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АНГЛИЙСКИЙ ЯЗЫК ДЛЯ БИОЛОГОВ: активная лексика и устная речь

Практикум

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Целью практикума является обучение студентов различным видам чтения, основам учебного реферирования и информационному поиску. Практикум содержит материалы, позволяющие студентам понимать тексты по специальности и активно употреблять научную лексику при профессиональном общении.

Предназначен для студентов-биологов 2-го курса, обучающихся на факультете биологии и экологии.

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ВВЕДЕНИЕ

Практикум состоит из двух частей: основной и дополнительной.

Основная часть содержит профессионально ориентированные тексты и упражнения на овладение общенаучной и специальной лексикой. Система упражнений позволяет студентам понимать тексты по специальности и активно употреблять научную лексику при профессиональном общении.

Дополнительная часть представлена статьями из научных журналов о достижениях и новейших разработках в области биологии, химии и медицины. Предлагаемые после текстов задания направлены на формирование умения анализировать научный текст и выделять его основные идеи с последующим изложением краткого содержания статьи.

Цель данного пособия – вовлечение студентов в профессионально ориентированное общение на иностранном языке, обучение различным видам чтения, основам учебного реферирования и информационному поиску.

UNIT 1

THE CELL

Active Vocabulary

1. **accumulate**, *v* – накапливать, скапливать, складывать; *syn.*: **incorporate**
accumulation, *n* – накопление, скопление, масса, грудa
2. **carry on**, *v* – продолжать, вести, совершать (*длительно*); to ~ vital processes – осуществлять жизненно выжные процессы
3. **compartment**, *n* – отделение; *зд.*: ячейка
4. **complicated**, *adj* – сложный, запутанный, составной; *syn.*: **complex**
5. **component**, *n* – составная часть, составной элемент; cell ~s – составные части клетки
6. **compose**, *v* – составлять; *syn.*: **to make up**; *ant-s*: **to decompose, to break down**; to be ~d of – состоять из (*syn.*: to be made up of)
composition, *n* – 1) составление, образование, построение; 2) состав (*химический*); to enter into the ~ of – входить в состав; 3) сочинение
7. **contain**, *v* – содержать в себе, вмещать
container, *n* – сосуд, контейнер, резервуар
8. **dissect**, *v* – 1) рассекать; 2) вскрывать, анатомировать; 3) анализировать, разбирать критически
dissection, *n* – 1) рассечение; 2) вскрытие, анатомирование; 3) анализ, разбор
9. **examine**, *v* – 1) рассматривать, исследовать; 2) проверять, обследовать; 3) экзаменовать; 4) *мед.* выслушивать, осматривать
examination, *n* – 1) осмотр, проверка, исследование; 2) осмотр, освидетельствование; 3) экзамен; to take an ~ – сдавать экзамен; to pass one's ~ – выдержать/сдать экзамен; to fail an ~ – провалиться на экзамене
10. **excrete**, *v* – выделять (*из организма*)
excretion, *n* – *физиол.* выделение
excretory, *adj* – *анат.* выводящий, выделительный, экскреторный

11. **generalize**, *v* – 1) обобщать, сводить к общим законам; 2) придавать неопределённость, говорить в общей форме; 3) распространять, вводить в общее употребление
generalization, *n* – 1) обобщение; *зд.:* заключение, вывод; 2) общее правило
general, *adj* – 1) общий, общего характера, всеобщий; *in ~* – вообще, в целом; 2) повсеместный, широкий; 3) обычный, общепринятый; 4) общий, приблизительный, неточный; 5) главный
12. **heredity**, *n* – наследственность; *суп.:* **inheritance**
hereditary, *adj* – наследственный, передаваемый по наследству, наследуемый
13. **maintain**, *v* – 1) поддерживать, удерживать, сохранять; 2) содержать; 3) оказывать поддержку, защищать, отстаивать; 4) утверждать
maintenance, *n* – 1) поддержка, поддержание, сохранение; 2) содержание, средства к существованию; 3) утверждение
14. **mix**, *v* – 1) смешивать, мешать, примешивать; 2) соединять(ся), смешивать(ся)
mixture, *n* – 1) смешивание; 2) смесь; 3) *мед.* микстура
15. **move**, *v* – двигать(ся), передвигать(ся), приводить в движение
movement, *n* – движение, перемещение, передвижение
16. **nutrient**, *n* – питательное вещество
nutrition, *n* – 1) питание; 2) пища
nutritional, *adj* – 1) относящийся к питанию; 2) пищевой, питательный; 3) диетологический, диетный
17. **organize**, *v* – 1) организовывать, устраивать; 2) *биол.* делать(ся) органическим, превращать(ся) в живую ткань, образовывать живую ткань
organization, *n* – 1) устройство, формирование, организация; 2) организм
18. **perform**, *v* – 1) исполнять, выполнять (*обещание, приказание и т. п.*), совершать; *to ~ a function* – выполнять функцию; 2) представлять, играть, исполнять (*пьесу, роль и т. п.*)
performance, *n* – 1) исполнение, выполнение, свершение; 2) действие, поступок, подвиг; 3) представление, спектакль
19. **signify**, *v* – 1) значить, означать; 2) иметь значение
significance, *n* – 1) важность, значимость; 2) значение, смысл

- significant**, *adj* – 1) значительный, показательный, существенный; 2) важный, значимый
20. **state**, *v* – 1) заявлять, утверждать; 2) устанавливать, точно определять; 3) констатировать, формулировать, излагать
state, *n* – состояние; ~ of the art – современное состояние, положение дел (*в науке и технике*); ~-of-the-art – достигнутый, реальный, внедрённый
statement, *n* – 1) утверждение, заявление; 2) изложение, формулировка
21. **support**, *v* – 1) поддерживать, подпирать; 2) помогать, поддерживать (*материально*), содержать; 3) поддерживать, способствовать, содействовать; 4) поддерживать, подкреплять, подтверждать
support, *n* – 1) поддержка; 2) опора, оплот; 3) средства к существованию
22. **surround**, *v* – окружать, обступать
surroundings, *n pl* – 1) окрестности; 2) среда, окружение
23. **transfer**, *v* – переносить, перемещать
transfer, *n* – перенос, перемещение
24. **unit**, *n* – 1) единица; 2) единица измерения; 3) часть, подразделение
25. **way**, *n* – 1) путь, дорога; 2) способ, манера, образ действия; in this ~ – таким образом; 3) отношение; in a ~ – в некотором отношении; in many ~s – во многих отношениях; 4) сторона, направление

Texts

The Cell Theory

The unit of protoplasmatic organization is the cell. The word “cell” is not a very good choice in this connection, but it has significance in the history of biology. The name was given by Robert Hooke, one of the first scientists having used a newly developed biological tool, a microscope, to the tiny divisions that he saw in a thin slice of cork. The cork slice, through his microscope, appeared to be made up of many small compartments arranged in rows and reminded him of the tiers of monks’ cells in English monasteries. He therefore called each compartment a cell and the name has survived, although it does

not accurately convey the picture of a living unit. What Hooke actually saw in the non-living wall, which had once surrounded the living protoplasm, was not the protoplasm itself. His microscopic studies of some other materials, such as feathers, fish scales, moulds, snow crystals and fabrics, brought him closer to the sight of living cells but not close enough to see the living substance.

Observations of classical microscopists and their successors on individual cells as parts of organisms, both plant and animal, led to one of the greatest and for a time most useful biological generalizations – the cell theory. This concept was first brought to general attention in 1838.

It was a natural outcome of many observations that had been made during the early part of the nineteenth and preceding centuries. Briefly, it states that organisms are composed of cells or of a single cell and that all cells, and hence all organisms, arise from the division of pre-existing cells. This theory was to biology, at that stage of its development, what Dalton's atomic theory was to chemistry.

Cells, Tissues, Organs and Systems

What can you see when you examine different organs under the microscope? One thing will quickly stand out. No matter what part of the body you examine, you will find cells. They are the smallest living units of the body. These complex structures are variously shaped, have a considerable range of size and are associated in different ways.

In some instances single cells constitute entire organisms, each such cell carrying on all the life processes. Or small numbers of cells may be associated in colonies. In these colonial groups all cells appear similar and have the same function.

In the higher plants and animals the cells are organized into tissues, or groups of similar cells all performing the same functions. There are nerve, muscle, bone and blood tissues among others. Combinations of tissues make up organs with more or less distinct functions. In animals, which are functionally more complicated than plants, organs compose systems, or groups of organs that are collectively responsible for certain functions.

Cells are so tiny that countless numbers of them go into the formation of our bodies. Our body consists of many different kinds of cells. Like other cells, each has cytoplasm, a nucleus and a thin cell

membrane. The cells of the body are built in such a way that they can do their special work best. For example, muscle cells are long and elastic, nerve cells are very sensitive. They have many branches which connect with other nerve cells or with muscles or glands.

Cell Components

Extensive knowledge of the cell and its components has been acquired from the highly developed techniques of microscopy and cell chemistry. Both animal and plant cells are bounded by a cell membrane. All living components within this cell membrane are often referred to as protoplasm. Protoplasm includes a nucleus and a mass of substance surrounding it, cytoplasm. These cellular structures have a functional significance and specific biochemical properties.

The nucleus is the controlling center of the cell. It controls all the cell's vital processes. What is more important is that the nucleus performs a hereditary function. It contains chromosomes which carry genes, the main hereditary factors.

Vital Processes

Movement
Reproduction
Sensitivity
Nutrition
Excretion
Respiration
Growth

Cytoplasm is a jelly-like stuff where all the chemical reactions happen. Within the cytoplasmic sap we can find small differentiated areas or small organs known as organelles and non-living materials, such as excretory products and reserve food.

The cell membrane is a thin skin around the cell. It holds the cell and cell components together and also transfers substances in and out of the cell.

In spite of these structural features in common, animal and plant cells have some differences. Only plants have a cell wall, vacuole and chloroplasts.

The cell wall is a rigid coating made up of cellulose. It gives support to the cell.

Vacuole is a large space filled with cell sap – a weak solution of sugar and salts.

Chloroplasts contain chlorophyll used for photosynthesis.

In addition, a plant cell is 40 times bigger than an animal cell.

Thus, the existence of all these cell components is necessary for the maintenance of the whole cell.

The Stuff of Life

In their attempts to solve the mysteries of life scientists have given much attention to the jelly-like living material of the cell. This substance is called protoplasm. They have studied it under high-powered microscopes, broken it down into its basic chemicals, treated it with dyes and electric currents and dissected it with microscopic needles. Yet no one has succeeded in making any protoplasm. It is one of the most complicated of all substances. We have learned many facts about it, but there are still many secrets to be discovered. Scientific research goes on, because protoplasm is the key to a real understanding of life.

Under the microscope protoplasm is an almost colourless substance. At times it is quite liquid, but it can easily change to a more solid jelly. All the living components of the cell, including the cell membrane, the cytoplasm and the nucleus, are made up of protoplasm. With a high-powered microscope we can see many small particles and bubbles floating in the jelly. These are often in rapid motion.

The chemical nature of protoplasm is not exactly known. Unfortunately, when chemists begin to analyse it, it usually dies. This brings about changes in the material they are studying. We do know that protoplasm is usually more than 75 per cent water. There are also salts and food materials, such as sugars, fats and proteins. Four chemical elements make up 98 per cent of protoplasm. These are carbon, oxygen, hydrogen and nitrogen. More than 15 other elements have been found. All of them are the common elements of which our earth is composed. There are no special chemicals that are found only in protoplasm. But such rare elements as strontium (Sr), rubidium (Rb), tin (Sn), nickel (Ni), gold (Au) and mercury (Hg) may enter into the composition of protoplasm as well.

Where the soil is especially rich in certain minerals, the plants growing there may incorporate them, and they may find their way into the tissues or hard parts of animals that feed on the plants. In some parts of the world gold is particularly abundant in the soil, and the hoofs, horns and hair of the deer living on the vegetation in these regions show relatively large accumulations of it. Radioactive elements in some regions are accumulated in the mosses and in vegetation of the region. These plants are the food for many animals and

analysis shows that these animals are also accumulating radioactive particles in their tissues. The food chain is extended to people living in these regions who feed on these animals and, in turn, incorporate the particles in their own tissues. As a result, their bodies contain a relatively high account of radioactive particles as compared with the population in general.

As a summary, it should be noted that protoplasm is a very complicated mixture of many kinds of substances. These are in constant activity, carrying on the processes of life. When the activity stops, life comes to an end.

Exercises

I. Translate the following text into English using the active vocabulary:

Изучение составных частей клеток и протоплазмы было начато после открытия микроскопа. Под микроскопом ученые увидели маленькие ячейки, которые были названы клетками. Позднее они обнаружили протоплазму. Все основные жизненные функции организма выполняются протоплазмой. Она состоит из ядра, окруженного веществом, названным цитоплазмой. Химический состав протоплазмы сложный, ученые долго не могли его изучить. Когда ученые начинают исследовать протоплазму, она меняет свою структуру и умирает. Но исследования продолжаются, и в настоящее время ученые уже много знают о свойствах, строении и составе протоплазмы.

II. Translate the text into English; say what additional information about the cell you have got from it:

Клетка – элементарная живая система, состоящая из трёх основных частей: цитоплазмы, ядра и клеточной оболочки. Она является основой строения, развития, жизнедеятельности всех животных и растительных организмов. Клеточное строение обнаруживается на различных уровнях организации живой природы. Итак, клетки, составляющие тело бактерий и простейших, являются самостоятельными организмами; в отличие от этого, клетки, входящие в состав тканей многоклеточных

организмов, представляют собой элементы, полностью подчиненные целостному организму.

Основной план строения животных и растительных клеток сходен, однако последние отличаются некоторыми особыми чертами. У животных, например, нет микроскопически видимых оболочек, а все растительные клетки окружены хорошо выраженными целлюлозными оболочками, которые могут иметь сложное строение и включать различные органические и неорганические вещества. Клетка как живая система поддерживает и восстанавливает свою целостность, адаптируется к условиям среды и выполняет различные функции за счет энергии вещества, пополняемой из окружающей среды. Любая клетка, являясь сравнительно высокоорганизованной формой живой материи, имеет сложный химический состав.

III. *Give a written translation of the texts without a dictionary; guess the meaning of unknown words from the context:*

A. The phenomena of life are associated with a particular substance called protoplasm, which has definite and specific characteristics. Physically protoplasm is a grayish jelly-like substance. Its consistency varies with different internal and external conditions from a fluid to a firm jelly. Protoplasm is found within the cells of living organisms. They are the smallest microscopically visible structural units of life. Chemically it is a complex mixture of many different combinations of elements. The analysis of protoplasm of different kinds of organisms shows that thirty-four elements may enter into its composition.

B. The living substance of plants and animals is organized into protoplasm. Protoplasm is the basic material of all living systems and its general properties are fundamentally the same in each system, plant or animal. It, however, differs somehow from one plant species to another, from one animal species to another. Protoplasm has a complex physicochemical structure. Common analytical procedures cause the death of protoplasm and thus bring about instantaneous (мгновенный) changes in its structure. Nevertheless, an informative picture of protoplasm is now known.

IV. *Compose dialogues for the following imaginary situations:*

1. Ask your friend if there is any difference between a green plant cell and an animal cell, and between a cell membrane and a cell wall. Discuss his answer.

2. A new student joined your group. He had studied at the Chemical faculty. He doesn't know anything about the cell theory. Tell him all you know about it.

3. A space ship carried some substance to the Earth from another planet. Examining it under the microscope you saw a cell. What conclusion can you draw from this fact?

4. An acquaintance of yours has heard something about protoplasm and says that it resembles water. Describe the appearance of protoplasm and explain the difference.

5. Your friend declares that protoplasm is the most important substance in living things. Your point of view is that it is the nucleus that carries on life processes. Try to prove it.

6. Your friend says that the words "protoplasm" and "cytoplasm" are synonyms. Explain the difference and prove that.

7. You have examined the chemical composition of protoplasm. Now you are to make account of your work at a conference. Discuss the main points of your report with your friend.

8. A student of your group is to examine protoplasm, but he doesn't know how to do it. Help him.

9. When cells are placed under the microscope they will die, if they become dry. From your knowledge of protoplasm explain the reason for this.

10. Some old scholars were convinced that protoplasm has a nucleus structure, others said it is fibrillar, the third group tried to prove that it is cellular. All of them were mistaken. Why so?

UNIT 2

LIVING MATTER

Active Vocabulary

1. **absorb**, *v* – всасывать, впитывать, поглощать, абсорбировать
absorption, *n* – всасывание, впитывание, поглощение, абсорбция
absorptive, *adj* – всасывающий, впитывающий, поглощающий, абсорбирующий
2. **abundance**, *n* – 1) изобилие, избыток (of); 2) множество; 3) распространённость
abundant, *adj* – обильный, изобилующий, богатый (in – чем-л.); to be ~ – иметь(ся) в изобилии
3. **amount** (to), *v* – доходить (до какого-л. количества), составлять (сумму), равняться
amount, *n* – 1) количество; 2) сумма, итог
4. **combine**, *v* – соединять(ся), сочетать(ся), смешивать(ся)
combination, *n* – соединение, сочетание
5. **compound**, *n* – соединение (химическое)
6. **conclude**, *v* – 1) заканчивать(ся); to ~ – итак (в конце речи); 2) выводить заключение, делать вывод, заключать
conclusion, *n* – 1) окончание, завершение; in ~ – в заключение; 2) умозаключение, вывод; to draw a ~ – делать вывод
7. **constitute**, *v* – составлять
constituent, *n* – составная часть
8. **damage**, *v* – повреждать, портить, наносить ущерб/убыток
damage, *n* – вред, повреждение, убыток, ущерб
9. **destroy**, *v* – разрушать, уничтожать
destruction, *n* – разрушение, уничтожение
destructive, *adj* – 1) разрушительный; 2) пагубный, вредный
10. **dissolve**, *v* – 1) растворять(ся), разжижать(ся); 2) таять
solution, *n* – 1) растворение; 2) раствор; 3) мед. микстура, жидкое лекарство
soluble, *adj* – растворимый; *ant.*: **insoluble**
solubility, *n* – растворимость
solvent, *n* – растворитель

11. **distinguish**, *v* – 1) видеть/проводить различие, различать, распознавать; 2) служить отличительным признаком, характеризовать; 3) отличать, выделять
12. **efficiency**, *n* – действенность, эффективность, продуктивность
efficient, *adj* – действенный, эффективный; *ant.*: **inefficient**
13. **enough**, *adj* – достаточный; *syn.*: **sufficient**
enough, *adv* – достаточно, довольно
14. **essential**, *adj* – 1) необходимый, весьма важный, ценный; *syn.*: **vital** ; 2) неотъемлемый, существенный
15. **fluid**, *n* – жидкость; *syn.*: **liquid**
16. **impair**, *v* – 1) ослаблять, уменьшать; 2) ухудшать (*качество*), портить, повреждать
impairment, *n* – ухудшение, повреждение
17. **increase**, *v* – возрастать, увеличивать(ся), расти, усиливать(ся); *ant-s*: **to decrease, to reduce**
increase, *n* – возрастание, рост, увеличение, прибавление; *ant-s*: **decrease, reduction**
18. **incur**, *v* – подвергать себя (*чему-л.*)
19. **inhale**, *v* – вдыхать; *ant.*: **to exhale**
20. **involve**, *v* – вовлекать, впутывать; *to be ~ed in* – участвовать в
involvement, *n* – вовлечение, участие
21. **lack**, *v* – 1) испытывать недостаток, не иметь; 2) не хватать, недоставать
lack, *n* – недостаток, отсутствие
22. **level**, *v* – выравнивать, сглаживать
level, *n* – уровень
23. **lose**, *v* (*lost*) – 1) терять, лишаться, утрачивать; 2) упустить, не воспользоваться; 3) проигрывать
loss, *n* – 1) пропaja, потеря, утрата; 2) урон, проигрыш; 3) убыток, ущерб
24. **lubricate**, *v* – смазывать
lubricant, *n* – смазочный материал, смазка
25. **metabolize**, *v* – биол. усваивать; *to ~ fats* – расщеплять жиры
metabolism, *n* – метаболизм, обмен веществ
metabolic, *adj* – относящийся к обмену веществ
26. **obtain**, *v* – 1) получать, приобретать; 2) достигать, добиваться
obtainment, *n* – получение, приобретение, достижение
27. **poison**, *v* – отравлять

- poison**, *n* – яд, отрава
poisonous, *adj* – ядовитый
28. **precipitate**, *v* – 1) *хим.* осаждать(ся); 2) *метео* выпадать (об осадках)
precipitation, *n* – 1) *хим.* осаждение, осадок; 2) *метео* выпадение осадков, осадки
29. **protect**, *v* – защищать, ограждать, предохранять
protection, *n* – защита, охрана, ограждение, прикрытие
protective, *adj* – защитный, прикрывающий
30. **relate**, *v* – 1) устанавливать связь, определять соотношение; to be ~ed to – быть связанным с (*syn.*: to be associated with); 2) относиться, иметь отношение
relation, *n* – отношение, связь; in ~ to – относительно, что касается
relationship, *n* – взаимоотношение, взаимосвязь
relative, *adj* – относительный, сравнительный
31. **remove**, *v* – устранять, удалять; *зд.:* физиол. выделять, удалять из организма (*syn.*: to eliminate)
removal, *n* – устранение, удаление
32. **restrict**, *v* – ограничивать, ставить предел; to be ~ed to – быть ограниченным (*чем-л.*) (*syn.*: to be confined to)
restriction, *n* – ограничение
33. **result**, *v* – 1) to ~ in – приводить к (*чему-л.*), кончаться (*чем-л.*); 2) to ~ from – следовать, происходить в результате (*чего-л.*)
result, *n* – результат, исход, следствие; as a ~ – в результате
34. **retain**, *v* – удерживать, сохранять
retention, *n* – 1) удерживание, удержание, сохранение; 2) *мед.* задержание, задержка
35. **stage**, *n* – фаза, стадия, период, этап, ступень
36. **store**, *v* – запасать, накапливать
store, *n* – запас, резерв
37. **survive**, *v* – остаться в живых, выжить, уцелеть; to ~ under (un)favourable conditions – выжить при (не)благоприятных условиях
survival, *n* – выживание; the struggle for ~ – борьба за выживание
38. **take in**, *v* – потреблять, поглощать; *syn.*: to consume

- intake**, *n* – потребление, поглощение; *syn.*: **consumption**
39. **waste**, *n* – отходы; ~ products – продукты жизнедеятельности
40. **weigh**, *v* – взвешивать(ся), весить
weight, *n* – вес, масса

Texts

Composition of Living Bodies

Chemical analyses show that living materials consist of carbon, hydrogen, oxygen, nitrogen, sulfur, phosphorus, potassium, iron and magnesium. In addition, they usually contain sodium, chlorine and lesser amounts of such elements as manganese, copper, iodine and fluorine. Everything can be identified. There is no residue of unidentifiable stuff. But the elements present in living matter are all found in abundance in mineral deposits, in sea water or in the atmosphere. Hence, we can conclude that there is nothing peculiar in the elemental composition of living matter.

But what of the way in which these elemental blocks are put together? We know, for instance, that hydrogen and oxygen combined in one proportion (H_2O) constitute water, a specific substance; in another (H_2O_2), hydrogen peroxide has quite different properties associated with their differences in composition. Is living matter distinguished from non-living matter by its chemical organization? In relation to many of chemical compounds found in living matter the answer to this question is no. In relation to the sum total of the compounds which together make up any living body the answer is yes.

A major part, 65 to 90 percent, of every living body is composed of hydrogen and oxygen combined as water. Water is an inorganic substance, chemically simple and obviously not confined to living organisms. The bodies of plants and animals contain numerous other inorganic substances – acids, bases and salts. None of them differ from the acids, bases and salts with which the inorganic chemist works daily in his laboratory.

Other substances, the so-called carbon or organic compounds, are restricted in nature to living bodies or the products of living bodies. They include carbohydrates, fats and proteins. All contain carbon, hydrogen and oxygen. In addition, proteins contain nitrogen and often sulfur and other elements.

Carbohydrates are generally considered the simplest organic substances. Their structure is adequately known and many of them can be synthesized. In living organisms they are important as energy compounds.

Nearly all the energy used by living organisms, plant and animal, is light energy derived from the sun. This light energy is converted to other energy forms by a process called photosynthesis. It is in carbohydrates that green plants first store this energy, which is then distributed to all parts of the plant, and it is from carbohydrates that animals obtain much of their energy.

Fats resemble carbohydrates in composition but are chemically more complex and contain more stored energy. Like carbohydrates many fats can be synthesized in the laboratory.

Proteins differ considerably from fats and carbohydrates. Chemically they are much more complicated than all except a few carbohydrates and fats. Thus, proteins are difficult to synthesize.

Proteins are complex nitrogenous organic substances of high molecular weight which form an essential part of all living tissues. It is known that enzymes are proteins or contain proteins as an essential part and all chemical processes involved in respiration, metabolism and growth are catalyzed and controlled by enzyme activity. In living tissue proteins are associated with water and are present in a colloidal state. However, environmental changes in temperature, pH or salt concentration result in their precipitation accompanied by some intramolecular change. When such a change is irreversible, proteins become permanently insoluble and any enzyme activity is destroyed.

Proteins have a specific character which the other organic compounds lack. Whereas the same carbohydrates and fats are found in thousands of different kinds of organisms, each protein tends to be a characteristic of only one kind of organism, sometimes of only certain organs or of particular stages in development. Hence, the differences among living things are in some way related to differences in the nature of their proteins.

The Importance of Water

Water (H₂O) is the single most important molecule on the planet's surface, without which life couldn't exist. It is the most abundant compound on the planet and provides habitat for a large number of

living organisms. It is also the most important component in the functioning of the human body.

From a biological point of view, water has many distinct properties that are critical for life. All known forms of life depend on water. Water is essential for cells to function properly: it enters into the composition of cells. Water is vital both as a solvent in which many of the body's solutions dissolve and as an essential part of many metabolic processes within the body.

Next to air water is the element most necessary for survival. The average adult body is 60 to 70 percent water. We can go without food for almost two weeks, but without water only a few days. The lack of sufficient water – or dehydration – can be the cause of many diseases. Yet most people have no idea how much water they should drink. In fact, many live in a dehydrated state.

Without water we'd be poisoned to death by our own waste products. When kidneys remove uric acid and urea, these must be dissolved in water. If there isn't enough water, wastes are not removed as efficiently and may build up kidney stones.

Water also is vital for chemical reactions in digestion, absorption of food and metabolism. It carries nutrients and oxygen to cells through blood and helps to cool the body through perspiration. Water also lubricates our joints and protects tissues and organs, including the spinal cord, from shock and damage.

We even need water to breathe. Our lungs must be moist to take in oxygen and excrete carbon dioxide. It is possible to lose a pint of liquid each day just exhaling.

Proper water intake is a key to weight loss. If people who are trying to lose weight don't drink enough water, the body can't metabolize the fat adequately. Retaining fluid also keeps weight up.

These are some of many reactions in which water is involved. Therefore, if you don't drink sufficient water, you can impair every aspect of your physiology. By not drinking enough water, many people incur excess body fat, poor muscle tone and size, decreased digestive efficiency and organ function, increased toxicity in the body, joint and muscle soreness and water retention.

Water retention? If you're not drinking enough, your body may retain water to compensate. Paradoxically, fluid retention can sometimes be eliminated by drinking more water, not less.

So, if you want to stay healthy, you should increase the level of water intake in a day to balance water loss and help keeping the body properly hydrated. Consuming water every day (approximately 1.5 liters), and at regular intervals, 8 times a day (before, during and in-between meals), without waiting until you're thirsty, is important as part of a healthy lifestyle at every stage of life!

Exercises

I. *Translate the following text into Russian:*

Vitamin C

Vitamin C is water-soluble and found chiefly in fresh fruits and vegetables, but its distribution is not very uniform. The Mediterranean lemon is a good source of vitamin C. Lemon juice is very easily oxidized, particularly in alkaline solution. Lemon juice left exposed to the air loses all its vitamin C in three hours. It is readily destroyed by heat, but is sometimes present in canned or dried foods. Tinned tomato juice is quite a good source.

Most animals can produce it themselves, but they cannot make it in sufficient amounts and need an outside supply for a healthy life.

The ease with which vitamin C is oxidized suggests that it takes part in tissue respiration and its absence results in a breakdown of protoplasmic structure and reduces resistance to infections.

II. *Read and translate the text; say what you have known about vitamins:*

Forty years ago it was believed that the essential constituents of a diet were proteins, carbohydrates and fats, certain minerals (inorganic ions) and water. But later when a chemically pure diet of this kind had been prepared and administered the animals died. Natural food therefore contains other non-calorie-providing, but nevertheless essential constituents for growth, health and life.

In rats, addition of small amounts of milk to a diet preserved health and restored growth. The unknown essential factors in milk were called "accessory food factors" by Hopkins. The accessory food factors or vitamins were soon divided into: 1) fat-soluble; 2) water-soluble. The fat-soluble were differentiated into vitamins A and D. The water-soluble – into B and C. It was soon found that vitamin B

was not a single substance, but a mixture of several substances. Its title was altered to vitamin B complex and the individual constituents, as they were isolated, were given distinctive names. In this way, many vitamins are now known. They are: vitamins A, D, E, K (all fat-soluble) and C, B complex (all water-soluble).

The distinctive characteristic of vitamins is that they are micro-constituents of the diet of high biological activity which cannot be replaced by other normal dietary constituents.

UNIT 3

BIOLOGY AND MEDICINE

Active Vocabulary

1. **achieve**, *v* – 1) достигать, добиваться; 2) успешно выполнять, доводить до конца
achievement, *n* – 1) достижение; 2) выполнение
achievable, *adj* – достижимый
2. **advance**, *v* – 1) продвигать(ся) вперёд; 2) делать успехи, развиваться; 3) выдвигать (*предложение, теорию и т. п.*)
advance, *n* – 1) продвижение вперёд; *in ~* – вперёд, заранее; 2) успех, прогресс, улучшение
advancement, *n* – 1) продвижение, распространение (*образования и т. п.*); 2) успех, прогресс
advanced, *adj* – 1) выдвинутый вперёд; 2) передовой; 3) успевающий (*об ученике*); 4) продвинутый, повышенного уровня
3. **apply**, *v* – 1) обращаться (*for* – за *работой, помощью, справкой, разрешением и т. п.*; *to* – к кому-л.); 2) применять, употреблять; *to ~ to practice* – применять на практике; 3) касаться, относиться, быть приемлемым (*to*) 4) прикладывать
application, *n* – 1) заявление, заявка, прошение; 2) применение, применимость; 3) употребление (*лекарства*); 4) прикладывание (*горчичника, пластыря и т. п.*)
applicant, *n* – претендент, кандидат, заявитель, соискатель, абитуриент
applicable (*to*), *adj* – применимый, пригодный, подходящий
applied, *adj* – прикладной
4. **approach**, *v* – 1) приближаться, подходить; 2) приближаться, быть почти равным/похожим
approach, *n* – 1) приближение; 2) подступ, подход (*тж. научный*)
approachable, *adj* – 1) охотно идущий навстречу (*предложениям и т. п.*); 2) доступный, достижимый
5. **consider**, *v* – 1) рассматривать, обсуждать; 2) обдумывать; 3) полагать, считать; *to be ~ed* – считаться

- consideration**, *n* – 1) рассмотрение, обсуждение; under ~ – на рассмотрении, рассматриваемый, обсуждаемый; 2) соображение; to take into ~ – принимать во внимание, учитывать
- considerable**, *adj* – 1) значительный, важный; 2) большой
6. **cure**, *v* – вылечивать, исцелять
cure, *n* – 1) лечение, излечение; 2) лекарство, средство; *syn.*: **medicine**; 3) курс лечения
curative, *adj* – целительный, целебный, лечебный
curable, *adj* – излечимый
cureless, *adj* – неизлечимый
7. **disease**, *n* – болезнь; to cause a ~ – вызывать болезнь; to spread a ~ – распространять болезнь; to treat a ~ – лечить болезнь
8. **establish**, *v* – 1) основывать, создавать, учреждать; *syn.*: **to set up**; 2) устанавливать, создавать, устраивать; 3) упрочивать, укреплять
establishment, *n* – 1) основание, введение; 2) учреждение, заведение, ведомство
9. **expose**, *v* – 1) выставлять, подвергать действию (*солнца, ветра и т. п.*) 2) подвергать (*опасности, риску и т. п.*)
exposure, *n* – 1) выставление, воздействие (*солнца, ветра и т. п.*); 2) подвержение (*опасности, риску и т. п.*)
10. **fail**, *v* – 1) потерпеть неудачу, не иметь успеха; 2) провалиться(ся) на экзаменах; 3) не сбываться, обманывать ожидания, не удаваться; 4) не исполнить, не сделать; 5) перестать действовать, выйти из строя; 6) недоставать, не хватать, иметь недостаток (*в чём-л.*)
failure, *n* – 1) неуспех, неудача, провал; 2) неудачник, неудавшееся дело; 3) неспособность, несостоятельность; 4) невыполнение, неосуществление; 5) отказ в работе, остановка или перерыв в действии; 6) недостаток, отсутствие (*чего-л.*)
11. **found**, *v* – 1) основывать, учреждать, создавать; 2) обосновывать; 3) опираться, основываться (*оп – на; о доводах и т. п.*)
foundation, *n* – 1) фундамент, основание, основа; 2) обоснованность; 3) организация, учреждение
founder, *n* – основатель, учредитель
12. **heal**, *v* – 1) заживать, заживляться (~ over, ~ up); 2) излечивать, исцелять (*of – от*)
healing, *n* – лечение, излечение, заживление

- healer**, *n* – исцелитель, целитель
- health**, *n* – 1) здоровье; 2) благосостояние, жизнеспособность; 3) целебная сила
- healthy**, *adj* – 1) здоровый; 2) полезный для здоровья; 3) жизнеспособный; *ant.*: **unhealthy**
13. **ill**, *adj* – 1) больной, нездоровый; to be ~ – быть больным; to fall ~ – заболеть; 2) (worse, worst) дурной, плохой, злой, вредный, губительный
- illness**, *n* – нездоровье, болезнь
14. **immunize**, *v* – делать невосприимчивым (к какой-л. болезни), иммунизировать
- immunization**, *n* – создание искусственного иммунитета, иммунизация
- immune**, *adj* – невосприимчивый (к какой-л. болезни), иммунный
- immunity**, *n* – невосприимчивость (к какой-л. болезни), иммунитет; to induce ~ – вырабатывать иммунитет
15. **infect**, *v* – заражать
- infection**, *n* – заражение, инфекция, зараза
- infectious**, *adj* – инфекционный, заразный; *syn.*: **contagious**
16. **influence**, *v* – оказывать влияние, влиять
- influence** (on), *n* – влияние, действие, воздействие (на); *syn.*: **impact**
- influential**, *adj* – влиятельный, важный
17. **inoculate**, *v* – делать прививку, прививать
- inoculation**, *n* – прививка, инокуляция
- inoculative**, *adj* – прививочный
18. **invent**, *v* – изобретать, делать открытие
- invention**, *n* – изобретение
- inventor**, *n* – изобретатель
19. **isolate**, *v* – 1) изолировать, отделять, подвергать карантину; to ~ the causes of a disease – выявлять причины заболевания; 2) *хим.* выделять
- isolation**, *n* – изоляция; ~ period – карантин
20. **prevent**, *v* – предотвращать, предохранять, предупреждать
- prevention**, *n* – 1) предотвращение, предохранение, предупреждение; 2) *мед.* профилактика

- preventive**, *adj* – 1) предупредительный; 2) *мед.* профилактический
21. **prove**, *v* – доказывать, удостоверить, подтверждать
provable, *adj* – доказуемый
proof, *n* – доказательство
proofless, *adj* – бездоказательный, необоснованный
22. **recognize**, *v* – 1) узнавать; 2) признавать, выражать одобрение
recognition, *n* – 1) узнавание, опознание; 2) признание, одобрение
23. **record**, *v* – записывать, регистрировать, протоколировать
record, *n* – запись, регистрация (*фактов*), протокол, отчёт;
to keep ~s – вести записи
24. **refer** (to), *v* – 1) посылать, отсылать (к кому-л., чему-л.), направлять (за информацией и т. п.); 2) обращаться; 3) ссылаться (на кого-л., что-л.); 4) иметь отношение, относиться; 5) наводить справку, справляться
reference, *n* – 1) ссылка, сноска; 2) отношение; in ~ to – относительно, что касается; 3) справка; a book of ~ – справочник
25. **succeed**, *v* – достигать цели, преуспевать, иметь успех
success, *n* – успех, удача
successful, *adj* – успешный, удачный; удачливый, преуспевающий
26. **surgeon**, *n* – хирург
surgery, *n* – хирургия
surgical, *adj* – хирургический
27. **treat**, *v* – 1) лечить (for – от чего-л., with – чем-л.); 2) обрабатывать, подвергать действию (with); 3) обращаться, обходиться, относиться
treatment, *n* – 1) лечение, уход; 2) обработка (чем-л.); 3) обращение, обхождение

Text

The History of Medicine

Medicine is among the most ancient of human occupations. It began as an art and gradually developed into a science over the centuries. There are 3 main stages in medicine development:

Medicine of Ancient Civilizations, Medicine of Middle Ages and Modern Medicine.

Early man, like the animals, was subject to illness and death. At that time medical actions were mostly a part of ceremonial rituals. The medicine-man practiced magic to help people who were ill or had a wound. New civilizations, which developed from early tribes, began to study the human body, its anatomic composition. Magic still played an important part in treating but new practical methods were also developing. The early Indians, for instance, set fractures and practiced aromatherapy. The Chinese were pioneers of immunization and acupuncture. The contribution made by the Greeks to medicine was enormous. An early leader in Greek medicine was **Aesculapius**. His daughters Panacea and Hygeia gave rise to dynasties of healers (curative medicine) and hygienists (preventive medicine). The division into curative and preventive medicine is true today.

Another Greek physician **Hippocrates**, who lived from 460 to 370 BC, is considered the father of modern medicine. Studying the human body, he began to apply a scientific method to the problem of diagnosis and treatment of diseases. Unlike other physicians of his time Hippocrates discarded the theory that disease was caused by the gods. Instead he kept careful records of symptoms and treatment, indicating the success or failure of the patient's cure. He recognized the importance of taking a complete history which included environmental exposures as well as foods eaten by the patient which might contribute to his or her illness. Most famously, Hippocrates summarized the ethic principles of a physician, known as the Hippocrates Oath, which is still in use today.

About a century later the Greek philosopher and scientist **Aristotle** began a scientific study of living things, classifying about 500 species of birds, mammals and fishes. Aristotle's *History of Animals* classified organisms in reference to a "Ladder of Life", placing them according to complexity of body structure and function so that higher organisms showed greater vitality and ability to move. Because of his great contribution to the field Aristotle has been called the father of biology.

By the first century A.D. the Roman army physician **Dioscorides**, a Greek botanist and pharmacologist, had collected a vast amount of information on plants which he recorded in the now famous *De*

Materia Medica. This encyclopedia, describing over 600 herbal cures, remained an influential reference among physicians for the following 1,500 years.

During the Middle Ages scientific method was scorned in favour of alchemy. Some scientists were even imprisoned for carrying out their investigations. A very important achievement of that time was the hospital. The first ones appeared in the 15th century in Oriental countries and later in Europe. Another advance was the foundation of universities during the 13–14th centuries. Among other disciplines students could study medicine.

During the later centuries came an increase in experimental research, particularly in the field of dissection and body examination, thus advancing our knowledge of human anatomy. As a result, in the 17th century the English physician and anatomist **William Harvey** discovered a mechanism for the circulation of the blood in the body. Harvey's Essay on *The Motion of the Heart and the Blood*, published in 1628, made possible a clear understanding of the action of the heart and the consequent movement of the blood around the body in a circuit.

Eventually new discoveries were made in chemistry, anatomy, biology and others sciences. Bacteria and protista were first observed with a microscope by the Dutch scientist **Antonie van Leeuwenhoek** in 1676, initiating the scientific field of microbiology.

By the end of the 18th century the English physician and scientist **Edward Jenner** had discovered a vaccine against smallpox, inoculating a few persons with cowpox and proving that they were immune to smallpox. Jenner's unique contribution not only controlled the disease itself, but also established the science of immunization by providing vaccination using cowpox to induce immunity.

Medicine was revolutionized by advances in bacteriology and virology. Louis Pasteur's theories about germs and bacteria, advanced in the 19th century, are considered to be the greatest single contribution of biology to medicine.

The French chemist and microbiologist **Louis Pasteur** is remembered for his remarkable breakthroughs in the causes and preventions of diseases. Performing fermentation experiments, Pasteur demonstrated that this process is caused by the growth of microorganisms which, infecting animals and humans, cause contagious diseases. He

created the first vaccines for rabies and anthrax and is best known to the general public for inventing a method to treat milk and wine in order to prevent it from contamination, a process called pasteurization. Therefore, he is regarded as one of the main founders of medical microbiology together with Robert Koch.

The German physician **Robert Koch** became famous for isolating *Tuberculosis bacillus* and was awarded the Nobel Prize in Physiology or Medicine in 1905 for his tuberculosis findings. Hence, the germ theory of disease in the 19th century led to treatment for many infectious diseases. Within a few decades the causes were isolated for such ancient diseases as leprosy, plague, diphtheria and tuberculosis.

But the advances of the 20th century in curative and preventive medicine and biology are far more numerous than all other periods combined. By applying Louis Pasteur's advances in microbiology, the British surgeon and pioneer of antiseptic surgery **Joseph Lister** successfully introduced carbolic acid (now known as phenol) to sterilize surgical instruments and to clean wounds. His method of antisepsis reduced mortality from post-operative infections and made surgery safer for patients, recognizing Lister as the father of modern surgery.

To sum up, medicine and biology have advanced enormously from the time of the ancients until nowadays. New techniques, approaches and theories, developed by scientists, are applied to practice by different fields of medicine. These are the discovery of blood groups and vitamins, invention of insulin and penicillin, development of antibiotics and X-rays, practice of plastic surgery and transplantation.

Exercises

I. Answer the following questions based on the text "*The History of Medicine*":

1. When did the history of medicine begin?
2. How did it begin?
3. How many stages are there in the history of medicine?
4. What did early medicine-men practice?
5. What helped new civilizations to develop more advanced practical methods in treating? Give examples.

6. Why is the Greeks' contribution to medicine considered to be enormous?
7. Why is Hippocrates recognized as the father of modern medicine?
8. What contribution did Aristotle make to Biology?
9. What can you say about *De Materia Medica*?
10. What are the achievements of the Middle Ages?
11. What was William Harvey?
12. What contributed to initiating the scientific field of microbiology?
13. How did Edward Jenner establish the science of immunization?
14. What did Louis Pasteur and Robert Koch discover in the 19th century?
15. What are the advances of the 20th century in curative and preventive medicine and biology?

II. *Translate the following text into Russian:*

The Genetic Revolution

Deoxyribonucleic acid is the spiral-staircase-shape molecule found in the nucleus of cells. DNA is the basic stuff of heredity. Scientists have known its chemical structure since 1953. Human DNA acts like a biological computer program that contains the instructions for making proteins, the basic building blocks of life.

What some genetic engineers are doing now is nothing less than a biomedical revolution. They are decoding life's molecular secrets and trying to use this knowledge to change completely the natural course of disease. The ability to manipulate genes – in animals and plants as well as humans – could eventually change everything: what we eat, what we wear, how we live and die.

III. *Read and translate the text; be ready to give the main points of it:*

Sun Exposure

Every year millions of people look forward to basking on the beach. Because they have heard that too much sun can cause skin cancer, they take a few precautions. Many use a sun-screen, others wear a hat and then get into the shade. This way, they think, they will get a safe tan. The latest research shows there is no such thing. Because of sun exposure many people will be stricken with skin cancer and some of them will die. Others will damage their eyes or their skin.

Still they may harm their immune system, thus becoming more vulnerable to infections and diseases.

Sun exposure, it turns out, is far more dangerous than even the experts have supposed. Exposing their bodies to the sun is one of the riskiest things people do. Medical experts agree that ultraviolet (UV) rays from the sun are the chief cause of skin cancer nowadays.

Is there a safe way to tan? The answer is straightforward: “No”. The scientists, who know more about human skin than anyone else, confirm that all suntanning is dangerous – no exceptions.

The idea that a suntan was “healthy” started in the 1930s and soon almost everyone believed a bronzed body was a symbol of fitness and vigor. But a suntan is not a sign of health. It is a crude defence mechanism, your body’s desperate and always unsuccessful attempt to protect you from damage that can be irreparable. Your system throws a dark curtain of pigment called melanin over you to keep dangerous UV radiation from doing even more harm. But it is too late. Once a suntan appears, the damage has already taken place.

SUPPLEMENTARY READING

TRAINING FOR ANNOTATING AND GENERALIZING

Unravelling the Secrets to Achieving High-Yield Plants

Understanding the basic mechanics of plant growth could help Europe increase crop yield while reducing the need for pesticides — a vitally important consideration given our growing demand for sustainable food. An EU-funded project has made significant advances in this respect, by shedding new light on the behaviour of certain plant hormones and their role in achieving successful crops.

The European BRAVISSIMO project focused on “brassinosteroids” (BRs), specific plant hormones that control aspects of plant growth and development. Scientists were already aware that these hormones have a positive effect on the quality and productivity of crops, and that they can increase crop resistance to stress and disease.

The BRAVISSIMO project’s major contribution in this field has been to successfully unravel the mechanism of brassinosteroid hormones that regulates “stomata” development. Stomata are microscopic pores through which plants breathe and release water.

When rain is scarce, for example, the pores will close to prevent the plant from wasting water while an automatic drought-protection mechanism is triggered into action. Brassinosteroids play an important role in determining the number of leaf stomata, but the underlying mechanism has not been well understood, until now.

This breakthrough has important implications for environmental research and for the protection of plants. The results have since been published in the prestigious science journal *Nature Cell Biology*. In a wider sense, better understanding of BRs could lead to innovative new agricultural practices.

Like human steroid hormones, brassinosteroids are crucially important, since a lack of this hormone can lead to the development of extremely small plants. Brassinosteroids offer the unique possibility of increasing crop yields by changing plant metabolism and protecting plants.

The scientists believe that a better understanding of BR function could provide the basis for developing plant varieties better adapted

to anticipated environmental change, and more resistant to disease. This could have significant economic implications.

Plants are the basis of European industries with an annual turnover of more than EUR 1 trillion, and they will continue to play an even more important role in our economies in the future. Over the next 20 years, the challenge for European agriculture will be to satisfy the growing demands for producing food in a sustainable manner.

At the beginning of the project, the tomato was selected as an ideal species for analysis, and also as a model system for fruit production. Together with scientists from a BASF Science Company a review was carried out of known genes involved in the BR pathway, and several candidates have since been selected for functional tests on rice.

By creating new opportunities and developing potential new technologies for agriculture, the ground-breaking BRAVISSIMO project supports the EU's stated Horizon 2020 goals of creating growth and jobs through research.

As group leader at the VIB Department of Plant Systems Biology at Ghent University, Dr Russinova is currently working on the interaction between plant cells and brassinosteroids. Unravelling this, she says, will be another important step towards the development of effective strategies for producing high-yielding plants.

1. Match the words in the left-hand column with their definitions in the right-hand column:

- | | |
|----------------|---|
| 1) hormone | a) the system of chemical activities by which a living thing gains energy, esp. from food |
| 2) pore | b) any of several substances directed from organs of the body into the blood so as to influence growth, development, etc. |
| 3) metabolism | c) the degree to which something is excellent, standard of goodness |
| 4) agriculture | d) a very small opening, esp. in the skin, through which liquids or sweat can pass |
| 5) pesticide | e) the amount of such a product that is grown and gathered in a single season or place |
| 6) advance | f) the practice or science of farming, esp. |

- | | |
|------------|--|
| | of growing crops |
| 7) quality | g) the state of not having enough of something |
| 8) crop | h) forward movement |
| 9) steroid | i) a chemical substance used to kill pests |
| 10) lack | j) any of various chemical compounds, including many hormones, that have a strong effect on the workings of the body |

2. Match the words and word-combinations on the left with their Russian equivalents on the right:

- | | |
|--|---|
| 1) to achieve high-yield plants | a) увеличивать сопротивляемость сельскохозяйственных культур к... |
| 2) plant growth and development | b) недостаток этого гормона |
| 3) to increase crop yield | c) развивать эффективные стратегии |
| 4) behaviour of certain plant hormones | d) качество и продуктивность |
| 5) to have a positive effect on... | e) выращивать высокоурожайные растения |
| 6) the quality and productivity of... | f) взаимодействие растительных клеток и брассиностероидов |
| 7) to increase crop resistance to... | g) объяснять (понимать) механизм брассинов (брассиностероидов) |
| 8) to unravel (to explain, understand) the mechanism of BRs (brassinosteroids) | h) определять количество устьиц на листе |
| 9) stomata development | i) рост и развитие растений |
| 10) to breathe and release water | j) создавать новые возможности и технологии для сельского хозяйства |
| 11) to prevent the plant from wasting water | k) приводить к появлению новых техник (технологий) |

- | | |
|--|---|
| 12) to determine the number of leaf stomata | l) изменять метаболизм и защищать растения |
| 13) to understand the underlying mechanism | m) получать высокоурожайные растения (добиваться высокого урожая) |
| 14) to lead to innovative agricultural practices | n) дышать и выделять воду |
| 15) a lack of the hormone | o) препятствовать потере воды растением |
| 16) to change metabolism and protect plants | p) развитие устьиц |
| 17) the interaction between plant cells and brassinosteroids | q) увеличивать урожайность |
| 18) to create new opportunities and technologies for agriculture | r) поведение определённых гормонов растения |
| 19) to develop effective strategies | s) иметь положительное влияние на... (положительно влиять на...) |
| 20) to produce (grow) high-yielding plants | t) понимать механизм, лежащий в основе... |

3. Answer the questions:

- 1) What is the aim of the project?
- 2) What does the abbreviation of “BRs” stand for?
- 3) What was known about the role of hormones before?
- 4) What exactly interested the researchers in the respect of plant hormones?
- 5) What can a lack of BRs lead to?
- 6) How can BRs increase crop yields?
- 7) What are “stomata”?
- 8) What happens to pores when rain is scarce?
- 9) What determines the number of leaf stomata?
- 10) Why is the research significant for agriculture?

4. *Arrange the following statements in order to make up a summary of the text:*

1) The project's contribution has been to understand the mechanism of brassinosteroid hormones that regulate 'stomata' development.

2) Brassinosteroids offer the unique possibility of increasing crop yields by changing plant metabolism and protecting plants.

3) Scientists were aware that these hormones have a positive effect on the quality and productivity of crops.

4) The European BRAVISSIMO project focused on specific plant hormones that control aspects of plant growth and development.

5) Stomata are microscopic pores through which plants breathe and release water.

6) These hormones can increase crop resistance to stress and disease.

7) Better understanding of BRs could lead to innovative agricultural practices.

8) Brassinosteroids are very important since a lack of this hormone can lead to the development of extremely small plants.

9) BRs play an important role in determining the number of leaf stomata.

10) Understanding the basic mechanics of plant growth could help Europe increase crop yield.

11) When rain is scarce the pores will close to prevent the plant from wasting water, while an automatic drought-protection mechanism is triggered into action.

High-Resolution Real-Time Neuronal Imaging

Neuronal cells have strange branching extensions with little knobby bulbs on them called spines, the places where one neuron communicates with another. In pioneering work, scientists have stimulated individual synapses and imaged spine changes.

Neurons have a unique morphology compared to most other cells in the body that are an approximate sphere. In addition to the cell body, they have specialised extensions for sending and receiving information. A branched dendritic tree comes off one region of the cell body and a single long axon off another.

Cells are small and dendrites even smaller. To complicate the picture a little more, the dendrites themselves have little knobby mushroom-shaped protrusions called dendritic spines. It is here that the synapses or junctions between neurons do their magic. It is also here that many neurological diseases find their origin.

Given their extremely tiny size and fast dynamics, studying them in situ has been very difficult. Scientists launched the EU-funded project DYNASPINE (Nanoscale photoactivation and imaging of synaptic spine dynamics) to develop and apply the techniques to do so. Their ultimate goal was to correlate structure and function on the single-synapse level in real time.

Neuronal signalling relies on a complicated interaction of chemical and electrical components. Voltages along the membrane change, pores in the membranes open and close, and ions and molecules move in and out. Even the number, size and shape of spines demonstrate plasticity (the ability to change). Such changes can accompany increases in synaptic strength that last for long periods of time (long-term potentiation), also induced by repeated stimulation. This phenomenon is thought to be involved in learning and memory.

Scientists applied a combination of electrophysiological recordings and one of the most advanced and high-resolution microscopy techniques available, stimulated emission depletion microscopy.

Experiments revealed the plasticity of the spine, in particular shortening and widening of the spine neck, during synaptic potentiation. They also showed that these structural changes had unexpectedly different effects on chemical and electrical signalling, pointing to a new layer of complexity in neuronal dendritic spine function.

DYNASPINE opened a new window on functioning dendritic spines. Follow-up of this exciting research direction will be met with great interest by the neuroscience community.

1. Match the terms from the text with their definitions:

- | | |
|-------------|--|
| 1) neuron | a) the point at which electrical signals move from one nerve cell to another |
| 2) axon | b) the structure or formation of an object or system; the scientific study of the formation of animals, plants and their parts |
| 3) dendrite | c) a stiff sharp-pointed plant or animal; the row |

of bones in the centre of the back of human beings and certain animals that supports the body and protects the spinal cord; the part of a book where the pages are fastened and the title is usually printed

- | | |
|---------------|--|
| 4) spine | d) one of the short parts like threads at the edge of a nerve cell that carry messages to the cell |
| 5) synapse | e) a nerve cell that carries information between the brain and other parts of the body |
| 6) morphology | f) a long thread-like structure attached to nerve cell that sends out signals away from the nerve cell |

2. Match the words and word-combinations with their Russian equivalents:

- | | |
|--|--|
| 1) branching extension | a) дендрический корешок |
| 2) pioneering work | b) уникальное строение |
| 3) unique morphology | c) быстрая динамика (большая подвижность) |
| 4) a complicated interaction of chemical and electrical components | d) многие неврологические болезни начинаются... |
| 5) specialized extension | e) выступ имеет форму гриба |
| 6) dendritic spine | f) разветвлённое продолжение (разветвление) |
| 7) many neurological diseases find their origin... | g) соотносить структуру (строение) и функцию |
| 8) fast dynamics | h) первые (первоначальные) работы |
| 9) mushroom-shaped protrusion | i) особое удлинение |
| 10) to correlate structure and function | j) нервный импульс |
| 11) neuronal signalling | k) сложное взаимодействие химических и электрических компонентов |

3. Answer the questions based on the text:

- 1) Neurons have a unique morphology, don't they?
- 2) What makes neuronal cells unique unlike other cells in the body?
- 3) How are specialized extensions presented?
- 4) What are the dendrites like?
- 5) What is the size of cells and dendrites?
- 6) What does a branched dendritic tree consist of?
- 7) What is the morphology of dendrites?
- 8) What is the function of dendrites?
- 9) How are knobby protrusions called?
- 10) Where do many neurological diseases find their origin?
- 11) What is the goal of the project?
- 12) What does neuronal signalling rely on?
- 13) What happens when interaction of chemical and electrical components takes place?
- 14) What demonstrates the number, size and shape of spines?

4. *Read the text again and find what the main idea of the text is, add some facts to support it.*

5. *Write a summary using the terms and vocabulary from Ex. 2.*

Medication Timing Key in Cancer Treatment

An internal clock determines many of our bodily functions. The same is true for tumour cells according to the findings of the researchers. This discovery could point the way to a more efficient, personalised approach to cancer treatment.

The biological clock located in our brain regulates hundreds of biochemical, physiological and behavioural processes that rhythmically oscillate in our body throughout the day. These 24-hour circadian rhythms are found, in mammals, in virtually every individual cell in the body. Every day circadian rhythms are synchronised to the outside world, and daylight is one of the most important synchronisers.

There are circadian rhythms in many aspects of disease as well. The intensity of signs and symptoms rhythmically changes in the course of the 24-hour day. The same is true of our body's receptiveness to medication. Here is where the concept of chronotherapy – the

application of treatment at the most optimal time of day to increase therapy success – comes into play.

During the last 30 years, the potential of using chronotherapy to improve the efficacy of anticancer therapy has been demonstrated.

So far, few hospitals have taken advantage of the benefits of chronotherapy. This is partly because the best time to apply many types of treatment is during the night when there is a lack of infrastructure and personnel. In addition, little is known about the mechanisms that relate specific cancer treatments to the circadian clock. Understanding how daily patterns of toxicity and sensitivity to cancer treatment vary throughout the day and how chronotherapy functions at the cellular level for each type of treatment, this should stimulate novel approaches for treating the disease. In this project, the researchers have done this type of study for several potential anticancer drugs that target the p53 protein which has been described as “the guardian of the genome”.

The p53 protein regulates the cell cycle in multicellular organisms such as animals and humans. It plays a central role as a tumour suppressor, preventing genome mutation and thus cancer. Through CANCERTIME, it was found that there was a link between p53 and the circadian clock. Several drugs that target the p53 protein and that could be candidates for chronotherapy targets were tested.

In addition, it was discovered that all of the tumour types investigated during CANCERTIME retained a functional clock that was synchronised with the surrounding tissue.

Kept alive in a petri dish, these tumours can even continue to oscillate for several days once they have been removed from the body. This confirms that the circadian clocks in these tumours can keep working even when they do not receive hormonal or metabolic signals from surrounding tissue. This knowledge will help design chronotherapy strategies for cancer patients.

As a result, anticancer therapy will become personalised over the coming years: doctors will take a sample of each tumour and will determine its specific genetic characteristics. In combination with more information from that specific patient, they will be able to design a personalised treatment that will provide the highest chance of success for that individual.

Every individual has a specific chronotype, depending on what time of the day their physical functions (hormone levels, cognitive faculties and sleep, for example) change or reach a certain level. Both the patient's chronotype and a chronotherapeutic approach should be taken into consideration in the personalised treatment of cancer.

1. Find the synonyms of the following words:

- | | |
|-------------------------------------|-------------------------------------|
| 1) medication | a) staff |
| 2) an internal clock | b) anticancer medicament (medicine) |
| 3) application | c) advance |
| 4) benefits of chrono-therapy | d) to use many curative methods |
| 5) to apply many types of treatment | e) advantages of chronotherapy |
| 6) personnel | f) treatment |
| 7) to vary | g) the use |
| 8) anticancer drugs | h) a biological clock |
| 9) success | i) to change |

2. Answer the following questions:

- 1) An internal clock determines many of our bodily functions, doesn't it?
- 2) Does an internal clock determine the behaviour of tumour cells?
- 3) Where is the biological clock located?
- 4) What does the biological clock regulate?
- 5) What changes in the course of the 24-hour day?
- 6) How does this fact relate to medication?
- 7) What is meant by the concept of chronotherapy?
- 8) Where can it be used?
- 9) Why do many hospitals not take chronotherapy into consideration?
- 10) What can stimulate new approaches for treating cancer?
- 11) What kind of protein regulates the cell cycle in animals and humans?
- 12) What is the role of this protein against genome mutation that leads to cancer?
- 13) How do tumours behave keeping alive in a petri dish?

- 14) In what way can the knowledge of existing circadian clocks in the tumours (without metabolic signals from surrounding tissue) help cancer patients?
- 15) What will be taken into consideration in the personalised treatment of cancer?

3. Make up a plan of the text and write down a list of key words for each item of the plan.

4. Summarize the text using the plan and active vocabulary.

Decisive Step in Safeguarding Europe's Pollinators

Completed in January, the STEP project has considerably advanced our understanding of trends affecting pollinator populations in Europe, while suggesting concrete measures to help safeguard the most important species.

Did you know that three quarters of the world's food crops and 90% of wild plants depend on pollination to thrive? If insects like bees, whose population is declining because of various environmental stressors, were to disappear, the damage in terms of biodiversity, food security and economic growth would be immeasurable. Food products as ubiquitous as coffee and chocolate would become memories of the past, which partly explains why some of the planet's most renowned scientists have been hard at work trying to curb this trend.

For the STEP (Status and Trends of European Pollinators) team, taking on this challenge can only be done with sufficient information on the extent and nature of the decline, which species we need most and why, and the main drivers impacting population levels. The STEP project is helping us better understand the causes of pollinator declines including habitat loss, climate change, diseases, invasive species and pesticides. Early results suggest that it is a combination of several of these pressures on pollinators that has resulted in the massive losses of wild bees and honeybees.

Now completed, the project announced this week the publication of the "Climatic Risk and Distribution Atlas of European Bumblebees", where climate change is identified as one of the main threats to this group of pollinators. The report, the latest in a series of over 50 STEP publications, expands on the likely consequences of different

scenarios of global warming for the years 2050 and 2100. It underlines that as many as 14 and 25 species are projected to lose almost all of their climatically suitable areas under the intermediate and most severe scenario respectively, and that strong mitigation strategies will be needed to preserve this important species and ensure the sustainable provision of pollination services.

The STEP project has generated a substantial body of knowledge on how to conserve pollinators, safeguard the pollination of crops and better understand how to mitigate against threats. One of these solutions, presented in a DG Research article, would consist in covering crop land margins with a mix of flowers to attract pollinators and help them colonise new spaces. The team observed a 500% growth in pollinator abundance thanks to this initiative.

Communications was also a big part of the STEP plan, with awareness campaigns having been organised in schools and supermarkets across Europe. The team also actively participated in international events and initiatives pursuing similar objectives.

The project released a final brochure containing its main recommendations in January. It includes a Red List of European Bees to help direct conservation efforts at the national and continental level, as well as a set of tools and methodologies to help with future monitoring and assessment of both pollinators and the services they deliver, and support planners and decision makers in managing the wider landscape. For the team, European decision makers should now focus on developing robust scientific evidence to underpin policy and practice measures aiming to safeguard our pollinators.

1. Fit the words and their meanings:

- | | |
|-----------------|--|
| 1) a trend | a) the process of spoiling the condition or quality of something and the harm or loss that results |
| 2) to affect | b) to develop well and be healthy, strong or successful |
| 3) to safeguard | c) to protect against possible dangers |
| 4) to thrive | d) to go from a better to a worse position, or from higher to lower |
| 5) to decline | e) to cause some result or change in; to influence |

- 6) damage f) a general tendency or direction in the way
a situation is changing or developing

2. *Read the text and find the answers to the questions:*

- 1) What trend affecting pollinator populations in Europe worries scientists? Why?
- 2) What causes pollinator declines?
- 3) Why is climate change one of the main threats to wild bees and honey bees?
- 4) What does the STEP project offer to safeguard (protect) species?

3. *Summarize the text using the following words and phrases:*

- 1) pollinator populations
- 2) to help safeguard species
- 3) the world's food crops
- 4) to depend on
- 5) to thrive
- 6) insects
- 7) to decline
- 8) environmental stressors
- 9) to damage the biodiversity
- 10) to protect species

4. *Say whether the following statements are true or false. In your arguments use: **I quite agree with; I don't think so; I can't agree with (I can't agree that); On the contrary; Quite so; From the point of view; In my opinion.***

- 1) The STEP project has advanced our understanding of trends affecting pollinator populations everywhere in the world.
- 2) The STEP project hasn't suggested concrete measures to protect the most important species.
- 3) The project helps us better understand the causes of pollinator declines.
- 4) The causes of pollinator declines are considered to be habitat loss, climate change, diseases, invasive species and pesticides.
- 5) Climate change isn't identified as one of the main threats to these species.

- 6) The consequences of global warming can result in the massive losses of wild bees and honey bees.
- 7) The project has presented a substantial body of knowledge on how to conserve pollinators and safeguard the pollination of crops.
- 8) Nothing is said about the measures how to lessen the threats.

Granzymes in the Fight against Sepsis

Sepsis is a major health problem that requires urgent solutions. A European study discovered that certain enzymes released by immune cells could help reduce the extent of inflammation.

Upon infection, our body initiates a process of inflammation that aims to effectively eliminate the threatening pathogen. However, when the process goes wrong, pathological situations may emerge such as in the case of sepsis. Sepsis refers to whole-body inflammation with life-threatening complications.

Emerging evidence indicates that granzymes, a family of proteases, contribute to sepsis. The scope of the EU-funded study GRANZYMES IN SEPSIS (The role of granzymes A, B and M in sepsis) was to investigate the role of different granzymes in bacterial sepsis and identify which cells secrete them through both experimental and clinical approaches.

Using blood from healthy volunteers and patients with sepsis and systemic inflammatory response syndrome, scientists analysed the percentage of different lymphocyte populations expressing different granzymes (A, B, M and K). Similar work was conducted in mouse models of sepsis and in patients with pulmonary tuberculosis.

Results showed that granzyme expression was linked to the process of inflammation and not the presence of bacteria per se. Natural killer cells were identified as the predominant population expressing these proteins. In tuberculosis patients, the granzyme levels were higher, similar to those observed during viral infections. Work in mice lacking one of the granzyme proteins suggested a role for these proteases in attenuating lung inflammation.

This protective role for granzymes in host defence against infection combined with information on their regulation opens up new avenues for their therapeutic exploitation. Future innovative treat-

ments based on the manipulation of granzymes could serve as a means of inflammatory disease management.

1. Predict the contents of the article by its title.

2. Match the terms with their definitions:

- | | |
|---------------------------|---|
| 1) sepsis | a) a substance in the body that breaks down proteins and peptides |
| 2) pathogen | b) a serious infectious disease in which swellings appear on the lungs and other parts of the body |
| 3) protease | c) a set of physical conditions that shows you have a particular disease or medical problem |
| 4) syndrome | d) a type of small white blood cell with one round nucleus found especially in the lymphatic system |
| 5) lymphocyte | e) any of a group of chemical substances that are produced by living cells and cause particular chemical reactions to happen while not being changed themselves |
| 6) pulmonary tuberculosis | f) poisoning a part of the body by disease bacteria |
| 7) enzyme | g) swelling and soreness on or in the body which is red and hot to touch |
| 8) inflammation | h) a thing that causes disease |

3. Fit the words and word-combinations and their Russian meanings:

- | | |
|-----------------------------------|---|
| 1) to eliminate | a) возникать, появляться |
| 2) threatening pathogen | b) появившееся доказательство |
| 3) to emerge | c) уменьшать |
| 4) whole-body inflammation | d) осложнения с угрозой для жизни |
| 5) life-threatening complications | e) способствовать возникновению сепсиса |

- | | |
|---|--|
| 6) emerging evidence | f) угрожающий патоген |
| 7) to contribute to sepsis | g) определять клетки, кото-
рые их выделяют |
| 8) to identify which cells secret
them | h) воспаление всего организма |

CONTENTS

ВВЕДЕНИЕ	3
 UNIT 1	
THE CELL	4
 UNIT 2	
LIVING MATTER	13
 UNIT 3	
BIOLOGY AND MEDICINE	21
 SUPPLEMENTARY READING	
TRAINING	
FOR ANNOTATING AND GENERALIZING	30

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активная лексика и устная речь**

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