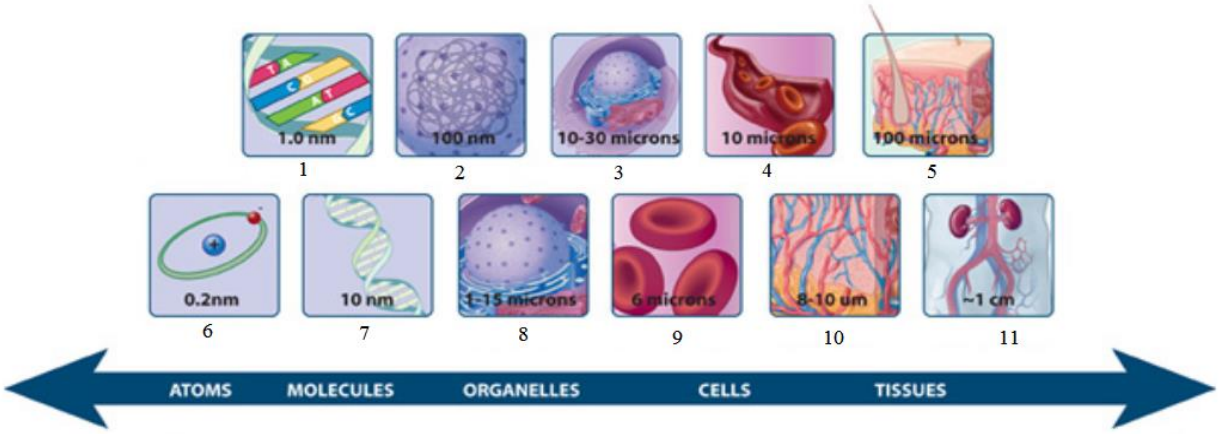
Exercises

1. **Fill in the gaps using words from the box.**

Organelles, nucleic acids, lipids, catalytic, ribonucleic acid, bloodstream, carbohydrates, intercellular organic molecules, proteins, mitochondrion, deoxyribonucleic acid

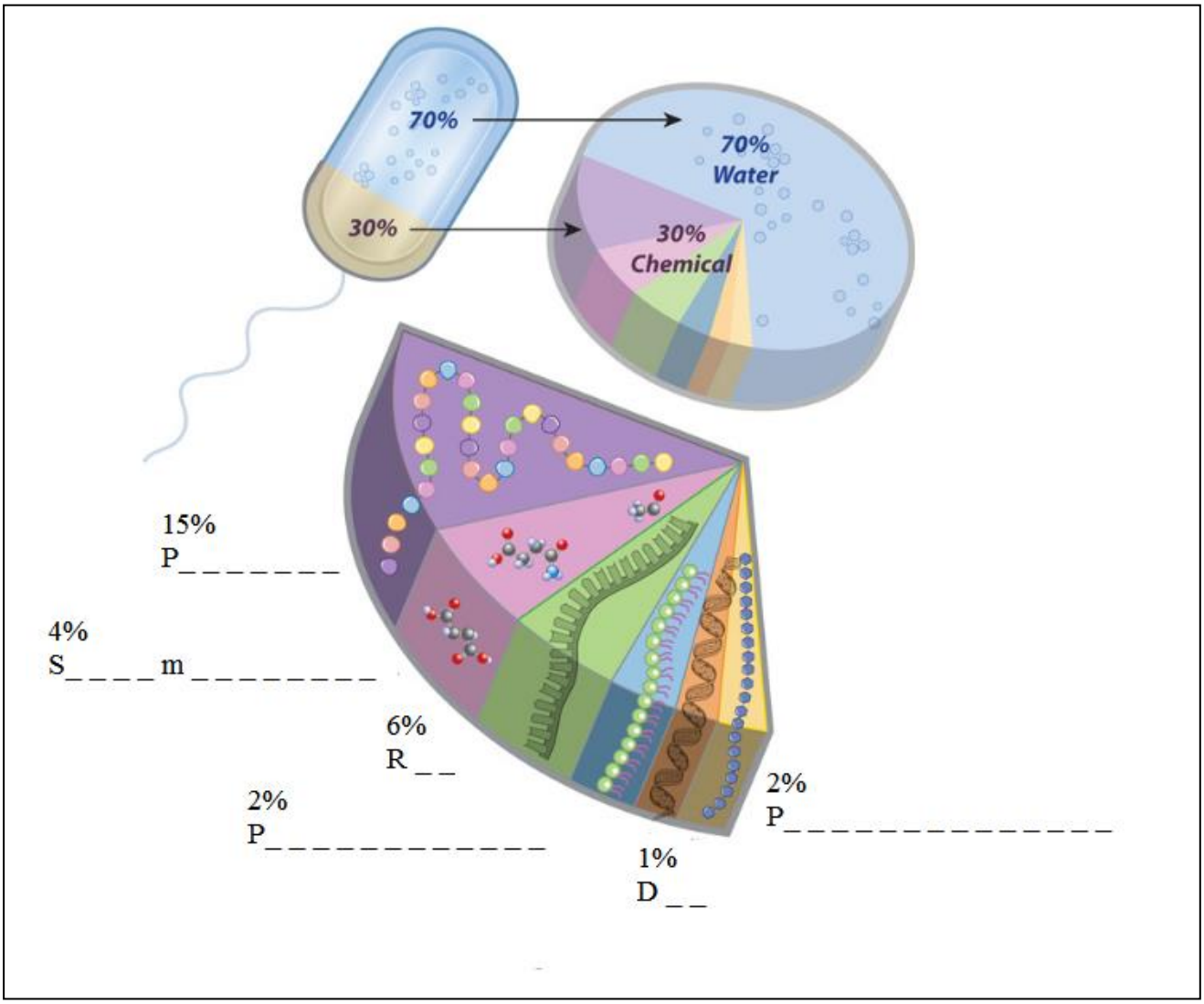
As previously mentioned, a cell's cytoplasm is home to numerous functional and structural elements which are called 1) _____. Let's take a look at the major classes of intracellular organic molecules. 2) _____ are made of amino acids and they serve structural and 3) _____ functions. 4) _____ contain a cell's genetic code. 5) _____ contains all the information needed to build and maintain the cell, 6) _____ helps with expression of the information held in 5) _____. 7) _____ (for example, starch and sugar) are needed for fulfilling cells immediately with energy or accumulate it in intracellular energy stores. 8) ____ are involved in energy storage too. Also, they relay signals within cell and 9) ____. The other important elements of a cell are 10) _____, for example, 11) _____ that holds and maintains the energy-producing chemical reactions.

2. Match the pictures with the names of structures on it.



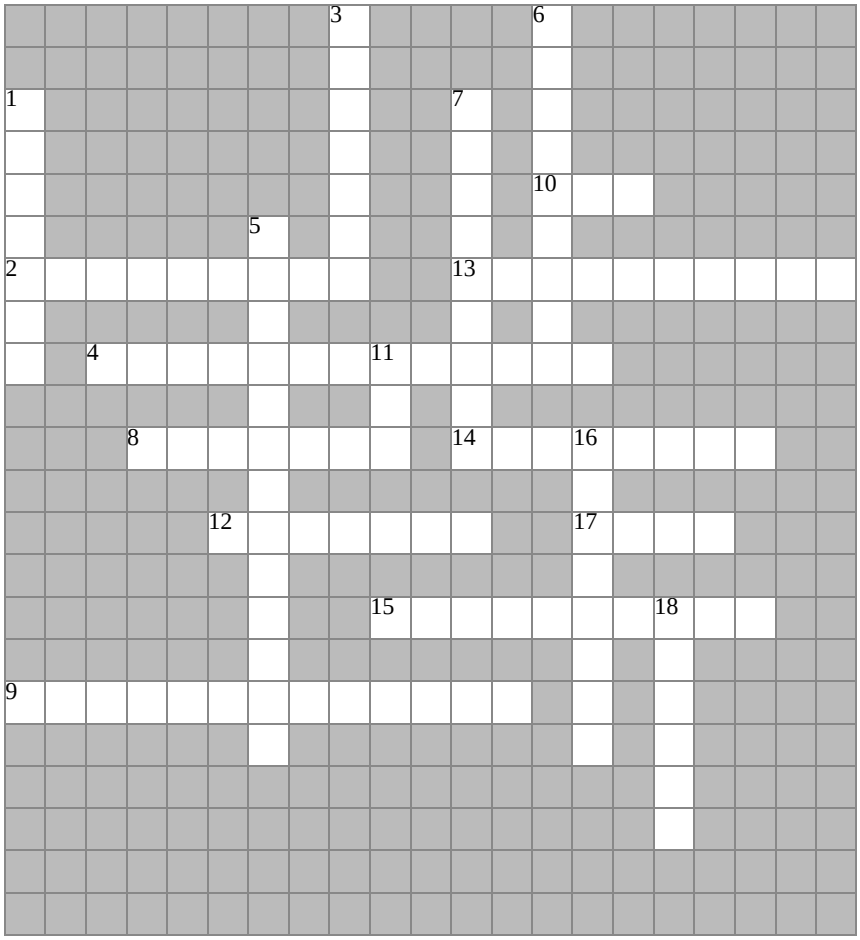
Cell nucleus; chromatin; atoms; arteriole lumen; capillaries; cell body width; blood vessels; human hair; DNA helix; nucleotides; red blood cells.

3. Fill in the gaps to complete the names of components of a cell.



Revision of UNITS1-2

Crossword



Across	Down
2. The process by which different kinds of living organism are believed to have developed from earlier forms during the history of the earth.	1. The membrane-enclosed organelle found in eukaryotic cells.
4. A biological molecule consisting of carbon, hydrogen and oxygen atoms.	3. A complex substance consisting of amino acids.
8. The prokaryotes which have one cell.	5. A double membrane-bound organelle found in all eukaryotic organisms.
9. A class of lipids that are a major component of all cell membranes.	6. An organism whose cells have a nucleus and other organelles enclosed within membranes.
10. A polymeric molecule essential in various biological roles in coding, decoding, regulation, and expression of genes.	7. The material within a living cell, excluding the cell nucleus.
12. Proteins which convert cellular molecules.	11. A molecule that carries the genetic instructions used in the growth, development, functioning and reproduction of all known living organisms and many viruses.
13. Unicellular organism without nucleus.	16. Microscopic living organisms, usually one-celled, that can be found everywhere.
14. A cellular selective barrier.	18. A group of naturally occurring molecules that include fats, waxes, sterols, fat-soluble vitamins (such as vitamins A, D, E, and K).
15. A specialized part of a cell having some specific function; a cell organ.	
17. The structural, functional and biological unit of all organisms.	

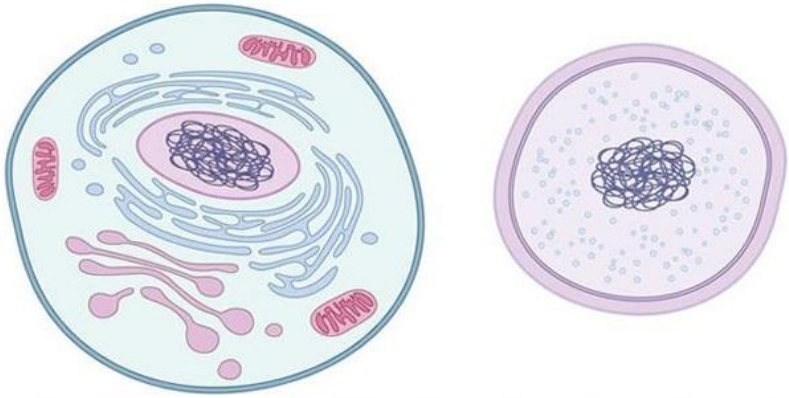
UNIT 3

Vocabulary

DNA – ДНК
Cytoplasm – цитоплазма
Procaryote – прокариоты
Bacteria – бактерия
Archaea – архея
Partitioned of – отгороженный
Nucles – ядро
Eucaryote – эукариоты
Amoebae – амёба
Entities – организм
RNA – РНК
Catalytic – каталитический
Proteins – белки
Nucleic acid – нуклеиновая кислота
Engulfing – поглощение
Cellular evolution – клеточная эволюция
Symbiotic – симбиотический
Chloroplasts – хлоропласты
Mitochondria – митохондрия

What Are the Different Categories of Cells?

Rather than grouping cells by their size or shape, scientists typically categorize them by how their genetic material is packaged. If the DNA within a cell is not separated from the cytoplasm, then that cell is a **prokaryote**. All known prokaryotes, such as bacteria and **archaea**, are single cells. In contrast, if the DNA is partitioned off in its own membrane-bound room called the **nucleus**, then that cell is a **eukaryote (see Fig.1)**. Some eukaryotes, like amoebae, are free-living, single-celled entities. Other eukaryotic cells are part of multicellular organisms. For instance, all plants and animals are made of eukaryotic cells — sometimes even trillions of them.
Researchers hypothesize that all organisms on Earth today originated from a single cell that existed some 3.5 to 3.8 billion years ago. This original cell was likely little more than a sack of small organic molecules and RNA-like material that had both informational and catalytic functions. Over time, the more stable DNA molecule **evolved** to take over the information storage function, whereas proteins, with a greater variety of structures than nucleic acids, took over the catalytic functions.



A eukaryotic cell (left) and a prokaryotic cell (right)

Fig.1

As described in the previous section, the absence or presence of a nucleus — and indeed, of all membrane-bound organelles — is important enough to be a defining feature by which cells are categorized as either prokaryotes or eukaryotes. Scientists believe that the appearance of self-contained nuclei and other organelles represents a major advance in the evolution of cells. But where did these structures come from? More than one billion years ago, some cells "ate" by engulfing objects that floated in the liquid environment in which they existed. Then, according to some theories of cellular evolution, one of the early eukaryotic cells engulfed a prokaryote, and together the two cells formed a **symbiotic** relationship. In particular, the engulfed cell began to function as an organelle within the larger eukaryotic cell that consumed it. Both chloroplasts and mitochondria, which exist in modern eukaryotic cells and still retain their own genomes, are thought to have arisen in this manner.

Exercises

1. **Match words with their definitions.**

1) Deoxyribonucleic acid	A. RNA
2) Ribonucleic acid	B. Symbiotic
3) A microscopic single - celled organism nucleus	C. DNA
4) Any organism whose cells have a nucleus	D. Eukaryote
5) Relationships that include interaction between two different organisms	E. Prokaryote

1)	2)	3)	4)	5)

2. **Write a summary of the text.**

UNIT 4

Vocabulary

Hereditary material – наследственный материал
Mitochondria – митохондрия
Nucleotide – нуклеотид
Maintain – поддерживать
Double helix – двойная спираль
Replicate – реплицироваться (копировать себя)
Sequence – последовательность
Heritage – наследие
Genetic disease – генетическое заболевание
Disorder – отклонение
Breast cancer – рак груди
Ovarian cancer – рак яичников

What is DNA?

DNA, or deoxyribonucleic acid, is the hereditary material in humans and almost all other organisms. Nearly every cell in a person's body has the same DNA. Most DNA is located in the cell nucleus (where it is called nuclear DNA), but a small amount of DNA can also be found in the mitochondria (where it is called mitochondrial DNA or mtDNA).

The information in DNA is stored as a code made up of four chemical bases: adenine (A), guanine (G), cytosine (C), and thymine (T). Human DNA consists of about 3 billion bases, and more than 99 percent of those bases are the same in all people. The order, or sequence, of these bases determines the information available for building and maintaining an organism, similar to the way in which letters of the alphabet appear in a certain order to form words and sentences.

DNA bases pair up with each other, A with T and C with G, to form units called base pairs. Each base is also attached to a sugar molecule and a phosphate molecule. Together, a base, sugar, and phosphate are called a nucleotide. Nucleotides are arranged in two long strands that form a spiral called a double helix. The structure of the double helix is somewhat like a ladder, with the base pairs forming the ladder's rungs and the sugar and phosphate molecules forming the vertical sidepieces of the ladder.

An important property of DNA is that it can replicate, or make copies of itself. Each strand of DNA in the double helix can serve as a pattern for duplicating the sequence of bases. This is critical when cells divide because each new cell needs to have an exact copy of the DNA present in the old cell.

DNA is a double helix formed by base pairs attached to a sugar-phosphate backbone.

DNA discovery

DNA was first observed by a German biochemist named FrederichMiescher in 1869. But for many years, researchers did not realize the importance of this molecule. It was not until 1953 that James Watson, Francis Crick, Maurice Wilkins and Rosalind Franklin figured out the structure of DNA — a double helix — which they realized could carry biological information. Watson, Crick and Wilkins were awarded the Nobel Prize in Medicine in 1962 "for their discoveries concerning the molecular structure of nucleic acids and its significance for information transfer in living material."

DNA testing

Your DNA contains information about your heritage, and can sometimes reveal whether you're at risk for certain diseases. DNA tests, or genetic tests, are used for a variety of reasons, including to diagnose genetic disorders, to determine whether a person is a carrier of a genetic mutation that they could pass on to their children, and to examine whether a person is at risk for a genetic disease. For instance, mutations in the BRCA1 and BRCA2 genes are known to increase the risk of breast and ovarian cancer, and analysis of these genes in a genetic test can reveal whether a person has these mutations.

Genetic test results can show specific features of a person's health, and the tests are often provided along with genetic counseling to help individuals understand the results and consequences of the test.

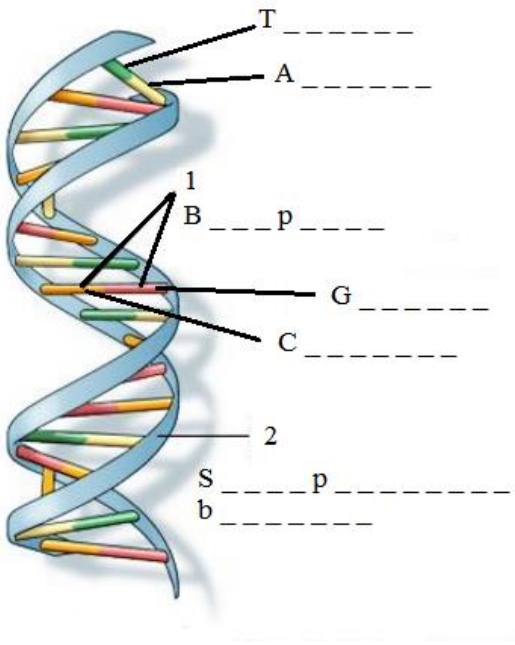
Exercises

1. **Translate into Russian.**

DNA is the hereditary material in humans and almost all other organisms, which is located mainly in cell nucleus, but also in mitochondria. DNA is a double helix, each strand consists of nucleotides. Nucleotides are made of a sugar molecule, a phosphate molecule and one of four chemical bases: adenine (A), guanine (G), cytosine (C), and thymine (T). The sequence of the bases determines the information available for building and maintaining an organism. The important property of DNA is that it can make copies of itself. It’s important when cells divide because each new cell needs to have an exact copy of the DNA present in the old cell.

DNA was discovered in 1869 but the importance of this invention was figured out in 1953 when scientists realized that DNA carries biological information. Today DNA tests may show hidden genetic diseases that could affect your health or pass on your children.

2. **Fill in the gaps.**


T _ _ _ _ _ _
A _ _ _ _ _ _
1
B _ _ _ p _ _ _ _
G _ _ _ _ _ _
C _ _ _ _ _ _ _
2
S _ _ _ _ p _ _ _ _ _ _ _ _
b _ _ _ _ _ _ _

UNIT5

Vocabulary

Acronym – акроним
RNA – РНК
Ribonucleic acid – рибонуклеиновая кислота
Vital – жизненно важный
Visualize – мысленно представить себе
Spiraling ladder – спиральная лестница
Refer – отсылать/ относиться
Vivid picture – яркий пример
Relay – передавать
Proper – нужный/ надлежащий
Countless – бесчисленный
Ribosome – рибосома
Select – выбирать
Amino acid – аминокислота
Stature – размер
messenger RNA – матричная РНК
transfer RNA – транспортная РНК
Messenger – посыльный
Protein-creating – производящие протеин
Fetch – приносить
Referred – называемые
Bases - основания
Adenine - аденин
Guanine - гуанин
Cytosine - цитозин
Uracil – урацил
Attract – притягивать
Contort – искривлять/ искажать

What is RNA?

RNA is the acronym for **ribonucleic acid**. RNA is a vital molecule found in your cells, and it is necessary for life. Pieces of RNA are used to construct **proteins** inside of your body so that new cell growth may take place. When we try to visualize RNA, the best way to do so is to picture a long, spiraling ladder. If it remained in one piece, the long, spiraling ladder would be referred to as **deoxyribonucleic acid** (**DNA**). DNA and RNA are actually thought of as 'cousins.' Now, if you split the long, spiraling ladder down the very middle, you have a pretty vivid picture of RNA. While it is true that RNA exists in various forms, this is its basic structure.

Main Functions of RNA

There are two main functions of RNA. It assists DNA by serving as a messenger to relay the proper genetic information to countless numbers of **ribosomes** in your body. The other main function of RNA is to select the correct **amino acid** needed by each ribosome to build new proteins for your body. While RNA is quite small in stature, your body could not perform as needed without its proper assistance. Let's discuss the two most important types of RNA to get a better idea about RNA's function inside of your body's cells.

Types of RNA

The two most important types of RNA are **messenger RNA** (**mRNA**) and **transfer RNA** (**tRNA**). You can picture the first type, mRNA, as the messenger because that is essentially both its name and job. It is responsible for traveling to the **ribosomes** of a cell. These are the small protein-creating factories located inside of a cell. The mRNA carries a genetic message that tells the ribosomes when it is time to create whatever type of protein that your body needs.

You can picture the second type, tRNA, as the delivery person in a large factory who fetches the proper item to fulfill an order. Transfer RNA is responsible for selecting the proper **amino acid** (one ingredient used to make a protein) to deliver to the ribosome inside of a cell. After the ribosome receives the proper amino acid from the tRNA and the genetic information from the mRNA, it may begin making the correct protein needed by your body.

Components of RNA

The main components of RNA are referred to as **bases**, which are made from sugar and phosphate. There are four bases: **adenine, guanine, cytosine and uracil**. Although ribonucleic acid is best visualized as a one-sided spiraling ladder, the bases are quite attracted to one another. This attraction causes RNA to contort its shape into various forms, which gives the bases the ability to pair together and leave the cell to perform the essential function that your body requires. The four RNA bases will pair together as an adenine/uracil pair and a guanine/cytosine pair.

Exercises

1. **Choose the correct answer**

Where does mRNA travel to deliver the genetic information needed for constructing proteins?

- Golgiapparatus
- Muscles
- Ribosomes
- DNA

Which type of RNA is responsible for selecting the proper amino acid to help with constructing proteins in the cell?

- mRNA
- kRNA
- zRNA
- tRNA

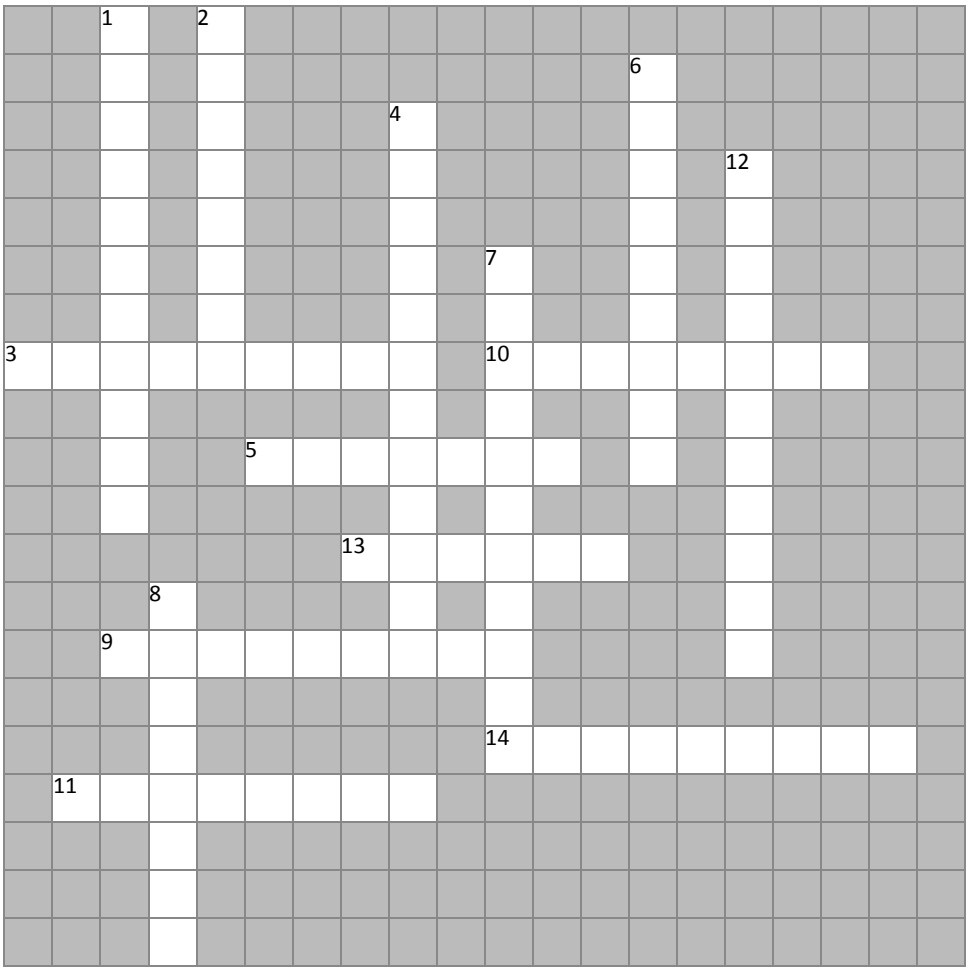
Which of the following is NOT a component of RNA?

- Uracil
- Thymine
- Adenine
- Guanine

2. **<u>Write a summary of the text.</u>**

Revision of UNITS 3-5

Crossword



Across	Down
3. Name of biochemist who first observed DNA in 1869	1. Nucleotides are arranged in two long strands that form a spiral called
5. Base that can be found both in DNA and RNA	2. Molecular machine that builds new proteins for your body
9. Verb, means to make copies of itself	4. Place where mitochondrial DNA can be found
10. Single cell prokaryote	6.Two cells may form a ___ relationship
11. Base that pairs with guanine	7. RNA is ___ acid
13. Base that can be found only in RNA	8.DNA contains information about your
14. liquid environment of a cell that is full of cellular machinery and structural elements	12. Organelle that conducts photosynthesis

UNIT 6

Vocabulary

Protein – белок
Amino acid – аминокислота
Adjacent – примыкающий
A peptide bond – пептидная связь
Polypeptide – полипептид
Solid – соль
Hemoglobin – гемоглобин
Tendon – сухожилие

What are Proteins?

Proteins are polymers of amino acids. Though there are hundreds of thousands of different proteins that exist in nature, they are all made up of different combinations of amino acids. Proteins are large molecules that may consist of hundreds, or even thousands, of amino acids. Amino acids all have the general structure (see Fig. 2).

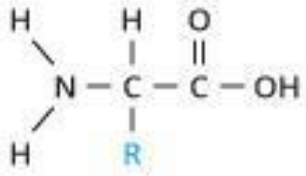


Fig. 2

The R in the diagram represents a functional group that varies depending on the specific amino acidin question. For example, R can be simply an H atom, as in the amino acid glycine, or a more complex organic group. When two amino acids bond together, the two ends of nearby amino acids (shown in red) are released and the carbon (called a carboxyl) end of one amino acid bonds to the nitrogen end of the adjacent one forming a peptide bond, as illustrated in Fig. 3.

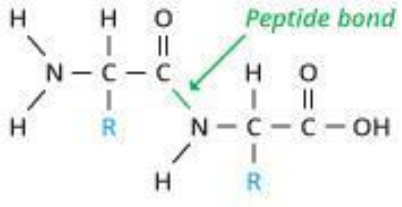


Fig. 3

Purpose of proteins

When many amino acids bond together to create long chains, the structure is called a protein (it is also called a polypeptide because it contains many peptide bonds). Proteins serve two broad purposes in the human body:

Structural proteins form most of the solid material in the human body. For example, the structural proteins keratin and collagen are the main component of your hair, muscles, tendons and skin.

Functional proteins help carry out activities and functions in the human body. For example, hemoglobin is a functional protein that occurs in the red blood cells and helps to transport oxygen in the body. Myosin is a protein that occurs in muscle tissue and is responsible for the ability of muscles to contract. Insulin is a functional protein that helps regulate the storage of the sugarglucose in the human body. A subclass of the functional proteins is the group of polypeptides referred to as enzymes. Enzymes help to carry out specific chemical reactions in the body. For example, amylase is an enzyme that occurs both in human saliva and in the intestines that helps to break apart the glucose-glucose bonds in the carbohydrate starch, thus allowing your body to absorb the glucose and use it for energy.

There are an estimated 100,000 different proteins in the human body alone, and each of them is made up of a combination of different combinations of only 20 amino acids. Each protein has a different structure and performs a different function in the body. When we eat protein-containing foods (such as meat, fish, beans, eggs, cheese, etc.) the polypeptide chains are generally broken down in the digestive tract and the individual amino acids are absorbed into our bodies. These amino acidsare then recombined into proteins specific to each individual person in a process called *protein synthesis*.

Job-specific aspects of protein structure

In order to carry out these very precise jobs in the body, each individual protein has to be unique and specific to the job in question. Four aspects of a protein's structure are specific to the job the protein does in the body.

Primary Structure (1°): The first aspect of a protein's structure is called the *primary structure (1°)*. The primary structure of a protein is the sequence of amino acids in the protein. The number of amino acids in a protein can vary from the hundreds to the thousands, and the sequence in which those 20 different amino acids just mentioned occur (obviously one amino acid can occur in a protein many times) is specific to the individual protein, just as the sequence of numbers in your phone number is specific to your phone.

Secondary Structure (2°): The *secondary structure (2°)* of a protein is defined by the way the long strands of amino acids coil about themselves. Just as a phone cord wraps around itself to form a coil, a protein will also wrap around itself, and the degree and tightness of the coil is specific to the protein in question.

Tertiary Structure (3°): Once a protein is coiled, the protein will begin to fold onto itself (similar to the way a phone cord tangles around itself); this folding is specific to the protein's function and is called the protein's *tertiary structure (3°)*.

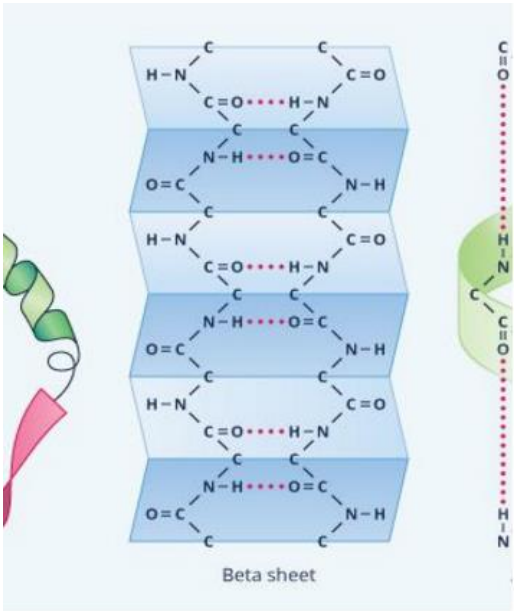
Quaternary Structure (4°): Some proteins have an additional layer of structure in which multiple polypeptides, each folded in their own way, come together to form a larger functional unit. This is called the *quaternary structure (4°)*. These large multi-subunit proteins show great complexity due to the unique contributions of each polypeptide. Some examples of proteins with quaternary structure are hemoglobin and antibodies, both of which are made of four separate polypeptides.

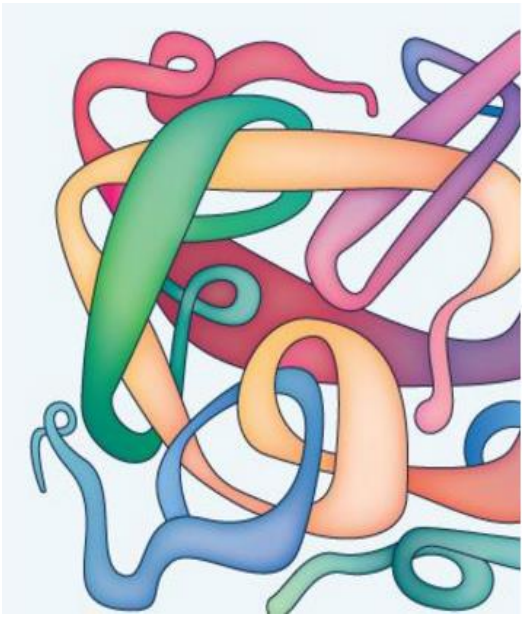
Exercises

1. **<u>Unshuffle the word and make up definition (The first and the last letter are on the right places).</u>**

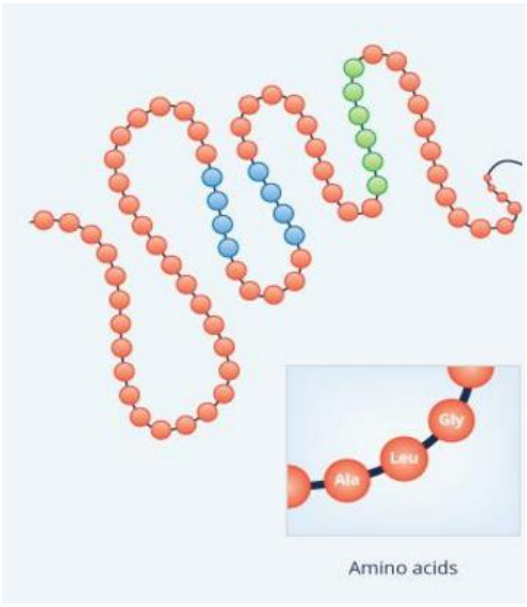
- Hielogbomn
- Ptrieon
- Mioysn
- Iinulsn
- Eymzne
- Pplpteyidoe

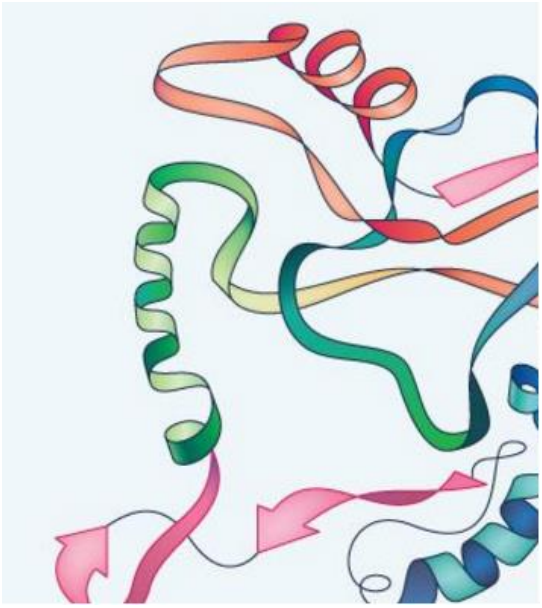
2. **<u>Define and describe the structures.</u>**





1)_____ **2)** _____





3)_____ **4)_____**

UNIT 7

Vocabulary

Carbohydrates – углеводы
Carbon – углерод
Hydrogen – водород
Oxygen –кислород
Bond together – связываться вместе
Ratio – соотношение
Obtain – получать
In reverse – в обратном порядке
Storage system – накапливающая система
Glucose molecules – глюкоза
Monosaccharide – моносахарид
Disaccharide – дисахарид
Polysaccharide – полисахарид
Starch – крахмал
Saliva – слюна
Intestines – кишечник
Liver – печень
Two-dimensional structure – двумерная структура
Fiber – клетчатка
Be digested – быть переваренным
Digestive tract – пищеварительный тракт
Stiff – жесткий

What are Carbohydrates?

Carbohydrates are the main energy source for the human body. Chemically, carbohydrates are organic molecules in which carbon, hydrogen, and oxygen bond together in the ratio: $C_x(H_2O)_y$, where *x* and *y* are whole numbers that differ depending on the specific carbohydrate to which we are referring. Animals (including humans) break down carbohydrates during the process of metabolism to release energy. For example, the chemical metabolism of the sugar glucose is shown below:

$$C_6H_{12}O_6 + 6\,O_2 \rightarrow 6\,CO_2 + 6\,H_2O + energy$$

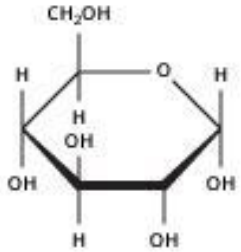
Animals obtain carbohydrates by eating foods that contain them, for example potatoes, rice, breads, and so on. These carbohydrates are manufactured by plants during the process of photosynthesis. Plants harvest energy from sunlight to run the reaction just described in reverse:

$$6\,CO_2 + 6\,H_2O + \underset{(from\ sunlight)}{energy} \rightarrow C_6H_{12}O_6 + 6\,O_2$$

A potato, for example, is primarily a chemical storage system containing glucose molecules manufactured during photosynthesis. In a potato, however, those glucose molecules are bound together in a long chain. As it turns out, there are two types of carbohydrates, the simple sugars and those carbohydrates that are made of long chains of sugars - the complex carbohydrates.

Simple sugars

All carbohydrates are made up of units of sugar (also called saccharide units). Carbohydrates that contain only one sugar unit (monosaccharides) or two sugar units (disaccharides) are referred to as simple sugars. Simple sugars are sweet in taste and are broken down quickly in the body to release energy. Two of the most common monosaccharides are glucose and fructose. Glucose is the primary form of sugar stored in the human body for energy. Fructose is the main sugar found in most fruits. Both glucose and fructose (Fig. 4a and 4b) have the same chemical formula ($C_6H_{12}O_6$); however, they have different structures, as shown (note: the carbon atoms that sit in the "corners" of the rings are not labeled):



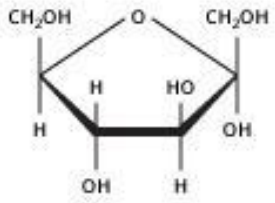


Fig. 4a- glucose *Fig. 4b- fructose*

Disaccharides have two sugar units bonded together. For example, common table sugar is sucrose, a disaccharide that consists of a glucose unit bonded to a fructose unit:

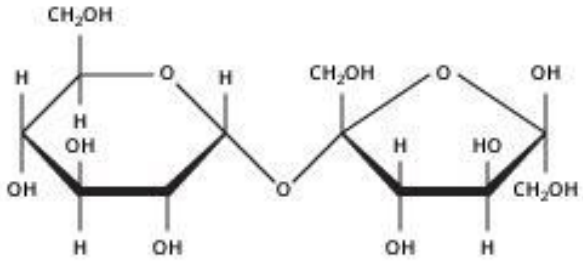


Fig. 5 – sucrose

Complex carbohydrates

Complex carbohydrates are polymers of the simple sugars. In other words, the complex carbohydrates are long chains of simple sugar units bonded together (for this reason the complex carbohydrates are often referred to as polysaccharides). The potato we discussed earlier actually contains the complex carbohydrate starch. Starch is a polymer of the monosaccharide glucose.

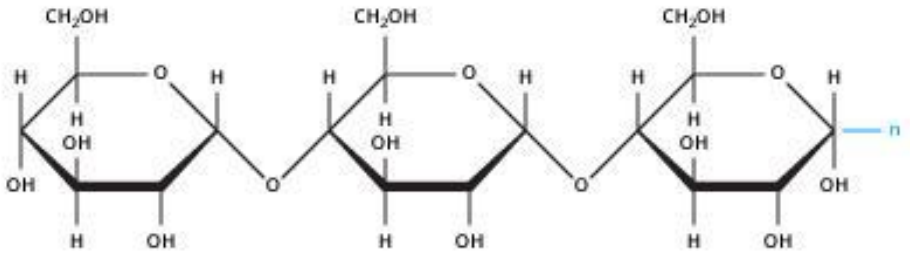


Fig. 6 – starch

Starch is the principal polysaccharide used by plants to store glucose for later use as energy. Plants often store starch in seeds or other specialized organs; for example, common sources of starch include rice, beans, wheat, corn, potatoes, and so on. When humans eat starch, an enzyme that occurs in saliva and in the intestines called amylase breaks the bonds between the repeating glucose units, thus allowing the sugar to be absorbed into the bloodstream. Once absorbed into the bloodstream, the human body distributes glucose to the areas where it is needed for energy or stores it as its own special polymer – glycogen.

Glycogen, another polymer of glucose, is the polysaccharide used by animals to store energy. Excess glucose is bonded together to form glycogen molecules, which the animal stores in the liver and muscle tissue as an "instant" source of energy. Both starch and glycogen are polymers of glucose; however, starch is a long, straight chain of glucose units, whereas glycogen is a branched chain of glucose units, as seen below:

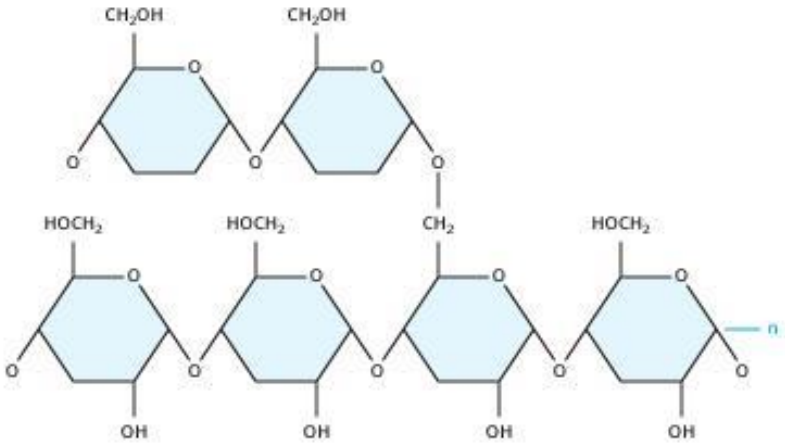


Figure 7 – glycogen

Another important polysaccharide is cellulose. Cellulose is yet a third polymer of the monosaccharide glucose. Cellulose differs from starch and glycogen because the glucose units form a two-dimensional structure, with hydrogen bonds holding together nearby polymers, thus giving the molecule added stability (Fig. 8). Cellulose, also known as plant fiber, cannot be digested by human beings, therefore cellulose passes through the digestive tract without being absorbed into the body. Some animals, such as cows and termites, contain bacteria in their digestive tract that help them to digest cellulose. Cellulose is a relatively stiff material, and in plants it is used as a structural molecule to add support to the leaves, stem, and other plant parts. Despite the fact that it cannot be used as an energy source in most animals, cellulose fiber is essential in the diet because it helps exercise the digestive track and keep it clean and healthy.

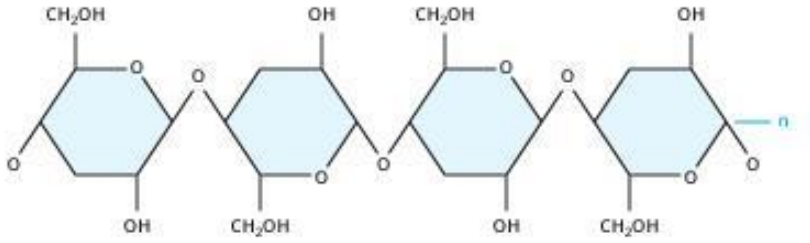


Figure 8 –cellulose

Exercises

1. **<u>Do you think these statements are true or false? Why?</u>**

- Monosaccharides contain two sugar units, disaccharides contain one sugar unit.
- Glucose and fructose have different chemical formula.
- Complex carbohydrates are long chains of simple sugar units bonded together.
- Starch is a polymer of glucose, glycogen is a polymer of fructose.
- Fiber can be digested by humans, but it’s harmful for human’s digestive tract.
- Cellulose is a two-dimensional structure.

UNIT8

Vocabulary

Fats – жиры
Insoluble – нерастворимый
Consumption – потребление
Fat reserves – запасы жира
Hormones – гормоны
Lipids – липиды
Saturated Fats – насыщенные жиры
Liquid – жидкость
Bond – связь
Monounsaturated fats – мононенасыщенные жиры

What are Fats?

Fats are a subgroup of compounds known as lipids that are found in the body and have the general property of being hydrophobic (meaning they are insoluble in water). Fats are also known as triglycerides, molecules made from the combination of one molecule of glycerol with three fatty acids.

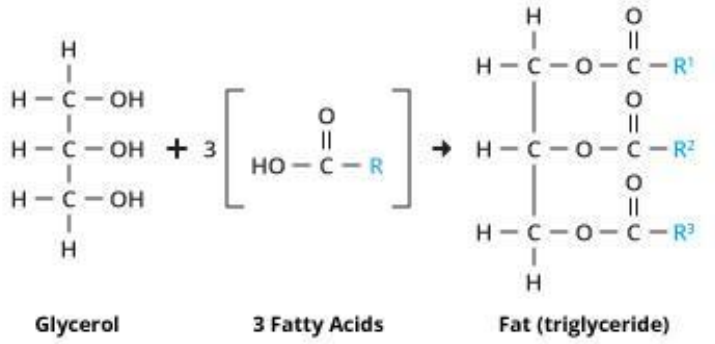


Fig. 9

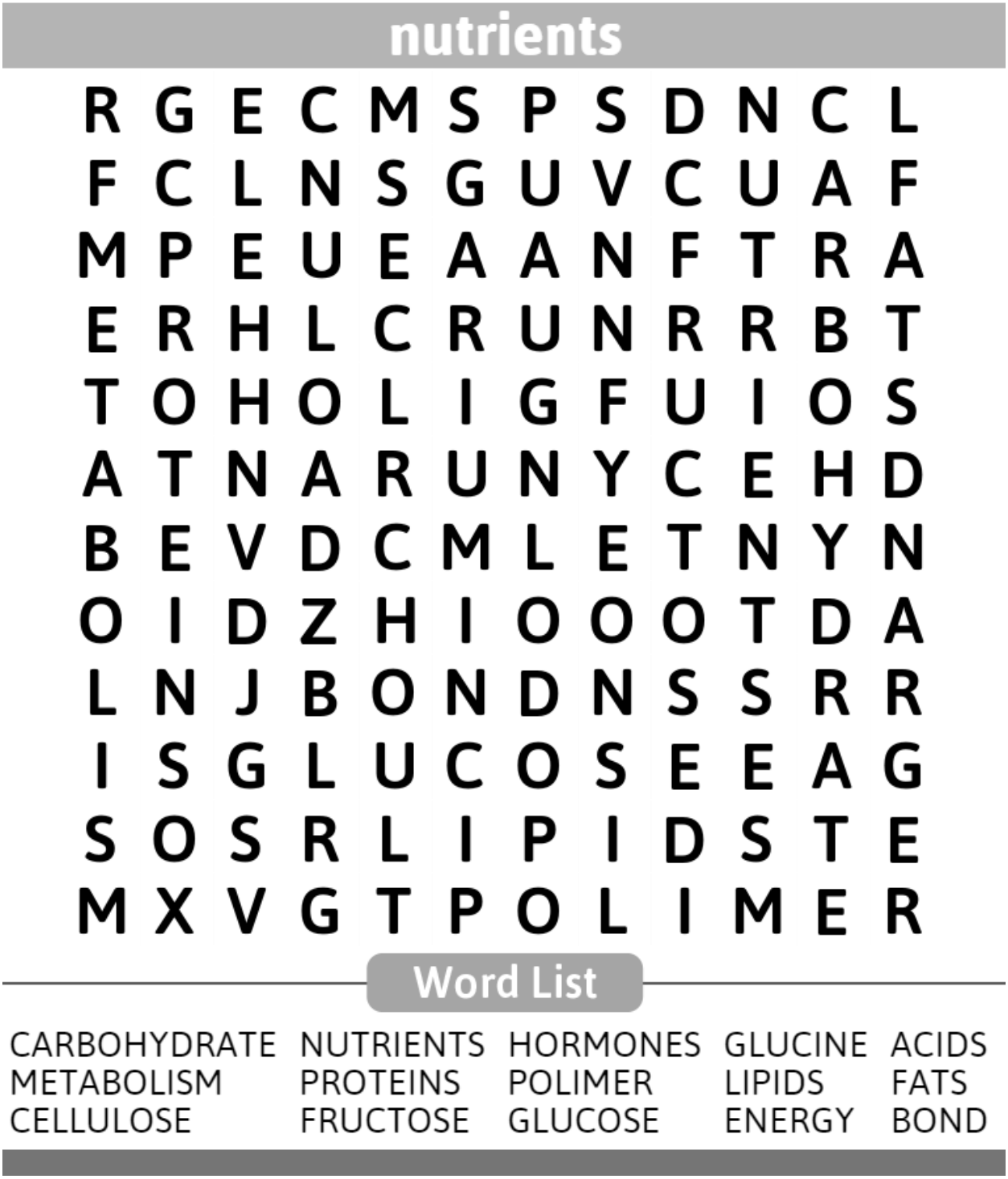
The main purpose of fats in the body is to serve as a storage system and reserve supply of energy. During periods of low food consumption, fat reserves in the body can be mobilized and broken down to release energy. Fats serve as an insulation material to allow body heat to be conserved and fats line and protect delicate internal organs from physical damage. Fats in the diet can be converted to other lipids that serve as the main structural material in the membranes surrounding our cells. Fats are also used in the manufacture of some steroids and hormones that help regulate proper growth and maintenance of tissue in the body.
Fats can be classified as either saturated or unsaturated depending on the structure of the long carbon-carbon chains in the fatty acids (the R's in Fig. 9).
Saturated Fats: Fats that contain no double bonds in their fatty acid chains are referred to as *saturated fats*. These fats tend to be solid at room temperature, such as butter or animal fat. The consumption of saturated fats carries some health risks in

that they have been linked to arteriosclerosis (hardening of the arteries) and heart disease.

Unsaturated Fats: *Unsaturated fats* contain some number of double bonds in their structure. These fats are generally liquid at room temperature (fats that are liquid at room temperature are referred to as oils). Unsaturated fats can be either polyunsaturated (many double bonds) or monounsaturated fats (one or few double bonds). Recent research suggests that the healthiest of the fats in the human diet are the monounsaturated fats, such as olive oil and canola oil, because they appear to be beneficial in the fight against heart disease.

Exercises

1. **Find all the words mentioned in the Word List**



UNIT 9

Vocabulary

Ultimately – в конечном счете
Trace back – установить связь
Fertilized egg – оплодотворенная яйцеклетка
Makeup – состоять из
Pool – пул
Stem cell – стволовая клетка
Embryo – эмбрион
Specialized – специализированные
Differentiated – дифференцированные
Decade – декада, период в 10 лет
Gradually – постепенно
Decipher – расшифровывать
Replicate – реплицироваться
Property – свойство
Appealing – привлекательный
Seek – искать, стремиться
Treatment – лечение
Damaged–поврежденный
Embryonic stem cells – эмбриональные стволовые клетки
Derive – извлекать
Adult stem cells – взрослые стволовые клетки
Tissue – ткань
Umbilical cord blood – пуповинная кровь
Placenta – плацента
Incurable – неизлечимый
Insulin-producing – продуцирующие инсулин
Pancreas – поджелудочная железа
Merely – только
Alleviate – смягчать

What is a stem cell?

Ultimately, every cell in the human body can be traced back to a fertilized egg that came into existence from the union of egg and sperm. But the body is made up of over 200 different types of cells, not just one. All of these cell types come from a pool of *stem cells* in the early embryo. During early development, as well as later in life, various types of stem cells give rise to the *specialized* or *differentiated* cells that carry out the specific functions of the body, such as skin, blood, muscle and nerve cells.

Over the past two decades, scientists have been gradually deciphering the processes by which unspecialized stem cells become the many specialized cell types in the body. Stem cells can replicate themselves or produce specialized cell types. This property makes stem cells appealing for scientists seeking to create medical treatments that replace lost or damaged cells.

Types of stem cells

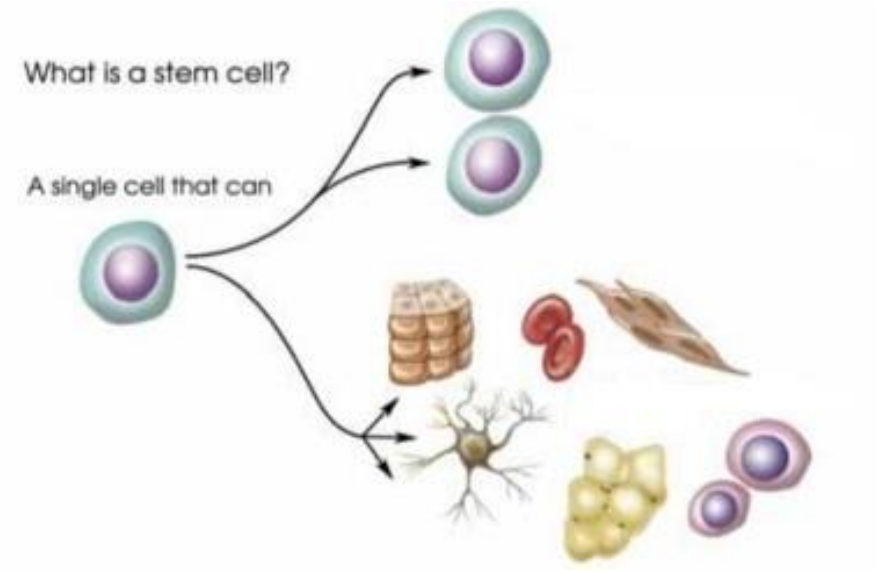
Stem cells are found in all of us, from the early stages of human development to the end of life. All stem cells may prove useful for medical research, but each of the different types has both promise and limitations. *Embryonic stem cells*, which can be derived from a very early stage in human development, have the potential to produce all of the body's cell types. *Adult stem cells*, which are found in certain tissues in fully developed humans, from babies to adults, may be limited to producing only certain types of specialized cells. Recently, scientists have also identified stem cells in umbilical cord blood and the placenta that can give rise to the various types of blood cells.

Why stem cell research is being pursued?

Right now, only a few diseases are treatable with stem cell therapies because scientists can only regenerate a few types of tissues. However, the success of the most established stem cell-based therapies – blood and skin transplants – gives hope that someday stem cells will allow scientists to develop therapies for a variety of diseases previously thought to be incurable. Many major diseases are caused by the loss of the insulin-producing cells of the pancreas, and its treatment is limited to merely alleviating the symptoms. Finding a cure for such diseases would be much easier if scientists could simply re-grow the missing or damaged cells and implant them into patients.

Exercises

1. **<u>Look at the picture and write the processes shown</u>**

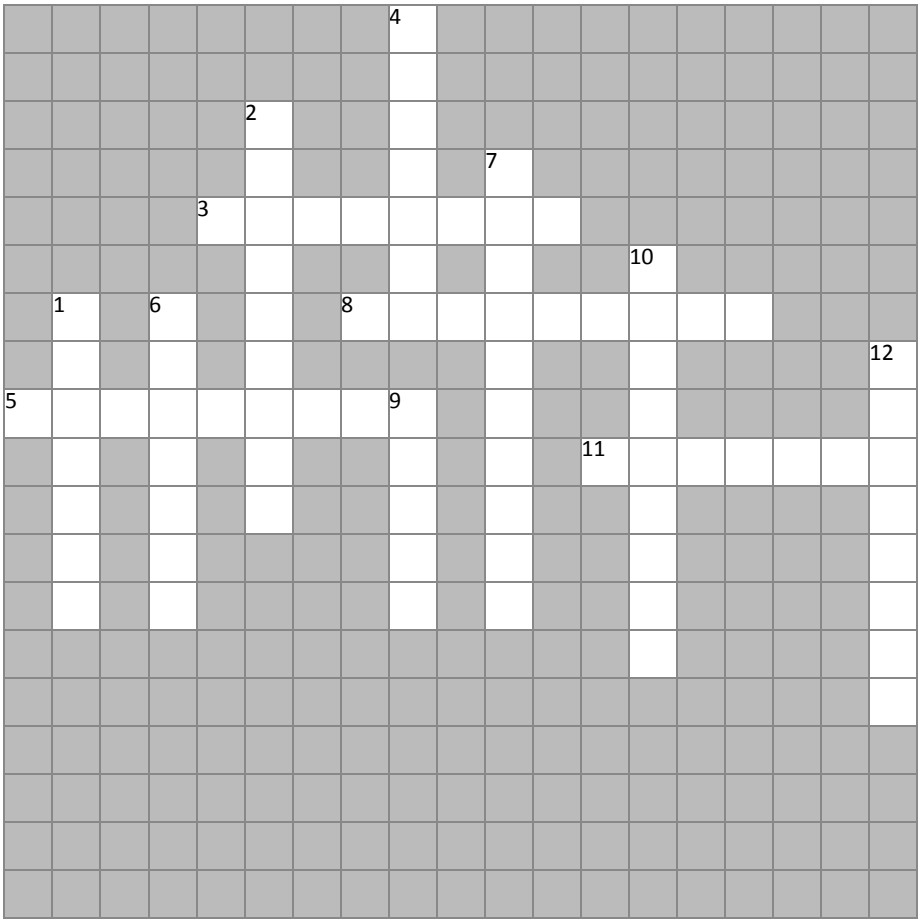


2. <u>Find mistakes in the following statements and correct them.</u>

1. Stem cells can't be found in the body of a newborn baby.
2. Every stem cell initially has its own function in body which can't be changed.
3. Scientists are not interested in stem cell – based therapies as they are not promising.
4. There are 3 types of stem cells: embryonic, adult and senile.
5. Today scientists haven't found yet any appliance of stem cells in medicine.

Revision of UNITS 6-9

Crossword



Down	Across
3. Polymer of glucose which is the polysaccharide used by animals to store energy	1. Carbohydrates that are polymers of the simple sugars are called
5. Type of stem cells which can be derived from a very early stage in human development	2. Polymer of the monosaccharide glucose which is also known as plant fiber and cannot be digested by human beings
8. Protein structure that reminds phone cord	4. Primary form of sugar stored in the human body for energy
11. Polymer of amino acids	6. Structural protein, the main component of your hair
	7. Functional protein that occurs in the red blood cells and helps to transport oxygen in the body
	9. In a potato glucose molecules are bound together in a long ___
	10. Fats that contain no double bonds in their fatty acid chains
	12. Organ which produces insulin

UNIT 10

Vocabulary

Niche – ниша
Step out – выйти
Whirlwind – вихрь
Breeding – селекция
Traits – черты
Slaughtering – производство
Enhancement – повышение
Bioluminescent – биолюминесцентный
To resign in disgrace –уйти в отставку с позором
Gelding – мерин
Transgenic pigs – трансгенные свиньи
Gestated – выношенный
Pass down through –пройти через
Ganglia – нервный узел
Moth – мотылек
Pupa stage – стадия куколки
Warehouse – склад
Body fluids – жидкости организма
Saliva – слюна
Consequences – последствия
Organic parent – органические родители
Artificial genome – искусственный геном
Hemispheres – полушария
Maze – лабиринт
Owl – сова
Prosthetic arm – протез руки
Rat neurons – нейроны крысы
Integrated chip – интегральная микросхема
Lamprey eel brain – мозг миноги
Full-intact – полностью неповреждённый
Nutrient medium – питательная среда
Cart – тележка
Sole processor – единственным процессором

TED Talk

Find a TED talk by Paul Root Wolpe “It’s Time to Question Bio-Engineering”, watch it and do the following exercises.

Exercises

1. Answer the following questions in order to check your understanding.

2. Which three stages of evolution did the speaker mention?
3. What are the examples of intentionally - designed creatures?
4. What animalsarehybrids?
5. From which organisms the bioluminescent genes were taken out?
6. What two creatures were created to save endangered species?
7. How did the monkey manage a prosthetic arm?
8. For what it is necessary to grow skin that is less immunoreactive to human skin?
9. How is the DNA synthesis carried out?

6. Choose one statement. Debate if it's right or not.

1. Experimenting on animals is ethical.
2. Eating genetically modified products is fine.
3. Cloning animals in order to save the endangered species is useless idea.
4. The increase of biotechnological opportunities may lead to degradation of human as specie.

VOCABULARY

A

Acronym – акроним
Adenine – аденин
Adjacent – примыкающий
Adult stem cells – взрослые стволовые клетки
Alleviate – смягчать
Amino acid – аминокислота
Amoebae – амёба
Appealing – привлекательный
Archaea – архея
Artificial genome – искусственный геном
Attract – притягивать

B

Bacteria – бактерия
Bases – основания
Be digested – быть переваренным
Bioluminescent – биолюминесцентный
Blood serum – сыворотка крови
Blood stream – кровообращение
Body fluids – жидкости организма
Bond – связь
Bond together – связываться вместе
Boundary – граница
Breast cancer – рак груди
Breeding – селекция

C

Carbohydrates – углеводы
Carbon – углерод
Cart – тележка
Catalytic – каталитический
Catalytic function – каталитическая функция
Cell division – деление клетки
Cellular evolution – клеточная эволюция
Cellular machinery – так называют химические компоненты клетки, которые функционируют вместе для различных нужд клетки
Chloroplasts – хлоропласты
Consequences – последствия

Consumption – потребление
Contort – искривлять/ искажать
Countless – бесчисленный
Cytoplasm – цитоплазма
Cytosine –цитозин

D

Damaged – поврежденный
Decade – декада, период в 10 лет
Decipher – расшифровывать
Deoxyribonucleicacid (DNA) - дезоксирибонуклеиновая кислота (ДНК)
Derive – извлекать
Differentiated – дифференцированные
Digestivetract –пищеварительный тракт
Disaccharide – дисахарид
Disorder – отклонение
DNA – ДНК
Doublehelix – двойная спираль

E

Embryo – эмбрион
Embryonic stem cells – эмбриональные стволовые клетки
Energy-producing chemical reactions – химические реакции образования энергии
Engulfing – поглощение
Enhancement – повышение
Entities – организм
Enzymes – энзимы
Eucaryote – эукариоты
Externalenvironment – внешняя среда

F

Fat reserves – запасы жира
Fats – жиры
Fertilized egg – оплодотворенная яйцеклетка
Fetch – приносить
Fiber – клетчатка
Framework – структура
Full-intact – полностью неповрежденный

G

Ganglia – нервный узел
Gatekeepers – привратники
Gelding – мерин
Geneticdisease – генетическое заболевание
Gestated – выношенный
Glucosemolecules – глюкоза
Gradually – постепенно
Guanine – гуанин

H

Hemispheres – полушария
Hemoglobin – гемоглобин
Hereditarymaterial – наследственный материал
Heritage – наследие
Hormones – гормоны
Hydrogen – водород

I

Inreverse – в обратном порядке
Incurable – неизлечимый
Insoluble – нерастворимый
Insulin-producing – продуцирующие инсулин
Integrated chip – интегральная микросхема
Intestines – кишечник
Intracellular organic molecules – внутриклеточные органические молекулы

L

Lampreyeel brain – мозг миноги
Lipids – жиры, липиды
Liquid – жидкость
Liver – печень

M

Maintain- поддерживать
Makeup – состоять из
Maze – лабиринт
Merely – только
Messenger – посыльный

Messenger RNA – матричная РНК
Mitochondria – митохондрия
Monosaccharide – моносахарид
Monounsaturated fats – мононенасыщенные жиры
Moth – мотылек

N

Niche – ниша
Nonetheless – тем не менее
Nucleicacid – нуклеиновая кислота
Nucleotide – нуклеотид
Nucleus – ядро
Nutrientmedium – питательная среда

O

Obtain – получать
Organelles – органоиды
Organicparent – органические родители
Ovariancancer – рак яичников
Owl – сова
Oxygen – кислород

P

Pancreas – поджелудочная железа
Partitioned of – отгороженный
Pass down through – пройти через
Peptide bond – пептидная связь
Permeable – проницаемой
Placenta – плацента
Plasma membrane – плазматическая мембрана
Polypeptide – полипептид
Polysaccharide – полисахарид
Pool – пул
Procaryote – прокариоты
Proper – нужный/ надлежащий
Property – свойство
Prosthetic arm – протез руки
Protein – белок, протеин
Protein-creating – производящие протеин
Pupa stage – стадия куколки

R

Rat neurons – нейроны крысы
Ratio – соотношение
Refer – отсылать/ относиться
Referredtoas – называемые
Relay – передавать
Replicate – реплицироваться (копировать себя)
Replicate the genome –репликация генома
Resign in disgrace – уйти в отставку с позором
Ribonucleic acid (RNA) –рибонуклеиновая кислота (РНК)
Ribosome – рибосома
RNA – РНК

S

Saliva – слюна
SaturatedFats – насыщенные жиры
Seek – искать, стремиться
Select – выбирать
Sequence – последовательность
Slaughtering – производство
Sole processor – единственным процессором
Solid – соль
Specialized – специализированные
Spiralin gladder – спиральная лестница
Starch – крахмал
Stature – размер
Stemcell – стволовая клетка
Stepout – выйти
Stiff – жесткий
Storage system – накапливающая система
Structural function – структурная функция
Symbiotic – симбиотический

T

Tendon – сухожилие
Tissue – ткань
Traceback – установить связь
Traits – черты
Transfer RNA – транспортная РНК
Transgenic pigs – трансгенные свиньи
Treatment – лечение

Two-dimensional structure – двумерная структура

U

Ultimately – в конечном счете
Umbilicalcor dblood – пуповинная кровь
Uracil – урацил

V

Visualize – мысленно представить себе
Vital – жизненно важный
Vividpicture – яркий пример

W

Warehouse – склад
Whirlwind – вихрь

KEYS

UNIT 1

Task 1: 1- C; 2- A; 3- A; 4- B; 5- B; 6- B.

Task 2: 1-B; 2-A; 3-C. 1st frame- Phospholipids; 2nd - Cell membrane; 3rd– Cytoplasm.

UNIT2

Task 1: 1-intercellular organic molecules; 2- proteins; 3- catalytic; 4- nucleic acids; 5- deoxyribonucleic acid; 6- ribonucleic acid; 7- carbohydrates; 8- lipids; 9- bloodstream;

10- organelles; 11- mitochondrion.

Task 2: 1-nucleotides; 2-chromatin; 3-cell body width; 4-arteriole lumen; 5- human hair; 6-atoms; 7-DNA helix; 8- cell nucleus; 9- red blood cell; 10- capillaries; 11- blood vessels.

Task 3: 15%- proteins; 4%- small molecules; 6%- RNA; 2%- Phospholipids; 1%- DNA; 2%- Polysaccharides.

RevisionCrossword

Answers

Across:	*Down*:
2. evolution	1. nucleus
4. carbohydrates	3. protein
8. archaea	5. mitochondrion
9. phospholipids	6. eukaryote
10. RNA	7. cytoplasm
12. enzymes	11. DNA
13. prokaryote	16. bacteria
14. membrane	18. lipids
15. organelles	
17. cell	

UNIT 3

Task 1: CAEDB

Task 2: Summary

UNIT 4

Task 1:

ДНК-это генетический материал человека и почти всех других организмов, который содержится в основном в ядре клетки, а также в митохондриях. ДНК-это двойная спираль, каждая цепь которой состоит из нуклеотидов. Нуклеотиды образуются из молекулы сахарида, остатка фосфорной кислоты и азотистых оснований: аденина, гуанина, тимина, цитозина. Последовательность этих оснований определяет информацию, необходимую для образования и поддержания организма. Важным свойством является то, что ДНК может создавать свои копии. Это важно при делении клеток, потому что в каждой новой клетке должна быть точная копия ДНК, находившейся в старой клетке.

ДНК была открыта в 1869 году, но важность этого открытия поняли в 1953 году, когда ученые выяснили, что ДНК несет в себе биологическую информацию. Сегодня ДНК-тестирования позволяют обнаружить скрытые генетические болезни, которые могут влиять на здоровье или передаваться по наследству потомкам.

Task 2: 1- thymine; 2- adenine; 3- base pairs; 4- guanine; 5- cytosine; 6- sugar phosphate backbone

UNIT 5
Task 1: 1- Ribosomes; 2- tRNA; 3- Thymine
Tast 2: Summary

REVISION

Across	Down
3. Frederich	1. doublehelix
5. adenine	2. ribosome
9. replicate	4. mitochondria
10. bacteria	6. symbiotic
11. cytosine	7. ribonucleic
13. uracil	8. heritage
14. cytoplasm	12. chloroplast

UNIT 6
Task 1: 1-Hemoglobin; 2-Protein; 3- Myosin; 4-Insulin; 5- Enzyme; 6- Polypeptide. (Definitions: 1) functional protein that occurs in the red blood cells and helps to transport oxygen in the body; 2) polymer of amino acids; 3) protein that occurs in muscle tissue and it’s responsible for the ability of muscles to contract; 4)functional protein that helps regulate the storage of the sugar glucose in the body; 5) helps to carry out specific chemical reactions; 6) the structure of many amino acids bonded

together, which contains many peptide bonds)

Task 2: 1-Secondary Structure; 2- Quaternary Structure; 3-Tertiary Structure; 4-Primary Structure.

UNIT 7

Task 1: 1- False; 2-False; 3-True; 4-False (Glycogen is a polymer of fructose too); 5-False; 6-True.

UNIT 9

Task 1: 1 – replicate itself; 2 – differentiate into many cell types

Task 2: 1 - Stem cells can be found in the body of a newborn baby; 2- Every stem cell initially has its own function in body which can't be changed. 3 - Scientists seek to create medical treatments that replace lost or damaged cells; 4 - There are 2 types of stem cells: embryonic, and adult; 5 - Today scientists use stem cells for blood and skin transplants.

REVISION

Down:	Across:
3. glycogen	1. complex
5. embryonic	2. cellulose
8. secondary	4. glucose
11. protein	6. keratin
	7. hemoglobin
	9. chain
	10. saturated
	12. pancreas

Оглавление

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Миссия университета – генерация передовых знаний, внедрение инновационных разработок и подготовка элитных кадров, способных действовать в условиях быстро меняющегося мира и обеспечивать опережающее развитие науки, технологий и других областей для содействия решению актуальных задач.

КАФЕДРА ИНОСТРАННЫХ ЯЗЫКОВ

Объединенная кафедра иностранных языков, являющаяся подразделением Института Международного Развития и Партнерства, с 2015 года получила возможность - в частности, в рамках программы 5-100 - реализовать программы коммуникативного курса английского языка. Количество часов, предусмотренное для изучения иностранных языков, было увеличено в несколько раз, массово внедряются современные учебные материалы и пособия. В 2014-2015 учебном году процесс затронул только ряд факультетов, а в 2015-2016 распространился уже на всех студентов бакалавриата.

Студенты получили возможность изучать английский язык в большом объеме и по самым продвинутым методикам. Это потребовало от преподавателей дополнительной подготовки и переподготовки по коммуникативным методикам. В результате кафедра вышла на новый уровень образовательной деятельности, которая охватывает не только студентов бакалавриата, но и магистратуры и аспирантуры. Для аспирантов был введен новый курс делового английского языка, по-новому строится курс английского языка для специальных целей, создана Лаборатория Академического Письма, готовятся электронные образовательные платформы и ресурсы.

Безусловно, английский язык занимает главное место в сфере образовательной деятельности кафедры, но немецкий и французский языки также преподаются на высоком профессиональном уровне, и при небольшом количестве студентов подготавливаются элитные кадры, владеющие несколькими иностранными языками.

Каждое из направлений работы открывает перед кафедрой новые горизонты, требует постоянного совершенствования методической и практической подготовки преподавателей, делает работу преподавателей и сотрудников творческой, привлекает на кафедру новые кадры. Кафедра иностранных языков готова ответить на любые запросы Университета – у нее есть все возможности, ресурсы и кадры для того, чтобы предложить самые современные решения.

Антонина Алексеевна Пучковская

Английский язык

Introduction to a Cell
Part 1

Учебно-методическое пособие

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