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ENGLISH FOR BIOLOGY STUDENTS

Методические рекомендации

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Данные методические рекомендации предназначены для студентов дневного отделения биологического факультета (специальности «Биология», «Биоэкология. Общая экология»), изучающих дисциплину «Иностранный язык».

Основная цель издания – совершенствование навыков и умений в различных видах чтения, а также обучение устным формам общения по профессиональной тематике. Методические рекомендации состоят из трех тематических разделов, содержащих профессионально-ориентированный текстовой материал. В конце каждого раздела есть блок самоконтроля.

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ПРЕДИСЛОВИЕ

Иноязычное профессиональное общение, обусловленное социальным заказом общества, является одной из основных составляющих содержания обучения специалистов. В связи с этим задачи вузовского курса дисциплины «Иностранный язык» определяются коммуникативными и познавательными потребностями специалистов соответствующего профиля.

Данное учебное издание предназначено для студентов биологического факультета высших учебных заведений дневной формы обучения, которые уже имеют базовую начальную подготовку по английскому языку и овладели лексическим и грамматическим минимумом для осуществления речевой деятельности в ситуациях социально-бытовой сферы общения.

Цель данного издания – сформировать у обучающихся навыки и умения различных видов чтения и говорения, развить способности извлекать и интерпретировать информацию, содержащуюся в оригинальных профессиональных текстах, а также осуществлять речевое взаимодействие для получения и обмена информацией. Соответственно, основное внимание в пособии уделяется работе с текстом как носителем информации и единицей деловой коммуникации, а также вербальному обеспечению речевого взаимодействия в профессиональной сфере. Это предполагает не только адекватное понимание, но и расширение активного и пассивного словарного запаса студентов.

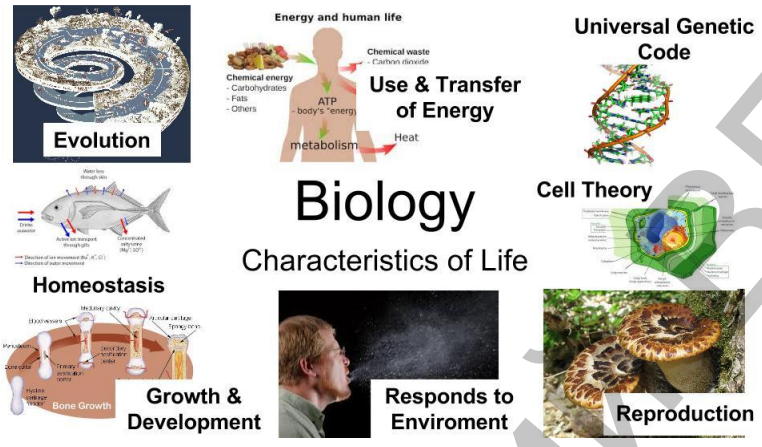
Методические рекомендации состоят из трех тематических разделов (Unit), содержащих профессионально-ориентированный аутентичный и адаптированный текстовой материал. В конце каждого раздела есть блок самоконтроля (Self Check). Целенаправленный подбор текстов, основанный на принципе максимальной доступности в смысловом и языковом отношении, призван сформировать у обучаемых систему образов и понятий, относящихся к базовым профессиональным знаниям. Это активизирует познавательную деятельность студентов и будет способствовать приобщению к профессиональной концептуальной системе и развитию навыков профессионального сотрудничества на иностранном языке.

Разнообразный познавательный и информативный материал ориентирован как на аудиторную, так и на самостоятельную работу студентов с иноязычными аутентичными текстами.

UNIT I. BIOLOGY AND RELATED JOBS

Text 1. WHAT IS BIOLOGY?

Exercise 1. Brainstorming. Define the term biology. What does it study? You may use the picture below.



Exercise 2. Choose the correct word to complete each sentence.

science	*scientific*	*scientist*

1. A couple of decades ago _____ noticed Panama's climate was slowly growing drier.
2. Advances in medical _____ mean that people are living longer.
3. The students of our department take many _____ courses.

biology	*biological*	*biologist*

1. The Marie Curie Research Institute develops molecular _____ research into the causes and treatment of cancer.
2. In recent years the science of vegetable palaeontology has been given the distinct name of Palaeobotany, so that "palaeontology e" among _____ mainly refers to zoology; but historically the two cannot be disconnected.
3. She studied _____ at university.

Exercise 3. Define the part of speech of the following words and translate them into Russian.

Live – living; biology – biologically; interact – interaction; cell – cellular; diverse – diversity; evolve – evolution; origin – originate; environment – environmentally; molecule – molecular.

Exercise 4. Study the words and find their meanings in the dictionary.

biologist
biology
cell
cellular units
distribution
diversity
DNA
energy
environment
equilibrium

evolution	origin
genetics	pre-existing cells
heredity	research
homeostasis	subfield
interaction	to come into existence
living things	to interact
molecular	to make up
molecules	to overlap

Exercise 5. Match the words with their definitions.

biology	*homeostasis*	*zoology*	*evolution*
genetics	*botany*	*cell*	*energy*

1. The smallest part of a living thing that can exist independently.
2. The study of how the qualities of living things are passed on in their genes.
3. The scientific study of animals and their behavior.
4. The ability or tendency of a living organism, cell, or group to keep the conditions inside it the same despite any changes in the conditions around it, or this state of internal balance.
5. The scientific study of living things.
6. The physical and mental strength that makes you able to do things.
7. The scientific idea that plants and animals develop and change gradually over a long period of time.
8. The scientific study of plants.

Exercise 6. Read the article and name the main principles or ideas of biology.

What is biology?

Life is incredibly varied, yet based on common processes. Biologists seek evidence to explain the nature of living things, and to understand where and how life is evolving, how evolution links life processes and ecology, and the impact that humans have on all forms of life.

Biology is the science of life. Its name is derived from the Greek words "*bios*" meaning "life" and "*logos"* meaning "study". Biology examines the structure, function, growth, origin, evolution, and distribution of living things. It classifies and describes organisms, their functions, how species come into existence, and the interactions they have with each other and with the natural environment.

There are generally considered to be at least nine "umbrella" fields of biology, each of which consists of multiple subfields.

- *Biochemistry*: the study of the material substances that make up living things
- *Botany*: the study of plants, including agriculture
- *Cellular biology*: the study of the basic cellular units of living things
- *Ecology*: the study of how organisms interact with their environment

- *Evolutionary biology*: the study of the origins and changes in the diversity of life over time
- *Genetics*: the study of heredity
- *Molecular biology*: the study of biological molecules
- *Physiology*: the study of the functions of organisms and their parts
- *Zoology*: the study of animals, including animal behavior

Adding to the complexity of this enormous idea is the fact that these fields overlap. It is impossible to study zoology without knowing a great deal about evolution, physiology and ecology. You can't study cellular biology without knowing biochemistry and molecular biology as well.

All the branches of biology can be unified within a framework of five basic understandings about living things. Studying the details of these five ideas provides the endless fascination of biological research:

- *Cell Theory*: There are three parts to cell theory — the cell is the basic unit of life, all living things are composed of cells, and all cells arise from pre-existing cells.
- *Evolution*: This is the overall unifying concept of biology. Evolution is the change over time that is the engine of biological diversity.
- *Genetics*: All living things have DNA and genetic information codes the structure and function of all cells.
- *Homeostasis*: All living things must maintain homeostasis, a state of balanced equilibrium between the organism and its environment.
- *Energy*: All living things require energy, and energy flows between organisms and between organisms and the environment.

Exercise 7. Fill in the blanks with the suitable words.

1. Biology examines the structure, function, growth, origin, evolution, and distribution of _____.
2. _____ is the study of the basic cellular units of living things.
3. _____ studies the origins and changes in the diversity of life over time.
4. _____ is the study of the origins and changes in the diversity of life over time.
5. These fields _____ because it’s impossible to study one field without knowing other ones.
6. You can't study cellular biology without knowing _____ and _____ as well.
7. All living things have _____ and genetic information codes the structure and function of all cells.
8. All living things must maintain _____, a state of balanced equilibrium between the organism and its environment.

Exercise 8. Answer the following questions.

1. What is biology? 2. What does it examine? 3. Name the main subfields of biology. 4. Describe what each subfield studies. 5. Genetics studies heredity, doesn’t it? 6. Does physiology or zoology study the functions of organism and their parts? 7. Why do the subfields overlap? 8. Define five ideas of biological research.

Exercise 9. Divide the article into logical parts and give each part a suitable title. Give a brief summary.
Exercise 10. Discussion. Work in pairs and discuss how biology might help you to understand environmental issues better.

Text 2. WHAT IS ECOLOGY?

Exercise 1. Brainstorming. What associations does the word "ecology" call to mind? What ecological problems do you know?

Exercise 2. Choose the correct word to complete each sentence.

ecology	*ecological*	*ecologist*	*ecologically*

1. But in _____ terms, something catastrophic occurred.
2. She is giving a lecture about the natural history and _____ of the sea shore.
3. This method of growing crops is effective and _____ sound.
4. In most cases _____ is to blame.
5. Economists say the ecosystem is basically healthy; _____ worry it may be on the verge of being irreparably damaged.

Exercise 3. Make up word-combinations.
Model: to exist in isolation

1.	climate	a.	organisms
2.	living	b.	the environment
3.	abiotic	c.	ecosystem
4.	environmental	d.	scarcities
5.	to affect	e.	things
6.	interactions of	f.	warming
7.	wetland	g.	plant and animal species
8.	global	h.	conditions
9.	food	i.	factors
10.	extinctions of	j.	pollution

Exercise 4. Study the words and find their meanings in the dictionary.

abiotic
biodiversity
biomass
biome
biosphere
biotic
community
distribution
ecology
ecosystem
extinction
food scarcities
fungi
global warming
isolation
moisture
organism
population
soil
species
to affect
to coin the term

to decay	to thrive
to expand	wetland

Exercise 5. Match the words with their definitions.

biotic factors	*population*	*biome*
abiotic factors	*community*	*ecosystem*

1. A type of environment that is described according to the typical weather conditions and plants that exist there.
2. Non-living parts of the environment (i.e. temperature, soil, light, moisture, rocks).
3. All the species of a particular type that live in one area.
4. All the animals and plants in a particular area, and the way in which they are related to each other and to their environment.
5. All living organisms inhabiting the Earth.
6. A group of different animals or plants that live or grow together.

Exercise 6. Read the passage and name the levels of organization.

What is ecology?

Ecology, also called bioecology, bionomics, or environmental biology, is the branch of biology which studies the interactions among living things, and between living things and and their environment. The word comes from the Greek word *oikos*, meaning "house". This word origin makes sense if you think of Earth as home and all organisms as members of Earth's household. Ernst Haeckel, a German biologist, coined the term *ecology* in 1866 to encourage biologists to consider the ways organisms interact. Until that time, most scientists studied a plant or an animal as though it existed in isolation – as if it did not affect its environment, and its environment did not affect it.

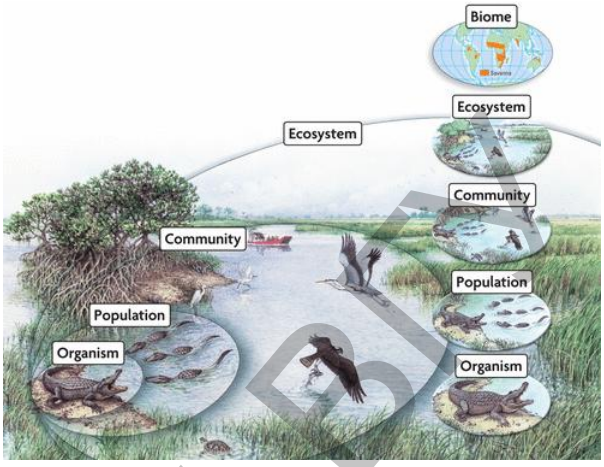
The objects of study are the interactions of organisms that include living and nonliving components of their environment. These parts are referred to as biotic and abiotic factors. Biotic factors are living things, such as plants, animals, fungi, and bacteria. Each organism plays a particular role in the ecosystem. For example, earthworms play a key role in enriching the soil. Abiotic factors are nonliving things such as moisture, temperature, wind, sunlight, and soil. The balance of these factors determines which living things can survive in a particular environment. The topics of interest of ecology are biodiversity, distribution, biomass, and populations of organisms, as well as cooperation and competition within and between species.

Ecologists study nature on different levels, from a local to a global scale. These levels reveal the complex relationships found in nature.

- ✓ *Organism*. An organism is an individual living thing, such as an alligator.
- ✓ *Population*. A population is a group of the same species that lives in one area, such as all the alligators that live in a swamp.

✓ *Community*. A community is a group of different species that live together in one area, such as groups of alligators, turtles, birds, fish, and plants that live together.

✓ *Ecosystem*. An ecosystem includes all of the organisms as well as the climate, soil, water, rocks, and other nonliving things in a given area. Ecosystems can vary in size. An entire ecosystem may live within a decaying log, which in turn may be part of a larger wetland ecosystem.



✓ *Biome*. A biome is a major regional or global community of organisms. Biomes are usually characterized by the climate conditions and plant communities that thrive there.

✓ *Biosphere*. Biosphere is the part of the Earth that supports all organisms, made up of all the Earth's ecosystems.

Ecologists study relationships within each level of organization and also between levels. For example, researchers may study the relationships within a population of alligators, as well as the relationships between alligators and turtles in a community.

Some of the most pressing problems in human affairs – expanding populations, food scarcities, environmental pollution including global warming, extinctions of plant and animal species, and all the attendant sociological and political problems – are to a great degree ecological.

Exercise 7. Complete the chain using information from the article.

Organism → _____ → *Community* → *Ecosystem* → _____ → *Biosphere*

Exercise 8. Work in pairs, discuss these statements. Do you agree or disagree? Begin the following sentences with the words:

I think that …, I'm not sure that …, I completely agree/disagree with …

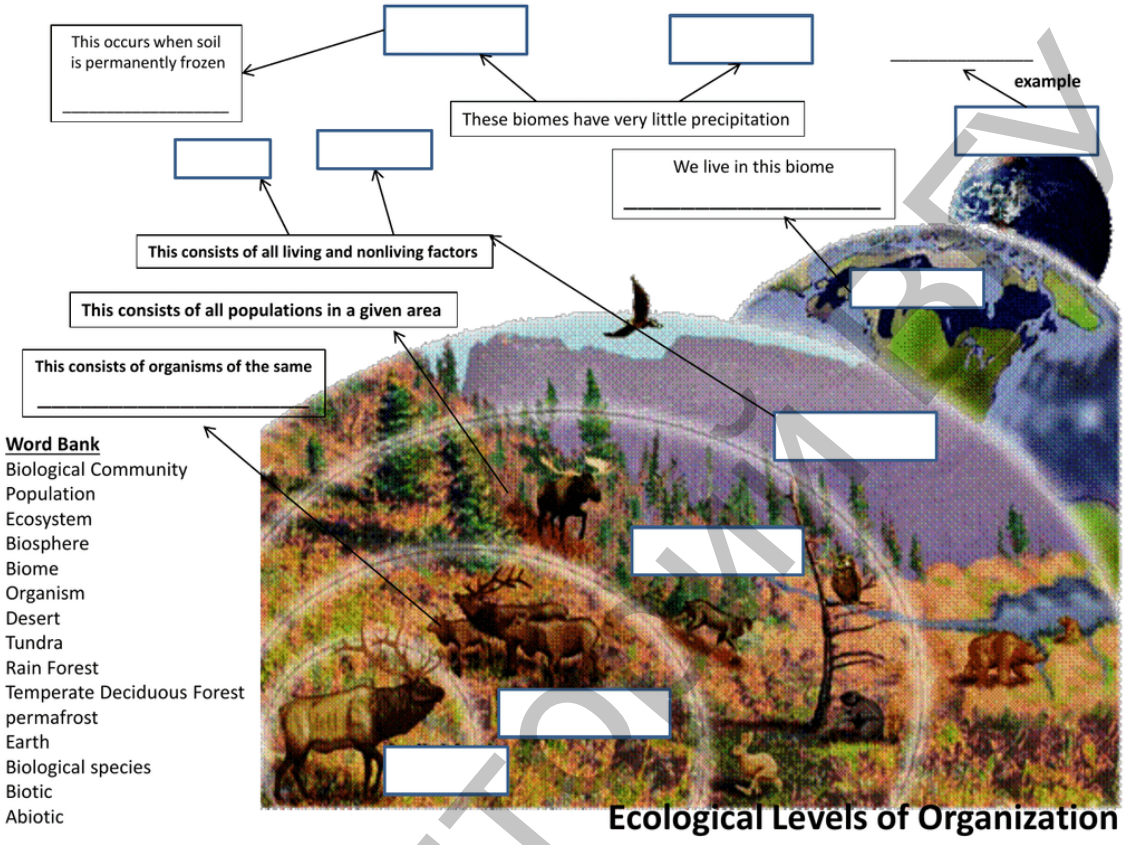
1. Ecology is the branch of biology which studies the interactions only among living things.
2. Ernst Haeckel is the inventor of the term ecology.
3. Abiotic factors are living things, such as plants, animals, fungi, and bacteria.
4. An organism is an individual living thing.
5. A community is a group of different species that live together in one area.
6. A biome is all the animals and plants in a particular area.

Exercise 9. Answer the following questions.

1. Define the term ecology. 2. Does the term ecology come from the Greek or Latin language? 3. What did Ernst Haeckel encourage biologists to do? 4. What is the

difference between biotic and abiotic factors? Give examples. 5. Describe the levels of organization. 6. What do ecologists study? 7. Name the most pressing ecological problems.

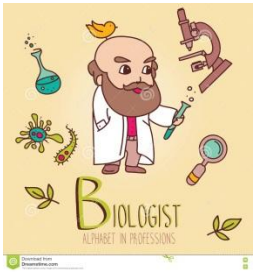
Exercise 10. Complete the chart using the information you have learnt.



Exercise 11. Discussion. Work in pairs and discuss what level of organization a flock of pigeons in a park describes. Give your arguments.

Text 3. JOBS IN BIOLOGY

Exercise 1. What is the image of a biologist? Does he look like a person in the picture? What skills and qualities should a biologist possess? What careers in biology can you think of?



Exercise 2. Tell your groupmates what a biologist does. You may use the picture below.

Exercise 3. Study the words and find their meanings in the dictionary.

bacteriologist
biochemist
botanist
cell biologist
consequence
conservation
ecologist
environmental issues
experimental biologist
geneticist
horticulture
inheritance
marine
molecular biologist
organ system
pathologist
phenomenon(a)
physiologist
protein
research worker
theoretical biologist
to culture
wildlife
zoologist

Exercise 4. Read the following information and name the jobs in biology.

Jobs in Biology

Studying life in all its forms is key to our understanding of many elements of the world around us. From the depths of the oceans to the deserts, swamp and wetlands, temperate regions and tundra and ice sheets, live is everywhere.

A biologist is a scientist who studies life, specifically organisms and their relationship to their environment. Generally speaking, biologists study humans, animals, plants and bacteria to gain a better understanding of how the body and nature works, and how external factors may influence each organism.

There are different types of biologists. Theoretical biologists use mathematical methods and develop models to understand phenomena and ideally predict future experimental results, while experimental biologists conceive experiments to test those predictions.

Modern biology is an enormous subject that has many branches. Specialists in some branches include:

- molecular biologists and biochemists who work at the chemical level, with the aim of revealing how DNA, proteins, and other molecules are involved in biological processes;
- geneticists who study genes and their involvement in inheritance and development;
- cell biologists who study individual cells or groups of cells, often by culturing them outside organisms; they investigate how cells interact with each other and their environment;
- physiologists who find out how organ systems work in a healthy body;
- pathologists who study diseased and dysfunctional organs;
- ecologists do research on the relationships between living things and their environment, as well as the consequences these relationships can, and do, have on the environment. Some focus their attention on whole organisms; others study populations, individuals of the same species living together at one location. They may also teach others to understand and appreciate the natural world we live

in by educating local communities about environmental issues and ecosystems in their area.

There are also biologists who specialize in particular groups of organisms; for example, bacteriologists study bacteria, botanists study plants, and zoologists study animals.

Biologists are employed in many fields including conservation and wildlife management, industry, health care, horticulture, agriculture, zoos, museums, information science, and marine and freshwater biology. In addition, many biologists are employed as teachers, lecturers, or research workers.

Exercise 5. Match the definitions with jobs from the box.

geneticist	*physiologist*	*pathologist*
bacteriologist	*botanist*	*zoologist*

1. A _____ studies plants.
2. A _____ studies genes and their involvement in inheritance and development.
3. A _____ studies bacteria.
4. A _____ finds out how organ systems work in a healthy body.
5. A _____ studies diseased and dysfunctional organs.
6. A _____ studies animals.

Exercise 6. Answer the following questions.

1. What is a biologist? 2. Name the types of biologists. 3. What does a molecular biologist do? 4. Cell biologists study individual cells or groups of cells, don't they? What else do they do? 5. Describe the issues an ecologist deals with. 6. What other fields are biologists employed in? 7. What field of biology would you like to work? Why?

Exercise 7. Read the interview with Michael Beresford speaking about teaching as a career. Say if it's popular with young people nowadays and name the qualities of a good teacher.

– *Well, Michael, is teaching as a career popular with young people?*

– Well, it's hard to say. I think, teaching of some kinds is still popular as it ever was, and I think, teaching small children, teaching in nursery schools and in primary schools - that is still quite popular. More, of course, among women than amongst men, and the vast majority of teachers in nursery schools and primary schools are women. That is still a career which many take up with enthusiasm. And I mean that they are good at it, and that women are probably better teachers at this level because they're a kind of a substitute for the mother. When the child is learning to go away from the family, a woman figures more than others, like a mother figures for the child, and I think that's a natural development. When we come to secondary education, I think their position is rather different. I think, until very recent time, teaching in secondary schools of all sorts was still regarded as a good career, because it is a good career if it is a good school. But there is no doubt, that these days, the life of a secondary school teacher is harder than it was, say, 20

or

30 years ago, when I started my teaching career. Those who have been in teaching for a long time, tend to put up resistance, they know how to cope with problems better than the young ones, who often get disillusioned and give up teaching. So, we are short of good teachers. This is not true, of course, of the independent schools. There they can recruit people and pay them better salaries, and so they have few problems of recruitment. So, it's really the main problem in the state secondary schools and the comprehensive schools, I would say.

– And what is your idea of a good teacher then?

– It'll take a lot of time to describe. I think, a good teacher has not only to know his or her own subject, to be skillful with the subject he or she is teaching, but also to be a good person, to be a person with a pleasant nature, pleasant personality, sympathetic, particularly sympathetic to young people and their problems, to be kind and good, and understanding and also not to be full of sarcasm. In the old days, and too quite recently, like the time when I was being educated it was fashionable among teachers to put scorn on children even if they made a slight mistake. They were taught with great scorn and contempt, as if they were fools: children were made to look foolish and ignorant and shown in class in front of others. It made children feel uncomfortable. The opposite approach is required with children who are most lacking confidence, I mean, to encourage them from the part of a teacher, which will improve the child's learning. The child will not, of course, learn from a teacher he or she doesn't like. And I think, that is because the children want to learn, they want to please the teacher when they like. So, the matter of personality, I think, is the most important problem of teaching. Even a teacher, who doesn't know the subject perfectly well, can be a good teacher, if a pupil wants to follow him, and this is the essence of it. I think that being a good and sympathetic person is first and foremost; training and skill and knowledge come second, in my opinion.

Exercise 8. Speak on the following:

1. What problems are British schools faced with? Compare them with the problems facing Belarusian schools.
2. Michael Beresford says that a good teacher should have a pleasant personality, be sympathetic, kind and understanding. What other personal qualities should a good teacher have?
3. Michael says that a teacher should not be full of sarcasm. Can you name a few other traits of character a teacher must not possess?
4. You surely have come across two types of teachers, kind and mild persons, and very strict, even authoritarian ones. Whose lessons did you enjoy more? Where did you show better standards of achievement? When were there fewer breaches of discipline?
5. What makes many young people take up teaching as a career? Does teaching appeal to you? Give your reasons.
6. Why do many teachers quit their jobs? Make a list of advantages and disadvantages of the teaching career.

Exercise 9. Discussion. Tell your partner about your career plans. Talk about further qualifications, skills and positions.

SELF-CHECK

Translate the article from Russian into English using active vocabulary. Render the article.

Биология (греч. *биос* – «жизнь» + *логос* – «учение, наука») – наука о жизни (живой природе), одна из естественных наук, предметом которой являются живые существа и их взаимодействие с окружающей средой. Биология изучает все аспекты жизни, в частности, структуру, функционирование, рост, происхождение, эволюцию и распределение живых организмов на Земле. Классифицирует и описывает живые существа, происхождение их видов, взаимодействие между собой и с окружающей средой.

Биолог – это специалист, который исследует общие свойства и закономерности развития живых организмов, изучает видовое многообразие растений.Он собирает тематический материал, исследует его, организует проведение экспериментов и разрабатывает технологии практического применения полученных результатов.

Работа биолога зависит от специализации: например, зоолог изучает особенности физиологии и анатомии животных, закономерности их развития и особенности поведения, многообразие видов, типов и т.п. Анатомы и физиологи изучают строение человека и особенности его жизнедеятельности, аномальное развитие отдельных органов и организма в целом.

Селекционеры и генетики изучают формы и особенности размножения, развития разных классов и видов, наследственность и изменчивость, структуры и функции генов, выводят более продуктивные сорта растений и породы животных. Биофизики и биохимики изучают закономерности физико-химических явлений в живых организмах и влияние различных физических факторов и химических веществ на живые системы.

Вирусологи и микробиологи исследуют закономерности размножения и распространения болезнетворных бактерий, вирусов, паразитов и выявление методов борьбы с инфекционными и вирусными заболеваниями.

К необходимым качествам биолога можно отнести большой интерес к изучаемым объектам природы, любознательность, развитие зрительного цветового восприятия, умение длительное время сосредотачиваться и очень высокая наблюдательность, творчество, терпение, аккуратность, высокие требования к аналитико-синтетическому и логическому мышлению, честность.

UNIT II. BASICS OF BIOLOGY

Text 1. CELL THEORY

Exercise 1. Brainstorming. Define the term cell. What do you know about the cell theory? What are its key points?

Exercise 2. Choose the correct word to complete each sentence.

cell	*cellular*	*unicellular*	*multicellular*

1. _____ organisms are composed of one cell.
2. The cell theory states that the _____ is the fundamental unit of life.
3. An organism made up of many cells is called _____ .
4. Cell communication occurs among more than one cell, but occurs at the _____ level.

Exercise 3. Look at this picture and speak about every scientist's contribution to the cell theory.

Exercise 4. Study the words and find their meanings in the dictionary.

archaea
cell division
chemical composition
cytoplasm
DNA (deoxyribonucleic acid)
eukaryotic cell
genetic information
ion
jellylike substance
membrane
mineral
mitosis
multi-celled
multicellular
nucleic acid
nucleus
organelle
pre-existing cell
prokaryotic cell
protein
reproduction
RNA (ribonucleic acid)
single-celled
tissue
to store
unicellular

Exercise 5. Match the words with their definitions.

prokaryotic cells	*DNA*	*mitosis*	*organelle*
eukaryotic cells	*RNA*	*cytoplasm*	*membrane*

1. A type of cell division that results in two daughter cells each having the same number and kind of chromosomes as the parent nucleus, typical of ordinary tissue growth.
2. Cells that contain a nucleus and organelles, and are enclosed by a plasma membrane.
3. Any structure, such as a nucleus or a chloroplast that has a particular purpose inside a living cell.
4. A microscopic double layer of lipids and proteins forming the boundary of cells or organelles.
5. A nucleic acid present in all living cells which role is to act as a messenger carrying instructions from DNA for controlling the synthesis of proteins.
6. Unicellular organisms that lack organelles or other internal membrane-bound structures.
7. The material or protoplasm within a living cell, excluding the nucleus.
8. The chemical present at the center of the cells of living things that controls the structure and purpose of each cell and carries genetic information during reproduction.

Exercise 6. Read the passage and name the basic ideas of the cell theory..

Cell Theory

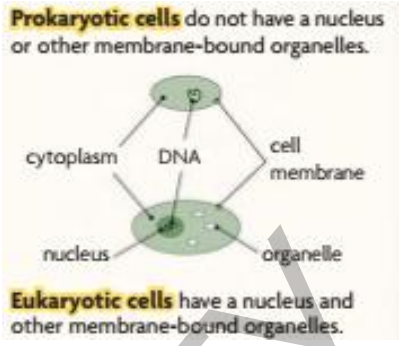
Cell Theory is one of the basic principles of biology. It states:

- All living organisms are composed of cells. They may be unicellular or multicellular.
- The cell is the basic unit of life through cell division.
- Cells arise from pre-existing cells. (They are not derived from spontaneous generation.)

All living organisms in the kingdoms of life are composed of and depend on cells to function normally. Your body alone is made of trillions of cells of many different shapes, sizes and functions. In general, cells tend to be microscopic in size and have similar building blocks. They are enclosed by a membrane that controls the movement of materials into and out of the cell.

Within the membrane, a cell is filled with cytoplasm. Cytoplasm is a jellylike substance that contains dissolved molecular building blocks – such as proteins, nucleic acids, minerals and ions. In some types of cells, the cytoplasm also contains organelles, which are structures specialized to perform distinct processes within a cell. Most organelles are surrounded by a membrane. In many cells, the largest and the most visible organelle is the nucleus, which stores genetic information.

Not all cells, however, are alike. There are two primary types of cells: prokaryotic and eukaryotic cells.



- Prokaryotic cells do not have a nucleus or other membrane-bound organelles. Instead, the cell's DNA is suspended in the cytoplasm. All prokaryotes are microscopic single-celled organisms.
- Eukaryotic cells have a nucleus and other membrane-bound organelles. The nucleus, the largest organelle, encloses the genetic information. Eukaryotes may be multicellular or single-celled organisms.

Examples of eukaryotic cells include animal cells, plant cells and fungal cells. Prokaryotic cells include both the bacteria and the archaea, which appear to be only distantly related to bacteria.

Thus, all organisms start as single cells. These cells grow, divide through mitosis, and develop into multi-celled organisms. Mitosis is a form of cell division that produces identical cells. These cells can then differentiate when given different signals produce different types of tissues and organs. This is how large and complex organisms are made. Single-celled organisms divide as well, but when they divide, the cells separate into two new individuals. This is known as asexual reproduction. Cells contain organelles, or tiny cellular structures, that carry out specific functions necessary for normal cellular operation. Cells also contain DNA (deoxyribonucleic acid) and RNA (ribonucleic acid), the genetic information necessary for directing cellular activities.

The modern approach of the Cell Theory includes the ideas that:

- Energy flow occurs within cells.
- Heredity information (DNA) is passed on from cell to cell.
- All cells have the same basic chemical composition.

Exercise 7. Complete the following sentences.

1. All organisms are made of _____ .
2. _____ are the basic units of structure and function for all _____ things.
3. All cells come from other _____ .
4. Prokaryotes are cells that do not have a _____ or other cellular _____.
5. Eukaryotes have a ____ surrounded by a nuclear ____.
6. Unicellular organisms are composed of ____ cell.
7. Multicellular organisms are made up of _____ cells.

Exercise 8. Answer the following questions.

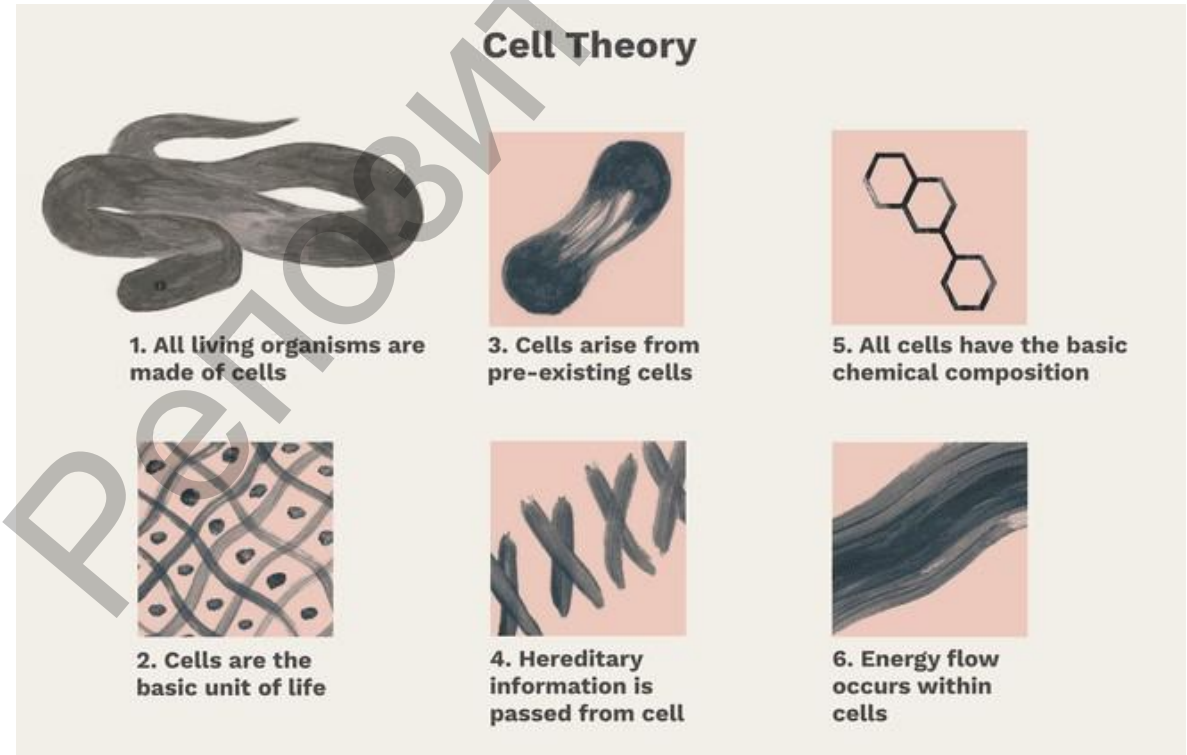
1. Name the basic principles of the cell theory. 2. Are all cells within an organism the same? If no, how do they differ? 3. Describe the inner structure of the cell. 4. How do prokaryotic and eukaryotic cells differ? Give examples of each type. 5. What is mitosis? 6. What is asexual reproduction? 7. What do cells contain? 8. Speak on the main ideas of the modern approach to the cell theory.

Exercise 9. Complete the chart using the information below and explain how improvements in the microscope helped scientists form the cell theory.

Scientists: *Zacharias Janssen, Rudolf Virchow, Robert Hooke, Theodor Schwann, Anton Von Leeuwenhoek, Matthias Schleiden.*
Dates: *1839, 1674, 1855, 1595, 1665, 1838.*

Scientist	***Date***	***Contribution***
1.		German histologist that concluded all cells come from other cells.
2.		German physiologist that concluded all animals are made of cells.
3.		Came up with the word "cell" after studying cork under the microscope.
4.		German botanist who concluded that all plants are made of cells.
5.		Dutch tradesman who made the first simple microscope.
6.		Dutch scientist that built a compound microscope with his father.

Exercise 10. Discussion. Using the picture below explain the major principles of cell theory in your own words.



Text 2. EVOLUTION

Exercise 1. Brainstorming. Define the term evolution. What do you know about the theory of evolution? Who is its discoverer?

Exercise 2. Choose the correct word to complete each sentence. Change the form if necessary.

evolution	*evolutionary*	*evolve*

1. Natural selection can't be the sole explanation of _____ change.
2. The process of biological _____ has taken billions of years.
3. Many scientists now believe that birds _____ from dinosaurs.
4. Charles Darwin stressed the role of competition in his theory of ____ .
5. _____ biology emerged in the nineteenth century.

Exercise 3. Look at this picture and explain why Charles Darwin can't be considered the first scientist to consider evolution.

Exercise 4. Study the words and find their meanings in the dictionary.

ancestor
birth rate
cladistics
concept
descent
driving force
gene pool
genetic code
genetic drift
genomics
inherited trait
mortality rate
natural selection
offspring
paleontology
phenetics
phylogenetics
phylogeny
selective breeding
siblings
survival
to breed
to compete
to inherit
variability
variation

Exercise 5. Match the words with their definitions.

ancestor	*driving force*	*variation*	*phylogeny*
gene pool	*natural selection*	*offspring*	*inherit*

1. An animal's baby or babies.
2. All of the genes available to a particular species.
3. Derive (a quality, characteristic or predisposition) genetically from one's parents or ancestors.
4. The history of the evolution of a species or group, especially in reference to lines of descent and relationships among broad groups of organisms.
5. The process whereby organisms better adapted to their environment tend to survive and produce more offspring.
6. Someone or something that strongly influences people and makes them do something.
7. A difference between similar things, or a change from the usual amount or form of something.
8. An animal that lived in the past that modern animals have developed from.

Exercise 6. Read the passage and name the main ideas on evolution.

Evolution

A central organizing concept in biology is that life changes and develops through evolution, and that all life-forms known have a common origin. The theory of evolution postulates that all organisms on the Earth, both living and extinct, have descended from a common ancestor or an ancestral gene pool. This universal common ancestor of all organisms is believed to have appeared about 3.5 billion years ago. Biologists regard the ubiquity of the genetic code as definitive evidence in favor of the theory of universal common descent for all bacteria, archaea and eukaryotes.

The term "evolution" was introduced into the scientific lexicon by Jean-Baptiste de Lamarck in 1809, and fifty years later Charles Darwin posited a scientific model of natural selection as evolution's driving force. Alfred Russel Wallace is recognized as the co-discoverer of this concept as he helped research and experiment with the concept of evolution. Evolution is now used to explain the great variations of life found on Earth.

What are Darwin's Four Main Ideas on Evolution?

Variation in Populations. In every species there is variation. This variability occurs even between related individuals. Siblings vary in colour, height, weight and other characteristics. Other characteristics rarely vary, such as number of limbs or eyes.

Inherited Traits. Each species has traits determined by inheritance. Inherited traits passed from parents to offspring determine the characteristics of the offspring. Inherited traits that improve the odds of survival are more likely to be passed on to subsequent generations.

Offspring Compete. Most species produce more offspring each year than the environment can support/. This high birth rate results in competition among the members of the species for the limited natural resources available. The struggle for resources determines the morality rate within a species. Only the surviving individuals breed and pass on their genes to the next generation.

Survival of the Fittest. Some individuals survive the struggle for resources. These individuals reproduce, adding their genes to the succeeding generations. The traits that helped these organisms to survive will be passed on to their offspring. This process is known as "natural selection". Conditions in the environment result in the survival of individuals with specific traits which are passed through heredity to the next generation.

Darwin theorized that species flourish or die when subjected to the processes of natural selection or selective breeding. Genetic drift was embraced as an additional mechanism of evolutionary development in the modern synthesis of the theory.

The evolutionary history of the species – which describes the characteristics of the various species from which it descended – together with its genealogical relationship to every other species is known as its phylogeny. Widely varied approaches to biology generate information about phylogeny. These include the comparisons of DNA sequences, a product of molecular biology (more particularly genomics), and comparisons of fossils or other records of ancient organisms, a product of paleontology. Biologists organize and analyze evolutionary relationships through various methods, including phylogenetics, phonetics and cladistics.

Evolutionary biologists have continued to study various aspects of evolution by forming and testing hypotheses as well as constructing theories based on evidence from the field or laboratory and on data generated by the methods of mathematical and theoretical biology. Their discoveries have influenced not just the development of biology but numerous other scientific and industrial fields, including agriculture, medicine and computer science.

Evolution is relevant to the understanding of the natural history of life forms and to the understanding of the organization of current life forms.

Exercise 7. Mark each sentence as T (True) or F (False) according to the given information.

1. Evolution is change in the heritable characteristics of biological populations over successive generations. 2. Similar characteristics tend to exist within any given population as a result of mutation, genetic recombination and other sources of genetic variation. 3. There are three key points of Darwin's theory of evolution. 4. The variations of individuals give some members of the species advantages in the competition to survive and reproduce. 5. Evolution is irrelevant to the understanding of the natural history of life forms and to the understanding of the organization of current life forms.

Exercise 8. Answer the following questions.

1.What is a central concept in biology? 2. When is the common ancestor of all organisms believed to have appeared? 3. Who introduced the term "evolution"?

4. What is evolution's driving force according to Charles Darwin? 5. Name the main key points of Darwin's theory of evolution. 6. What is phylogeny? What does it include? 7. What spheres have the discoveries of evolutionary biologists influenced?

Exercise 9. Complete the chart with the contribution to evolutionary theory made by each scientist.

Scientist	Contribution
Carolus Linnaeus	
George Buffon	
Erasmus Darwin	
Jean-Baptiste Lamarch	
Charles Darwin	

Exercise 10. Work in pairs and discuss why Darwin's theory of evolution is discarded by many religions. Which approach do you support? Give your arguments.

Text 3. HOMEOSTASIS

Exercise 1. Brainstorming. What is homeostasis? Give your own definition to the term knowing that 'home' means "similar," and 'stasis' means "standing still" or "stable."

Exercise 2. Choose the correct word to complete each sentence.

homeostasis	*homeostatic*

1. Warm-blooded animals are able to achieve temperature _____.
2. These events undermine metabolic _____, but may not directly lead to overt diabetes in the early stage.
3. All _____ control mechanisms have at least three interdependent components.
4. Successful _____ is vital to the survival of any living thing.
5. _____ processes also maintain water, oxygen, pH and blood sugar.

Exercise 3. Make up word-combinations.

Model: different parts of an ecosystem

1. to result	k.	level
2. the part of	l.	feedback loop
3. internal and external	m.	a homeostatic system
4. negative	n.	in a disaster
5. temperature	o.	in response
6. the ability	p.	regulation
7. blood sugar	q.	to self-regulate

8. to decline r. environment

Exercise 4. Study the words and find their meanings in the dictionary.

blood clotting
blood pressure regulation
blood sugar level
breathing rate
competition
control center
decomposition
effector
feedback
internal environment
maintenance
metabolic rate
negative feedback loop
osmoregulation
perspiration
positive feedback loop
predation
receptor
response
status quo
target
temperature regulation
to amplify
to monitor
to perceive
to process

Exercise 5. Match the words with their definitions.

homeostasis	*control centre*	*receptor*	*effector*
feedback loop	*temperature regulation*	*osmoregulation*	

1. Maintenance by an organism of an internal balance between water and dissolved materials regardless of environmental conditions.
2. A biological occurrence wherein the output of a system amplifies the system or inhibits the system.
3. The sensing component responsible for monitoring and responding to changes in the external and internal environment.
4. The component which responds to the commands of the control centre by opposing or enhancing the stimulus.
5. The ability of an organism to keep its body temperature within certain boundaries, even when the surrounding temperature is very different.
6. The integration centre that receives and processes information from the receptor.
7. The ability or tendency of a living organism, cell, or group to keep the conditions inside it the same despite any changes in the conditions around it, or this state of internal balance.

Exercise 6. Read the passage and explain what homeostasis is and why it important.

Homeostasis

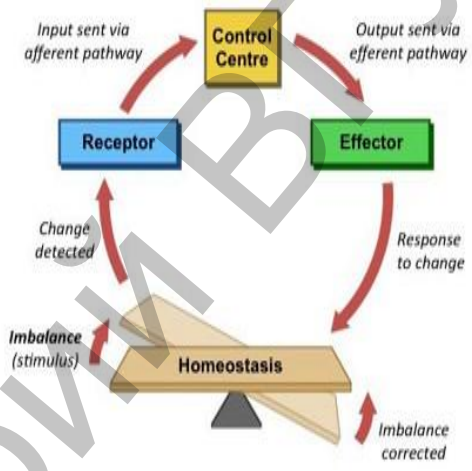
What is homeostasis?

The concept of homeostasis – that living things maintain a constant internal environment – was first introduced in 1865 by French physiologist Claude Bernard, and the term was first used in 1926 by Walter Bradford Cannon. The word homeostasis derives from Greek, with home meaning "similar," and stasis, meaning "standing still" or "stable."

As originally conceived by Bernard, homeostasis was applied to the struggle of a single organism to survive. The concept was later extended to include any biological system from the cell to the entire biosphere, all the areas of Earth inhabited by living things.

Homeostasis is any self-regulating process by which an organism tends to maintain stability while adjusting to conditions that are best for its survival. If homeostasis is successful, life continues; if it's unsuccessful, it results in a disaster or death of the organism.

Regulation of homeostasis



The components of homeostasis are: (1) a receptor, (2) a control center, and (3) an effector. The *receptor* is the part of a homeostatic system that receives information regarding the status of the body. It monitors and perceives the changes in its environment, both the internal and the external, and relays this information to the control center. The *control center*, in turn, processes the information and sends signals to the effector. The *effector*, then, produces a response based on the signal from the control center. Receptors, control centers and effectors work together in what is known as a feedback loop. Feedback is information from receptors that allows a control center to compare current conditions to a set of ideal values. In a feedback loop, information moves continuously among receptors, a control center and an effector.

Why is Feedback Important?

Without feedback, homeostasis cannot occur. This means that an organism loses the ability to self-regulate its body. Negative feedback mechanisms are more common in homeostasis, but positive feedback loops are also important.

Positive Feedback Loops

A positive feedback loop occurs in nature when the product of a reaction leads to an increase in that reaction. If we look at a system in homeostasis, a positive feedback loop moves a system further away from the target of equilibrium. It does this by amplifying the effects of a product or event and occurs when something needs to happen quickly. The examples of positive feedback loops are fruit ripening, childbirth, blood clotting, etc.

Negative Feedback Loops

A negative feedback loop occurs in biology when the product of a reaction leads to a decrease in that reaction. In this way, a negative feedback loop brings a system closer to a target of stability or homeostasis. Negative feedback loops are responsible for the stabilization of a system, and ensure the maintenance of a steady, stable state. The response of the regulating mechanism is opposite to the output of the event. The examples of negative feedback loops are temperature regulation, blood pressure regulation, osmoregulation, etc.

Positive vs. Negative Feedback

The key difference between positive and negative feedback is their response to change: positive feedback amplifies change while negative feedback reduces change. This means that positive feedback will result in more of a product: more apples, more contractions, or more clotting platelets. Negative feedback will result in less of a product: less heat, less pressure, or less salt. Positive feedback moves away from a target point while negative feedback moves towards a target.

What is an example of homeostasis in a living thing?

Body temperature control in humans is one of the most familiar examples of homeostasis. Normal body temperature hovers around 37 °C (98.6 °F), but a number of factors can affect this value, including exposure to the elements, hormones, metabolic rate, and disease, leading to excessively high or low body temperatures. The hypothalamus in the brain regulates body temperature, and feedback about body temperature from the body is carried through the bloodstream to the brain, which results in adjustments in breathing rate, blood sugar levels, and metabolic rate. In contrast, reduced activity, perspiration, and heat-exchange processes that permit more blood to circulate near the skin surface contribute to heat loss. Heat loss is reduced by insulation, decreased circulation to the skin, clothing, shelter, and external heat sources.

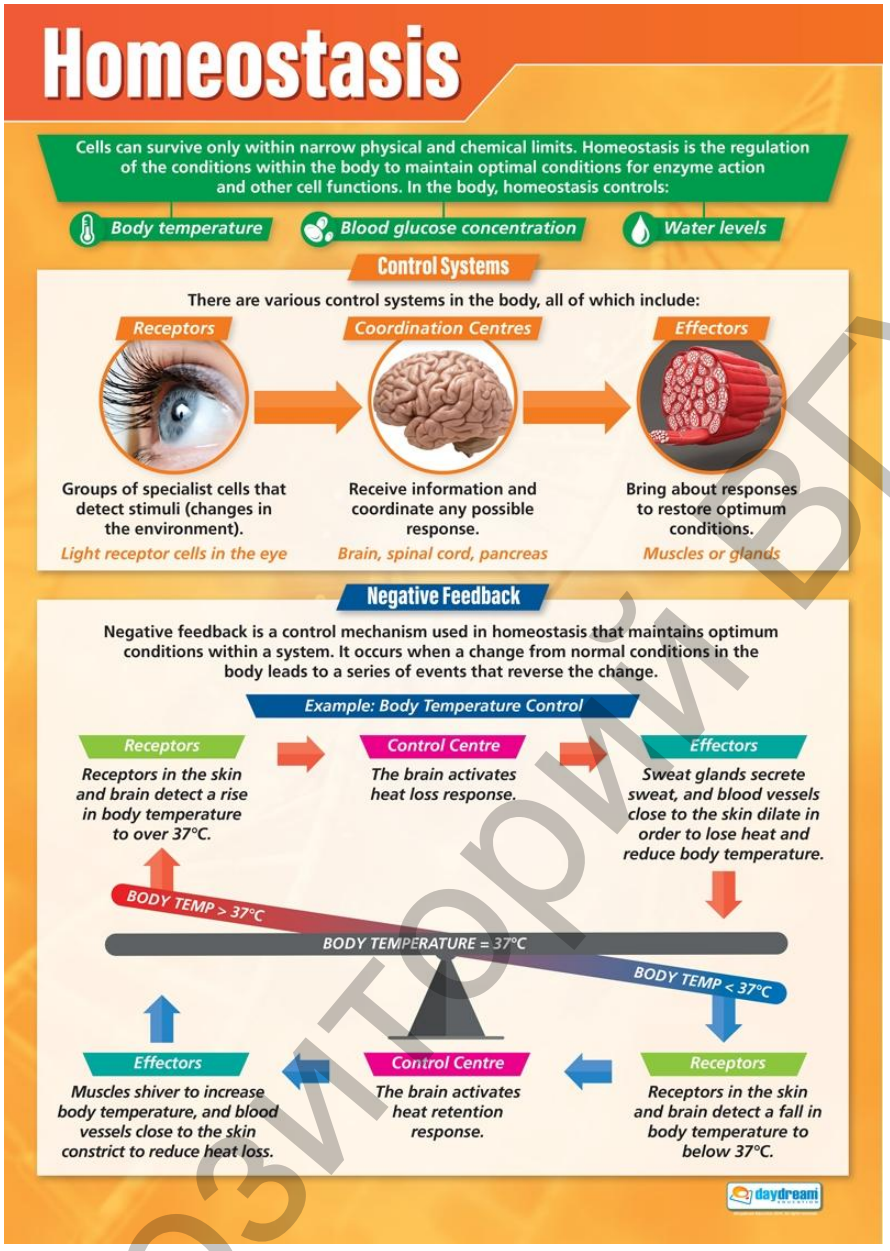
Are there any examples of homeostasis in ecosystems?

The concept of homeostasis has also been used in studies of ecosystems. Canadian-born American ecologist Robert MacArthur first proposed in 1955 that homeostasis in ecosystems results from biodiversity and the ecological interactions (predation, competition, decomposition, etc.) that occur between the species living there. The term homeostasis has been used by many ecologists to describe the back-and-forth interaction that occurs between the different parts of an ecosystem to maintain the status quo. It was thought that this kind of homeostasis could help to explain why forests, grasslands, or other ecosystems persist (that is, remain in the same location for long periods of time). Since 1955 the concept has changed to incorporate the ecosystem's nonliving parts, such as rocks, soil, and water.

A good example of feedback loops at the ecosystem level is in the cycle of predator and prey populations: a boom in prey population will mean more food for predators, which will increase predator numbers. This will then lead to over predation, and the prey population will again decline. The predator population will decline in response, releasing the pressure on the prey population and allowing it to bounce back.

Exercise 7. Look at the picture and find the answers to the given questions in it.

1. What is homeostasis?
2. What does homeostasis control in the body?
3. Name the main parts of homeostasis and give examples to each part.
4. Explain the mechanism of homeostasis.
5. What is a positive feedback loop?
6. What is a negative feedback loop?
7. Explain the negative feedback loop on the example of body temperature control.
8. Give ant examples of homeostasis in ecosystems.



Exercise 8. Work in pairs and define the type of feedback. Begin the following sentences with the words:

I think that …, I suppose that … I'm not sure … but I think … .

Remember that ***in negative feedback systems****, the response reverses a change in a controlled condition.* ***In positive feedback systems****, the response strengthens the change in a controlled condition.*

1. A child is ill. He keeps a cover on and begins to sweat.
2. A butcher slices finger on the blade. He wraps it in a towel until the bleeding begins to subside.
3. A team of hunters got lost in a snowy forest, they begin to shiver and huddle close together.
4. A group of teens visits a haunted house and one of the teens is frightened and his heart beats harder than normal.
5. The mother brought green bananas. In some days they became yellow.

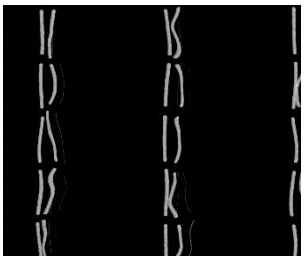
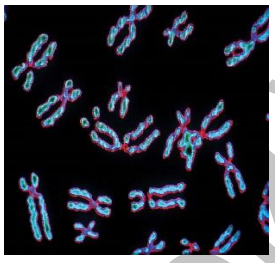
6. A toddler got into his sister's candy stash and ate a lot of sweets.
7. After running a jogger feels very thirsty and drinks some water.

Exercise 9. Divide the article into logical parts and give each part a suitable title. Give a brief summary.

Exercise 10. Discussion. Work in pairs and discuss why it is important to control your internal environment. Give your arguments.

Text 4. GENETICS

Exercise 1. Brainstorming. What does genetics study? Have you ever come across genetically modified products in your life?


Exercise 2. Choose the correct word to complete each sentence.

gene	*geneticist*	*genetics*	*genetic code*	*genetic*

1. _____ arose out of the identification of genes, the fundamental units responsible for heredity.
2. Many environmental _____ try to understand how environmental factors interact with _____ to cause disease.
3. In humans protein synthesis in mitochondria relies on a _____ ___ that varies from the canonical code.
4. Modern _____ started with Mendel's studies at the nature of inheritance in plants.

Exercise 3. Define the part of speech of the following words and translate them into Russian.

Heredity – inherited; hybrid – hybridize; dominant – dominance; amenable – amenability, viral – virus; modify – modifiable; pharmaceutical – pharmaceutics; affliction – afflicted; clone – cloning; breeding – breed.

Exercise 4.Compose your own sentences with the following word combinations.

traits
analysis
genetic engineering
disease
techniques

Exercise 5. Study the words and their meanings in the dictionary.

heredity	genome
to transmit	property
gene	emphasis
offspring	to treat
chromosome	inherited
to duplicate	disorder
amenable	affliction
replication	husbandry
to modify	pests
transgenic	strain
to sequence	yield

Exercise 6. Match the words with their definitions.

to duplicate	*chromosome*	*to inherit*	*genome*
gene	*to replicate*	*strain*	*to transmit*

1. A part of a cell in a living thing that controls what it looks like, how it grows, and how it develops.
2. A part of every living cell that is shaped like a thread and contains the gene.
3. All the genes in one type of living things.
4. A type of animal, plant, or disease.
5. To copy something exactly.
6. To divide and produce exact copies of itself.
7. To have the same character or appearance as your parents.
8. To send or pass something from one person, place or thing to another.

Exercise 7. Read the text and name the main ideas of genetics.

Genetics

Genetics, study of heredity in general and of genes in particular. Genetics forms one of the central pillars of biology and overlaps with many other areas, such as agriculture, medicine, and biotechnology.

Genetics arose out of the identification of genes, the fundamental units responsible for heredity. Genetics may be defined as the study of genes at all levels, including the ways in which they act in the cell and the ways in which they are transmitted from parents to offspring.

Areas of Study

Classical genetics, which remains the foundation for all other areas in genetics, is concerned primarily with the method by which genetic traits – classified as dominant (always expressed), recessive (subordinate to a dominant trait), intermediate (partially expressed), or polygenic (due to multiple genes) – are transmitted in plants and animals.

Cytogenetics, the microscopic study of chromosomes, blends the skills of cytologists, who study the structure and activities of cells, with those of geneticists, who study genes. Cytologists discovered chromosomes and the way in which they

duplicate and separate during cell division at about the same time that geneticists began to understand the behaviour of genes at the cellular level.

Microbial genetics. Microorganisms have many different physical and physiological characteristics that are amenable to study. Bacteria became important model organisms in genetic analysis. Bacterial genetics is the centre of cloning technology. Viral genetics is another key part of microbial genetics. The genetics of viruses that attack bacteria were the first to be elucidated.

Molecular genetics is the study of the molecular structure of DNA, its cellular activities (including its replication), and its influence in determining the overall makeup of an organism. Molecular genetics relies heavily on genetic engineering (recombinant DNA technology), which can be used to modify organisms by adding foreign DNA, thereby forming transgenic organisms. Transgenesis forms the basis of gene therapy, the attempt to cure genetic disease by addition of normally functioning genes from exogenous sources.

Genomics. The development of the technology to sequence the DNA of whole genomes on a routine basis has given rise to the discipline of genomics, which dominates genetics research today. Genomics is the study of the structure, function, and evolutionary comparison of whole genomes.

Population genetics. The study of genes in populations of animals, plants, and microbes provides information on past migrations, evolutionary relationships and extents of mixing among different varieties and species, and methods of adaptation to the environment. Human population geneticists have traced the origins and migration and invasion routes of modern humans. DNA comparisons between the present peoples on the planet have pointed to an African origin of Homo sapiens.

Behaviour genetics studies the influence of heredity on behaviour. Many aspects of animal behaviour are genetically determined and can therefore be treated as similar to other biological properties. Human behaviour is difficult to analyze because of the powerful effects of environmental factors, such as culture.

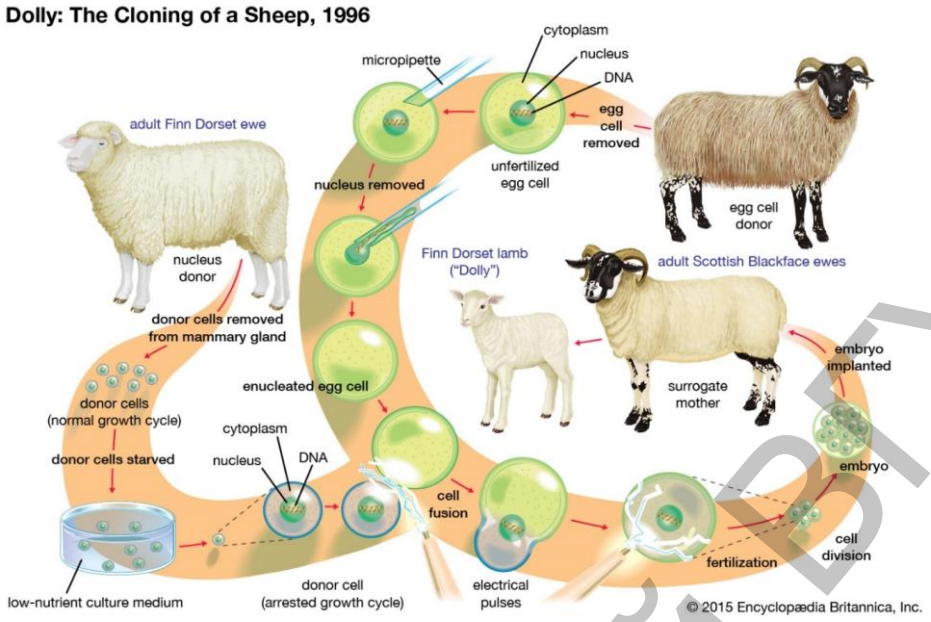
Human genetics. Some geneticists specialize in the hereditary processes of human genetics. Most of the emphasis is on understanding and treating genetic disease and genetically influenced ill health.

Applied Genetics

Medicine. Genetic techniques are used in medicine to diagnose and treat inherited human disorders. Knowledge of a family history of conditions such as cancer or various disorders may indicate a hereditary tendency to develop these afflictions. Gene therapy is based on modification of defective genotypes by adding functional genes made through recombinant DNA technology.

Agriculture and animal husbandry apply genetic techniques to improve plants and animals. Breeding analysis and transgenic modification using recombinant DNA techniques are routinely used. Several types of mammals can be cloned, meaning that multiple identical copies can be produced of certain desirable types.

Plant geneticists use special techniques to produce new species, such as hybrid grains (i.e., produced by crossing wheat and rye), and plants resistant to destruction by insect and fungal pests.



Industry. Various industries employ geneticists. The pharmaceutical industry has developed strains of molds, bacteria, and other microorganisms high in antibiotic yield. Penicillin and cyclosporin from fungi, and streptomycin and ampicillin from bacteria, are some examples.

Biotechnology, based on recombinant DNA technology, is now extensively used in industry. "Designer" lines of transgenic bacteria, animals, or plants capable of manufacturing some commercial product are made and used routinely. Such products include pharmaceutical drugs and industrial chemicals such as citric acid.

Exercise 8. Fill in the blanks with the suitable words.

1. Genetic traits are classified as _____ (always expressed), _____ (subordinate to a dominant trait), _____ (partially expressed), or _____ (due to multiple genes) and transmitted in plants and animals.
2. Cytologists discovered _____ and the way in which they _____ and _____ during cell division.
3. _____ genetics is the centre of cloning technology.
4. Transgenesis forms the basis of gene _____, the attempt _____ genetic disease.
5. Genomics is the study of the _____, _____, and evolutionary _____ of whole genomes.
6. Human population geneticists have traced the _____ and _____ and invasion routes of modern humans.
7. Behaviour genetics studies the influence of _____ on behaviour.
8. Some geneticists specialize in the _____ processes of human _____.
9. Gene therapy is based on modification of _____ _____ by adding functional _____ made through _____ DNA technology.
10. Several types of mammals can be cloned, meaning that _____ _____ copies can be produced of certain _____ types.

11. The pharmaceutical industry has developed _____ of molds, bacteria, and other microorganisms high in _____ yield.

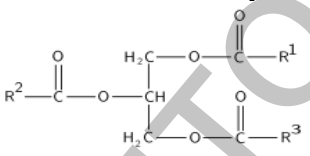
Exercise 9. Answer the following questions.

1. What is genetics?
2. What is the foundation for all areas in genetics? What is it concerned with?
3. What skills does cytogenetics blend?
4. What are the parts of microbial genetics?
5. What does molecular genetics study?
6. Define the reasons for studying population genetics.
7. Human behaviour is difficult to analyze because of the powerful effects of migration, isn't it?
8. What does human genetics study?
9. In what ways are genetic techniques used?

Exercise 10. Discussion. Choose any areas of genetics and prove that it's the most important nowadays. Think of the arguments to beat your antagonists.

Text 5. ENERGY

Exercise 1. Brainstorming. What are the sources of the energy? Guess these substances according to their chemical formulae.

$C_{12}H_{22}O_{11}$  RCH(NH2)COOH

Exercise 2. Choose the correct word to complete each sentence.

glucose	*glycogen*	*glycolysis*

1. _____ literary means 'sugar splitting'.
2. During _____, single molecules of _____ are split and ultimately converted into 2 molecules of a substance called pyruvate.
3. Animal cells can also synthesize branched polymers of _____ known as _____.

Exercise 3. Define kinds of molecules and cells.

donor acceptor energy-rich food energy carrier electron acceptor	molecule	eukaryotic prokaryotic photosynthetic animal plant	cell

Exercise 4. Study the words and find their meanings in the dictionary.

abundant	to yield
chemical bond	membrane
to capture	carbon dioxide
to convert	cytoplasm
to power metabolism	phosphorylation
to release the energy	pyruvate
to split	chloroplast
to store the energy	acetyl
to transfer	mitochondrion
ultimately	to harvest

Exercise 5. Match the words with their definitions.

1. abundant	a) something that exists or is available in large quantities so that there is more than enough
2. bond	b) finally, after everything else has been done or considered
3. cytoplasm	c) the chemical force that holds atoms together in a molecule
4. to harvest	d) an organelle found in large numbers in most cells, in which the biochemical processes of respiration
5. mitochondrion	e) all the material in the cell of a living thing except the nucleus
6. reservoir	f) to produce a result, answer, or piece of information
7. to split	g) to gather crops from the fields
8. ultimately	h) to divide or separate something into different parts or groups
9. to yield	i) a large amount of something that is available and has not yet been used

Exercise 6. Read the passage and name the processes of getting energy from food molecule.

Cell energy

Cells release the energy stored in their food molecules through a series of oxidation reactions. Oxidation describes a type of chemical reaction in which electrons are transferred from one molecule to another, changing the composition and energy content of both the donor and acceptor molecules. Food molecules act as electron donors. During each oxidation reaction involved in food breakdown, the product of the reaction has a lower energy content than the donor molecule that preceded it in the pathway. At the same time, electron acceptor molecules capture some of the energy lost from the food molecule during each oxidation reaction and store it for later use. Eventually, when the carbon atoms from a complex organic food molecule are fully oxidized at the end of the reaction chain, they are released as waste in the form of carbon dioxide.

Cells do not use the energy from oxidation reactions as soon as it is released. Instead, they convert it into small, energy-rich molecules such as ATP and nicotinamide adenine dinucleotide (NADH), which can be used throughout the cell to power metabolism and construct new cellular components.

Eukaryotic cells use three major processes to transform the energy held in the chemical bonds of food molecules into more readily usable forms – often energy-rich carrier molecules. Adenosine 5'-triphosphate, or ATP, is the most abundant energy carrier molecule in cells. This molecule is made of a nitrogen base (adenine), a ribose sugar, and three phosphate groups.

The first process in the eukaryotic energy pathway is glycolysis, which literally means "sugar splitting." During glycolysis, single molecules of glucose are split and ultimately converted into two molecules of a substance called pyruvate.

Glycolysis is an ancient, major ATP-producing pathway that occurs in almost all cells. This process, which is also known as fermentation, takes place in the cytoplasm and does not require oxygen. In contrast, when oxygen is available, the pyruvates produced by glycolysis become the input for the next portion of the eukaryotic energy pathway. During this stage, each pyruvate molecule in the cytoplasm enters the mitochondrion, where it is converted into acetyl CoA, a two-carbon energy carrier, and its third carbon combines with oxygen and is released as carbon dioxide. At the same time, an NADH carrier is also generated. Acetyl CoA then enters a pathway called the citric acid cycle, which is the second major energy process used by cells.

The third major process in the eukaryotic energy pathway involves an electron transport chain, catalyzed by several protein complexes located in the mitochondrial inner membrane. Overall, the combination of the citric acid cycle and oxidative phosphorylation yields much more energy than fermentation - 15 times as much energy per glucose molecule! Together, these processes that occur inside the mitochondion, the citric acid cycle and oxidative phosphorylation, are referred to as respiration, a term used for processes that couple the uptake of oxygen and the production of carbon dioxide.

In plant and other photosynthetic cells, chloroplasts also have an electron transport chain that harvests solar energy. Even though they do not contain mithcondria or chloroplasts, prokaryotes have other kinds of energy-yielding electron transport chains within their plasma membranes that also generate energy.

When energy is abundant, eukaryotic cells make larger, energy-rich molecules to store their excess energy. The resulting sugars and – in other words, polysaccharides and lipids – are then held in reservoirs within the cells.

Animal cells can also synthesize branched polymers of glucose known as glycogen, which in turn aggregate into particles. A cell can rapidly mobilize these particles whenever it needs quick energy. Plant cells don't produce glycogen but instead make different glucose polymers known as starches, which they store in granules.

Exercise 7. Complete the chain using information from the article.

Glycolysis (fermentation) → _____ _____ _____ → _____ _____ _____.

Exercise 8. Work in pairs and discuss these statements. Do you agree or disagree? Begin the following sentences with the words:

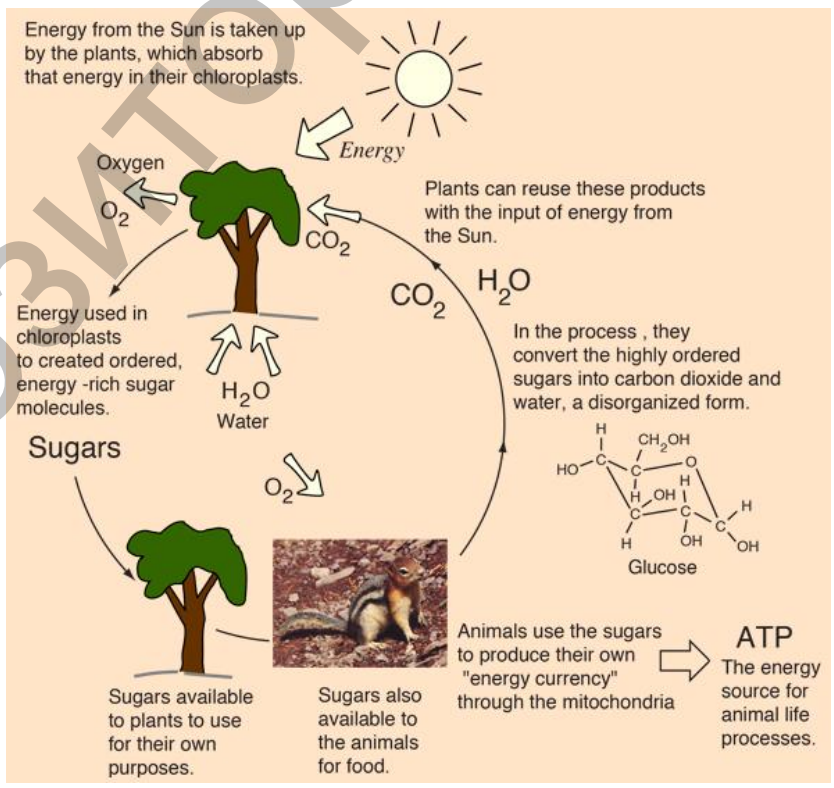
As for me … , In fact … , Besides … , In my opinion … , Actually … .

1. Cells release the energy stored in their food molecules through a series of substitution reactions.
2. Food molecules act as electron donors.
3. Cells use the energy from oxidation reactions as soon as it is released.
4. ATP is the most abundant energy carrier molecule in cells.
5. During glycolysis, single molecules of glucose are fused and ultimately converted into two molecules of a substance called pyruvate.
6. The citric acid cycle is the second major energy process used by cells.
7. In plant and other photosynthetic cells, chloroplasts also have an electron transport chain that harvests solar energy.

Exercise 9. Answer the following questions.

1. Describe the oxidation process. 2. What are energy-rich molecules which can be used to power metabolism? 3. What is the glycolysis? 4. Does fermentation require oxygen? 5. Describe the second major energy process used by cells. 6. What process catalysed by several protein complexes located in the mitochondrial inner membrane occurs? 7. Where do prokaryotes generate energy? 8. What are energy reservoirs within eukaryotic cells?

Exercise 10. There are a number of energy transformations in plants and animals which are essential to life. Look at the picture and explain the energy cycle in living things.



Exercise 11. Discussion. Nowadays more and more people all over the world become obese. Describe the mechanism of getting fat and give recommendations how to be fit.

SELF-CHECK

Translate the article from Russian into English using active vocabulary. Render the article.

Биология – наука о происхождении и развитии живого, его строении, формах организации и способах активностию Современная биология утверждает единство живой материи на всех уровнях, представляя мир живого как огромную систему систем, в которой каждый компонент обладает собственными специфическими свойствами и соединяется с другими особым типом связей.

Выделяют пять принципов, объединяющих все биологические дисциплины в единую науку о живой материи.

- Клеточная теория — учение обо всём, что касается клеток. Все живые организмы состоят как минимум из одной клетки — основной структурно-функциональной единицы организмов. Базовые механизмы и химия всех клеток во всех земных организмах сходны; клетки происходят только от ранее существовавших клеток, которые размножаются путём клеточного деления. Клеточная теория описывает строение клеток, их деление, взаимодействие с внешней средой, состав внутренней среды и клеточной оболочки, механизм действия отдельных частей клетки и их взаимодействия между собой.
- Эволюция. Через естественный отбор и генетический дрейф наследственные признаки популяции изменяются из поколения в поколение.
- Теория гена. Признаки живых организмов передаются из поколения в поколение вместе с генами, которые закодированы в ДНК. Информация о строении живых существ или генотип используется клетками для создания фенотипа, наблюдаемых физических или биохимических характеристик организма. Хотя фенотип, проявляющийся за счёт экспрессии генов, может подготовить организм к жизни в окружающей его среде, информация о среде не передаётся назад в гены. Гены могут изменяться в ответ на воздействия среды только посредством эволюционного процесса.
- Гомеостаз. Физиологические процессы, позволяющие организму поддерживать постоянство своей внутренней среды независимо от изменений во внешней среде.
- Энергия. Атрибут любого живого организма, существенный для его состояния.

UNIT III. ENVIRONMENTAL ISSUES

Text 1. ENVIRONMENTAL PROBLEMS

Exercise 1. Brainstorming. What ecological problems facing our planet can you recollect? What ecological problems does Belarus have?

Exercise 2. Choose the correct word to complete each sentence.

to pollute	*pollution*	*pollutant*	*polluted*	*polluter*

1. The rivers had been _____ with aluminium.
2. The _____ should pay for the cost of the clean-up.
3. The race to develop clean energy is motivated by high levels of _____ that people fear are permanently damaging the earth's environment.
4. Industrial _____ have been dumped in the lake.
5. The project's aim is to clean up _____ land.

Exercise 3. Define the part of speech of the following words and translate them into Russian.

Environment – environmental; pollution – pollutant – pollute; developed – developing; warm – warming; acid – acidification; new – renewable; forest – deforestation; released – releasing; migrant – migration.

Exercise 4. Study the words and find their meanings in the dictionary.

to become aware
brink
vulnerable
pile up
prudently
to be doomed
oil spill
runoff
to deprive
precipitation
excessive
to strain
consumption
notorious
to decimate
combustion
commodity
sprawl
rural
to put a dent
conscious

Exercise 5. Match the words with their definitions.

toxins	*precipitation*	*disposal*	*acidification*	*depletion*	*sprawl*

1. The process of becoming acid or being converted into an acid.
2. Reduction in the number or quantity of something.
3. The action or process of getting rid of something.

4. Rain, snow, sleet, or hail that falls to or condenses on the ground.
5. The disorganized and unattractive expansion of an urban or industrial area into the adjoining countryside.
6. Any poisonous substance produced by bacteria, animals, or plants.

Exercise 6. Read the text and say which environmental problems you face in your own country.

ENVIRONMENTAL PROBLEMS

Our environment is constantly changing. However, as our environment changes, so does the need to become increasingly aware of the problems that surround it.

Our planet is poised at the brink of a severe environmental crisis. Current environmental problems make us vulnerable to disasters and tragedies, now and in the future. We are in a state of planetary emergency, with environmental problems piling up high around us. Unless we address the various issues prudently and seriously we are surely doomed for disaster. Current environmental problems require urgent attention.

15 MAJOR CURRENT ENVIRONMENTAL PROBLEMS

1. Pollution. Water pollution is caused by oil spill, acid rain, urban runoff; air pollution is caused by various gases and toxins released by industries and factories and combustion of fossil fuels; soil pollution is majorly caused by industrial waste that deprives soil from essential nutrients.

2. Global Warming. Global warming leads to rising temperatures of the oceans and the earth' surface causing melting of polar ice caps, rise in sea levels and also unnatural patterns of precipitation such as flash floods, excessive snow or desertification.

3. Overpopulation. The population of the planet is reaching unsustainable levels as it faces shortage of resources like water, fuel and food. Population explosion in less developed and developing countries is straining the already scarce resources.

4. Natural Resource Depletion. Fossil fuel consumption results in emission of Greenhouse gases, which is responsible for global warming and climate change. Globally, people are taking efforts to shift to renewable sources of energy like solar, wind, biogas and geothermal energy.

5. Waste Disposal. The over consumption of resources and creation of plastics are creating a global crisis of waste disposal. Developed countries are notorious for producing an excessive amount of waste or garbage and dumping their waste in the oceans and, less developed countries. Nuclear waste disposal has tremendous health hazards associated with it.

6. Climate Change. Climate change occurs due to rise in global warming which occurs due to increase in temperature of atmosphere by burning of fossil fuels and release of harmful gases by industries.

7. Loss of Biodiversity. Human activity is leading to the extinction of species and habitats and loss of biodiversity. Ecosystems, which took millions of years to perfect, are in danger when any species population is decimating.

8. Deforestation. Our forests are natural sinks of carbon dioxide and produce fresh oxygen as well as help in regulating temperature and rainfall. Deforestation simply means clearing of green cover and making that land available for residential, industrial or commercial purpose.

9. Ocean Acidification. It is a direct impact of excessive production of CO_2. 25% of CO_2 produced by humans. The ocean acidity has increased by the last 250 years but by 2100, it may shoot up by 150%.

10. Ozone Layer Depletion. Depletion of the crucial Ozone layer of the atmosphere is attributed to pollution caused by Chlorine and Bromide found in Chlorofluorocarbons (CFC's). Once these toxic gases reach the upper atmosphere, they cause a hole in the ozone layer. The CFC's are banned in many industries and consumer products. Ozone layer is valuable because it prevents harmful UV radiation from reaching the earth.

11. Acid Rain. Acid rain can be caused due to combustion of fossil fuels or erupting volcanoes or rotting vegetation which release sulfur dioxide and nitrogen oxides into the atmosphere. Acid rain is a known environmental problem that can have serious effect on human health, wildlife and aquatic species.

12. Water Pollution. Clean drinking water is becoming a rare commodity. Water is becoming an economic and political issue as the human population fights for this resource. One of the options suggested is using the process of desalinization. Industrial development is filling our rivers seas and oceans with toxic pollutants which are a major threat to human health.

13. Urban Sprawl. Urban sprawl refers to migration of population from high density urban areas to low density rural areas which results in spreading of city over more and more rural land. Urban sprawl results in land degradation, increased traffic, environmental issues and health issues.

14. Public Health Issues. Dirty water is the biggest health risk of the world and poses threat to the quality of life and public health. Pollutants cause respiratory disease like asthma and cardiac-vascular problems. High temperatures encourage the spread of infectious diseases like Dengue.

15. Genetic Engineering. Genetic modification of food results in increased toxins and diseases as genes from an allergic plant can transfer to target plant. Genetically modified crops can cause serious environmental problems as an engineered gene may prove toxic to wildlife. Another drawback is that increased use of toxins to make insect resistant plant can cause resultant organisms to become resistant to antibiotics.

The need for change in our daily lives and the movements of our government is growing. If humans continue moving forward in such a harmful way towards the future, then there will be no future to consider. Although it's true that we cannot physically stop our ozone layer from thinning (and scientists are still having trouble figuring out what is causing it exactly,) there are still so many things we can do to try and put a dent in what we already know. By raising awareness in your local

community and within your families about these issues, you can help contribute to a more environmentally conscious and friendly place for you to live.

Exercise 7. Fill in the blanks with the suitable word or word combination.

1. Global warming leads to melting of polar ___ ____, rise in ___ _____ and also unnatural patterns of _____.
2. People are taking efforts to shift to renewable sources of energy like____, ____, _____ and _____ energy.
3. The over consumption of resources and creation of _____ are creating a global crisis of _____ _____.
4. Human activity is leading to the _____ of species and _____ and loss of _____.
5. Ocean acidification is a direct impact of excessive production of _____.
6. Ozone layer is valuable because it prevents harmful ___ _____ from reaching the earth.
7. Acid rain is a known environmental problem that can have serious effect on _____ _____, _____ and _____ _____.
8. Clean drinking water is becoming a rare _____.

Exercise 8. Work in pairs, discuss these statements. Do you agree or disagree? Begin the following sentences with the words:
I agree…, I know…, I totally agree …, Exactly!. I don't agree … , That's not true…, I'm not sure…, Yes, but…, I completely disagree … .

1. Water pollution is caused by industrial waste.
2. The population of the planet is reaching unsustainable levels as it faces shortage of resources like water, fuel and food.
3. Climate change occurs due to rise in acid rain which can be caused due to combustion of fossil fuels or erupting volcanoes or rotting vegetation.
4. Our forests are natural sinks of carbon dioxide and produce fresh oxygen as well as help in regulating temperature and rainfall.
5. Once Chlorofluorocarbons reach the lower atmosphere, they cause a hole in the ozone layer.
6. Industrial development is filling our rivers seas and oceans with toxic pollutants which are a major threat to human health.
7. Pollutants cause respiratory disease like Dengue.
8. Genetically modified crops can cause serious environmental problems as an engineered gene may prove toxic to wildlife.

Exercise 9. Discussion. Which environmental problems occurred because of the Industrial Revolution? What measures should be taken to overcome the environmental crisis?

Text 2. GENETIC POLLUTION

Exercise 1. Brainstorming. Think of positive and negative consequences of genetic pollution.

Exercise 2. Choose the correct word to complete each sentence.

genetic pollution	*gene flow*	*introduced species*
gene pool	*invasive species*	*genetic rescue*

1. _____ is a controversial term for uncontrolled _____ into wild populations.
2. _____ interbreed with native species to form sterile or more evolutionarily fit hybrids.
3. The introduction of genetic material into the _____ of a population by human intervention can have both positive and negative effects on populations.
4. When genetic material is unintentionally introduced to a population, this is called _____ .
5. An _____ is one that is not native to a given population that is either intentionally or accidentally brought into a given ecosystem.
6. When genetic material is intentionally introduced to increase the fitness of a population, this is called _____ .

Exercise 3. Make up word combinations.

native/wild/domestic	genes
altered	material/diversity
gene	effect
positive/negative	population
genetic	organisms
introduced/invasive	flow/pool
genetically engineered	species

Exercise 4. Study the words and find their meanings in the dictionary.

altered genes
fitness
phenotype
introduced species
intentionally
dispersal
cross-population
genetic rescue
outbreeding depression
outcome
invasive species
extinction
gene pool
profound
consumption
containment
decreased
detrimental
disruptive
native species
salmon
to break free
to outcompete
to persist
to pose for
vulnerable

Exercise 5. Match the words with their definitions.

1. crop	a) a fine powdery substance, typically yellow, consisting of microscopic grains discharged from the male part of a flower
2. diversity	b) the set of observable characteristics of an individual resulting from the interaction of its genotype with the environment
3. ecosystem	c) all the inhabitants of a particular place
4. environment	d) all the plants and animals that live in a particular area together with the complex relationship that exists between them and their environment
5. evolution	e) a group of living organisms consisting of similar individuals capable of exchanging genes or interbreeding
6. hybrid	f) the surroundings or conditions in which a person, animal, or plant lives or operates
7. phenotype	g) the fact of including many different types of people or things
8. pollen	h) the offspring of two plants or animals of different species or varieties
9. population	i) a process in which environmental or genetic influences determine which types of organism thrive better than others
10. selection	j) the scientific idea that plants and animals develop and change gradually over a long period of time
11. species	k) a cultivated plant that is grown on a large scale commercially

Exercise 6. Read the passage and explain the danger of invasive species in agriculture and crops.

Genetic pollution

Genetic pollution is a controversial term for uncontrolled flow into wild populations. It is defined as "the dispersal of contaminated altered genes from genetically engineered organisms to natural organisms, esp. by cross-pollination", but has come to be used in some broader ways.

The use of the word "pollution" is meant to convey the idea that mixing genetic information is bad for the environment, but because the mixing of genetic information can lead to a variety of outcomes, "pollution" may not always be the most accurate descriptor.

The introduction of genetic material into the gene pool of a population by human intervention can have both positive and negative effects on populations. When genetic material is intentionally introduced to increase the fitness of a population, this is called genetic rescue. When genetic material is unintentionally introduced to a population, this is called genetic pollution and can negatively affect the fitness of a population (primarily through outbreeding depression), introduce other unwanted phenotypes, or theoretically lead to extinction.

Introduced species. An introduced species is one that is not native to a given population that is either intentionally or accidentally brought into a given ecosystem. Effects of introduction are highly variable, but if an introduced species

has a major negative impact on its new environment, it can be considered an invasive species. The presence of the Asian Longhorned beetle in North America ecosystem destabilizes community structure, having a negative influence on many species in the system. Introduced species are not always disruptive to an environment, however. Presence of introduced honeysuckle in the Happy Valley Region of Pennsylvania was associated with higher diversity of the bird populations in that area, demonstrating that introduced species are not always detrimental to a given environment and it is completely context dependent.

Invasive species. Invasive species can invade both large and small native populations and have a profound effect. Upon invasion, invasive species interbreed with native species to form sterile or more evolutionarily fit hybrids that can outcompete the native populations. Invasive species can cause extinctions of small populations on islands that are particularly vulnerable due to their smaller amounts of genetic diversity.

Domestic populations. Increased contact between wild and domesticated populations of organisms can lead to reproductive interactions that are detrimental to the wild population's ability to survive. Genes from domesticated populations are added to wild populations as a result of reproduction. In many crop populations this can be the result of pollen traveling from farmed crops to neighboring wild plants of the same species. For farmed animals, this reproduction may happen as the result of escaped or released animals.

Aquaculture. Aquaculture is the practice of farming aquatic animals or plants for the purpose of consumption. This practice is becoming increasingly common for the production of salmon. One of the dangers of this practice is the possibility of domesticated salmon breaking free from their containment. The reason these escapes are considered dangers is the impact they pose for the wild population they reproduce with after escaping. In many instances the wild population experiences a decreased likelihood of survival after reproducing with domesticated populations of salmon.

Crops. Crops refer to groups of plants grown for consumption. Despite domestication over many years, these plants are not so far removed from their wild relatives that they could reproduce if brought together. Many crops are still grown in the areas they originated and gene flow between crops and wild relatives impacts the evolution of wild populations. Domesticated crops have been changed through artificial selection and genetic engineering. The genetic make up of many crops is different than that of its wild relatives, but the closer they grow to one another the more likely they are to share genes through pollen. Gene flow persists between crops and wild counterparts.

Exercise 7. Fill in the blanks with the suitable words.

1. Genetic pollution is defined as “the dispersal of contaminated _____ _____ from genetically engineered organisms to natural organisms, especially by _____”.

2. If __ _____ species has a major negative _____ on its new environment, it can be considered __ _____ species.

3. Introduced species are not always _____ to an environment.
4. Invasive species can _____ both large and small native _____ and have a _____ effect.
5. Invasive species can cause _____ of small populations on islands.
6. Genes from _____ populations are added to wild populations as a result of _____.
7. In many instances the wild population experiences a decreased likelihood of _____ after _____ with domesticated populations of salmon.
8. Domesticated crops have been changed through _____ selection and _____ engineering.

Exercise 8. Answer the following questions.

1. Define the term "genetic pollution". 2. Why may pollution not always be the most accurate descriptor? 3. What effects on populations can the introduction of genetic material into the gene pool of a population have? 4. Give the definition of the term "introduced species". 5. What is the specific feature of invasive species? 6. What are the ways of gene flow from domesticated populations to wild ones? 7. Explain the risks of reproducing wild population of salmon with domesticated ones. 8. Is there gene flow between crops and wild relatives that affects the evolution of wild plants?

Exercise 9. Define the given samples (hogweed, Colorado beetle, horse-chestnut, wheat) as introduced or invasive species.

Exercise 10. Think of distant consequences of genetic pollution. What measures should be taken now to avoid them in the future? Can humans stop genetic pollution? Why?

Exercise 11. Discussion. Do you think it's possible to solve the problem of hunger by the traditional methods? Do potential benefits of genetically engineered plants and animals in your opinion overwhelm potential risk of its implementation?

Text 3. GENETICALLY MODIFIED ORGANISM

Exercise 1. Brainstorming. Are genetically engineered products available in the shops of Belarus? Are they safe?

Exercise 2. Choose the correct word to complete each sentence.

mutant	*mutation*	*mutable*	*to mutate*

1. Simple organisms like bacteria _____ rapidly.
2. When an animal's genes change the new form of the animal that results is a _____.
3. Is any living creature _____ ?
4. A _____ is a genetic change that causes new and different characteristics.

to modify	*modification*

1. We've made one or two _____ to the original design.
2. _____ may mean to alter something, but it's not a total makeover.

Exercise 3. Make up word-combinations.

genetic	a) modified food
molecular	b) contamination
herbicide	c) food, crops
transgenic	d) biodiversity
species	e) production
biological and chemical	f) engineering, modification, experiment
GM	g) tolerance
genetically	h) biology

Exercise 4. Study the words and find their meanings in the dictionary.

drought	to neglect
GM	to promote
intolerable	weed
proliferation	amendment
side effect	assessment
to meddle with	contamination
to pertain to	seed-farming
to push for	to threaten

Exercise 5. Match the words with their definitions.

to meddle (with)	*to label*	*proliferation*	*resistance*
allergy	*to contaminate*	*seed*	*weed*

1. A damaging immune response by the body to a substance, especially a particular food, pollen, fur, or dust, to which it has become hypersensitive.
2. Make (something) impure by exposure to or addition of a poisonous or polluting substance.
3. To write information on something.
4. To interfere in something that is not one's concern.
5. Rapid reproduction of a cell, part, or organism.
6. The unit of reproduction of a flowering plant, capable of developing into another such plant.
7. Lack of sensitivity to a drug, insecticide, etc., especially as a result of continued exposure or genetic change.
8. A wild plant growing where it is not wanted and in competition with cultivated plants.

Exercise 6. Read the article and define the problems Belarus faces.

Genetically Modified Organism

Genetic modification (GM) is the subject of controversy in its own right. Some see the science itself as intolerable meddling with «natural» order, despite many known examples of natural genetic crossings occurring throughout history (see for example horizontal gene transfer). While some would like to see it banned, others push simply for required labeling of genetically modified food. Other controversies include the definition of patent and property pertaining to products of genetic engineering and the possibility of unforeseen global side effects as a result of modified organisms proliferating. The basic ethical issues involved in genetic research are discussed in the article on genetic engineering.

While scientific progress on molecular biology has a great potential to increase our understanding of nature and provide new medical tools, it should not be used as justification to turn the environment into a giant genetic experiment by commercial interests. The biodiversity and environmental integrity of the world's food supply is too important to our survival to be put at risk.

What are GE plants?

These are plants, in which foreign genes were inserted to develop the traits of herbicide tolerance, pest resistance, and increased crop capacity.

How are GE plants produced?

They are produced by inserting a gene from another organism into the DNA of the plant. Donors can be bacteria, viruses, other plants, animals and even a human being. For example, the frost-resistant tomato was produced by transferring into it's DNA a gene of the North American flounder. To breed the drought resistant wheat a gene of the scorpion was used.

Who and when created genetically modified organisms (GMO)?

Transgenic foods were first developed by Monsanto Company (USA).

The first transgenic crops were planted in 1988, and in 1993 first food products with GE ingredients appeared on the shelves of supermarkets. In late 1990s transgenic food came to the Belorussian market.

Why are GMO dangerous for human health?

Many scientists express their fear that GMO contribute to a risk of serious allergies, food poisoning, mutations and promote immunity against antibiotics.

Why are GMO dangerous for the environment?

There is scientific evidence that GM crop production results in destruction of the whole groups of insects, appearance of new mutant weeds and insects, biological and chemical contamination of soils and gradual biodiversity loss, especially in the centers of cultivated crops.

Why are GMO dangerous for the Belarusian agriculture?

Releasing GMO in Belarusian fields threatens, firstl, a decrease in species biodiversity; second, economic dependence on GM crops' manufacturers and loss of an important Russian industry - seed-farming; third, undermining food safety; and, fourth, worsening the environmental situation all over the country.

Are GMO allowed in Belarus?

Yes, they are. In our country, some GE ingredients are officially allowed for sale and food production, including baby food. The industrial GM production is banned and to get permission each species has to pass the environmental impact assessment.

How to identify GE food products?

According to the amendment to the law «On Consumers' Rights Protection» of 2005, a product containing any amount of GE ingredients must have appropriate labeling. Labeling requirements and the control procedure haven't been developed yet. This enables manufacturers to neglect labeling standards.

Exercise 7. Work in pairs, discuss these statements. Do you agree or disagree? Begin the following sentences with the words:

You are right…, That's right…, I agree …, No, it isn't (it doesn't / it hasn't)… , I take/see your point, but … .

1. While some would like to see GM banned, others push simply for required spreading genetically modified food.
2. While scientific progress on molecular biology has a great potential, it should not be used as justification to turn the environment into a giant genetic experiment by commercial interests.
3. GE plants are plants, in which foreign genes were inserted to develop the traits of herbicide tolerance, pest resistance, and increased crop capacity.
4. Gene donors can be other plants and animals.
5. Many scientists express their fear that GMO contribute to a risk of serious allergies, food poisoning, mutations and promote immunity against antibiotics.
6. Releasing GMO in the Belorussian fields threatens economic dependence on GM crops' manufacturers only.
7. The industrial GM production is banned in the Republic of Belarus.
8. A product containing any amount of GE ingredients must have appropriate labeling.

Exercise 8. Answer the following questions.

1. Why is genetic modification the subject of controversy in its own right?
2. Why shouldn't scientific progress on molecular biology be a justification to turn the environment into a giant genetic experiment?
3. Give the definition of genetically engineered plants.
4. What is the mechanism of producing GE plants?
5. When and where were first GMO developed?
6. Are GMO dangerous for humans?
7. Name the risks of GMO for the Belorussian agriculture.
8. Is the industrial GM production allowed in the Republic of Belarus? Why?

Exercise 9. Make a report about GMO in general and in Belarus in particular using the data from the text.

Exercise 10. Discussion. Think of positive and negative effects of using GMO in daily life. Should genetically engineered humans appear?

SELF-CHECK

Translate the article from Russian into English using active vocabulary. Render the article.

Экологической проблемой называют ту проблему, которая приводит к уничтожению окружающей среды, и даже способна привести к уничтожению человечества.

Перенаселение является важнейшей проблемой современности. Из-за перенаселения людей погибает природа, и расплачиваться за это рано или поздно придётся. С каждым годом появляется всё больше различных эпидемий, забирающих жизни людей. И по мере того, как развивается медицина, вирусы также становятся сильнее. К чему это приведёт в будущем? Глобальное потепление является отнюдь не мифом, о чём свидетельствует таяние арктических льдов. И происходит это из-за парникового эффекта, что возникает в результате загрязнения атмосферы нашей планеты.

Сколько люди существуют на Земле, столько они и загрязняют воду. В наше время, с развитием промышленности и серьёзным увеличением количества людей, эта проблема приобрела совершенно другой масштаб. С каждым годом становится всё меньше и меньше чистой пресной воды. А ведь она жизненно необходима для существования практически всех живых существ. Загрязнение почвы и деградация земельных ресурсов приводят к опустыниванию почвы. Некогда плодородные земли превращаются в пустыни, без растительного покрова и влаги. Загрязнение атмосферы нашей планеты является серьёзной экологический проблемой, поскольку воздух необходим живым

существам для дыхания. Многие живые организмы уже сейчас не выдерживают загрязнения атмосферы, в результате чего вымирают целые виды.

Кислотные осадки приводят к ухудшению состояния почвы, загрязнению водоёмов (из-за чего даже гибнут водные организмы и животные), а также наносят большой вред растительности. И пусть явление это не слишком частое, ущерб природе оно успевает нанести весомый. Сокращение лесных массивов является серьёзной экологической проблемой, ведь леса занимаются очисткой воздуха, которым мы с вами дышим. А помимо этого, вырубка лесов также приводит к уничтожению целых экосистем, что наносит непоправимый вред природе.

Истощение природных ресурсов является реальной экологической проблемой. И речь идёт не только о полезных ископаемых, а вообще обо всех природных компонентах, которые люди используют в своих интересах. Другими словами, природа не успевает восстанавливать то, что уничтожают люди. И если ничего не изменить, то в скором времени это перерастёт в глобальную проблему катастрофических масштабов.

Сокращение видового разнообразия живых организмов - серьёзная проблема человечества. Нарушение баланса может привести к краху всей системы.

ЛИТЕРАТУРА

1. Павловская И.Ю. Language Teaching Methodology (a course of lectures for teachers and students of English). – СПб: СПб ун-т, 2003. -140 с.
2. Encyclopedia Britannica [Electronic resource] – Mode of access: https://www.britannica.com. – Date of access: 15.02.2018.
3. Kalk, M. Biology success in 20 minutes a day / M. Kalk – LearningExpress, LLC., 2005. – 126 p.
4. Kent, M. Advanced Biology / M. Kent – Oxford University Press, 2004. – 624 p.
5. Martin, A. Dictionary of Biology. / A. Martin, R. Hine – Oxford University Press, 2015. – 662 p.
6. McCarthy, M. English Vocabulary in use. Upper-intermediate / M. McCarthy, F. O'Dell – Cambridge University Press, 2017. – 280 p.
7. Nowicki, S. Biology / S. Nowicki. – Houghton Mifflin School, 2008. – 1052 p.

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