МІНІСТЕРСТВО ОСВІТИ І НАУКИ УКРАЇНИ

МИКОЛАЇВСЬКИЙ НАЦІОНАЛЬНИЙ АГРАРНИЙ УНІВЕРСИТЕТ

Факультет культури й виховання

Кафедра іноземних мов

АНГЛІЙСЬКА МОВА

методичні рекомендації
та навчальний матеріал для аудиторної та самостійної роботи
здобувачів вищої освіти освітнього ступеня “молодший бакалавр”
початкового рівня (короткий цикл) спеціальностей:
204 “Технологія виробництва і переробки продукції тваринництва”,
162 “Біотехнології та біоінженерія”, 181 “Харчові технології”

МИКОЛАЇВ
2021

УДК 811.111
А64

Друкується за рішенням науково-методичної комісії факультету культури й виховання Миколаївського національного аграрного університету від 28.09.2021 р., протокол №1.

Укладач:

О. О. Саламатіна – канд. філол. наук, доцент кафедри іноземних мов, Миколаївський національний аграрний університет;

Рецензенти:

О. Л. Щербакова – кандидат педагогічних наук, старший викладач кафедри англійської мови і літератури, Миколаївський національний університет імені В. О. Сухомлинського;

К. В. Тішечкіна – канд. філол. наук, доцент кафедри іноземних мов, Миколаївський національний аграрний університет.

Зміст

Передмова

Євроінтеграційні процеси спонукають до оновлення змісту вищої освіти, вихід її на новий якісний рівень потребує створення нових методичних напрацювань для підготовки фахівців різних галузей народного господарства. Володіння англійською мовою професійного спрямування є вимогою часу і потребою особистості для її успішної самореалізації у фаховій сфері.

Методичні рекомендації та навчальний матеріал призначені для аудиторних занять та самостійної роботи здобувачів вищої освіти освітнього ступеня "молодший бакалавр" початкового рівня (короткий цикл) спеціальностей: 204 "Технологія виробництва і переробки продукції тваринництва", 162 "Біотехнології та біоінженерія", 181 "Харчові технології" з дисциплін: "Іноземна мова (за професійним спрямуванням) (англійська)" та "Іноземна мова (англійська)".

Видання підготовлено згідно з трансферно-модульною системою. Воно забезпечує навчальний матеріал для вивчення модулів "Технологія виробництва і переробки м'яса та м'ясних продуктів", "Технологія виробництва і переробки молока та молочних продуктів", "Актуальні проблеми тваринництва", "Мікробіологія", "Вірусологія", "Генна інженерія", "Харчові технології". Методичні рекомендації містять тексти фахової спрямованості, що допомагають здобувачам вищої освіти поглибити та систематизувати їхній активний словниковий запас, необхідний у майбутній професії, а також набути практичних умінь і навичок англійського мовлення.

На кожен модуль відводиться 3-4 години аудиторних занять та 3-5 годин самостійної роботи. За роботу на аудиторних заняттях здобувач може отримати 15-25 балів.

Кожен текст зі спеціальності має два типи завдань: дати відповіді на запитання до тексту та пояснити значення термінів з фаху, поданих у тексті. Метою завдань є систематизація та контроль знань здобувачів вищої освіти із фахової термінології, розвиток навичок читання і перекладу текстів із фаху, розвиток навичок говоріння. За кожне завдання здобувач може отримати 5-10 балів.

Для підготовки методичних рекомендацій використовувались матеріали із новітніх підручників, автентичних джерел та періодичних видань.

II. TECHNOLOGY OF PRODUCING AND PROCESSING OF THE LIVESTOCK PRODUCTS

1. The Queen

Read and translate the text:

She is a handsome insect and half as large again as a worker. Most of her greater size is due to her long abdomen which projects well beyond the tips of her folded wings. Her body is less hairy than those of other bees and often she is of a different and lighter color. Her legs are long and strong and she stands a little higher than the other bees. These characteristics must be clearly remembered since they help us when we are faced with the task of finding the queen among the other 40,000 inhabitants of the hive. Her job is to lay eggs and thus she is a mother to all the bees in the hive. Her egg - laying performance is amazing and at the height of her season she will lay up to 1,500 eggs (about equivalent to her own weight) per day.

Answer the following questions:

1. How large is the queen?
2. What does its size depend on?
3. Can you compare its body with the other bees' ones?
4. Why do we need to remember its characteristics clearly?
5. Can we find it among the other 40,000 inhabitants of the hive?
6. What is the queen's job?
7. How many eggs can she lay at the height of her season?

Give definitions to the following terms:

Insect, worker, abdomen, hive.

2. Dairy Cattle Management

Read and translate the text:

Since the beginning of the history the cow has been useful to man in many ways. She has not been a source of food and a beast of burden, but she has even played an important role in his religion, mythology and political economy. One hundred years ago dairying was largely a family affair. Even in towns and villages most families kept a cow for their own use; the milk was usually consumed in the raw state and the surplus was made into butter and cheese. Dairying gradually became more specialized, and people bought milk, butter and cheese from farmers farther out in the country. Today, obtaining milk from the cow is only a first step in the very complex process of producing dairy foods. With the gradual development of large centres of concentrated population, the dairy industry has become divided into three separate and distinct phases - production, processing and distribution.

Answer the following questions:

1. In what ways has the cow been useful to man?
2. What was dairying like one hundred years ago?
3. Was a cow kept in towns then?
4. How did people use its milk?
5. Did it become more specialized later?
6. What is obtaining milk nowadays?
7. What are three separate and distinct phases of dairy industry?

Give definitions to the following terms:

Source of food, beast of burden, dairying, raw state, dairy foods, production, processing, distribution.

3. The Workers. Drones

Read and translate the text:

Of the three types of bee the worker is the smallest and its abdomen only just projects - beyond the tips of the folded wings. Its tongue is long and well developed while on its hind legs it has spiny structures known as pollen baskets and when these are full of pollen the worker appears to be wearing colored trousers. The worker has rudimentary ovaries and under special circumstances can lay about a dozen eggs, which, if they hatch, produce drones since workers can never mate. The duties of a worker vary with its age and the order in which these duties are undertaken is remarkably constant. There is the life schedule of the average worker.

The drone has become a symbol of idleness but he has a function to perform, which is, if required, to mate with the virgin queen and his reward for this is death. No doubt also his activities help to keep the hive warm but he brings in no nectar or pollen and helps himself liberally to the workers hard - won stores. The drone is about the same length as the worker but much broader with a blunt ended abdomen. He is more hairy than the other bees and often darker in color. His two magnificent compound eyes are so large that they meet on the top of the head. He has no sting. A hive in summer contains several hundred drones even though only one or two will ever be required for mating; nevertheless, if attempts are made to eliminate all the surplus drones, the workers become listless, unsettled and do not work well.

Answer the following questions:

1. Can you describe the appearance of the worker?
2. What are pollen baskets and what are they used for?
3. Can the workers lay eggs?
4. What are the duties of a worker?
5. Do its duties vary with its age?
6. Has the drone become a symbol of idleness or hard working?
7. What is the drone's function?
8. Do his activities help to keep the hive warm?
9. How do the drones influence the workers?

Give definitions to the following terms:

Abdomen, folded wings, pollen baskets, rudimentary ovaries, drone, to mate, virgin queen, nectar, pollen, compound eyes, sting.

4. Horse Breeding

Read and translate the text:

There are forty-five breeds and breed groups reared in the former Soviet Union. The horse continues to be used for various work such as drawing loads, pulling carts, sledges, carrying packs; it helps in ploughing and harrowing small plots, grass moving, hay racking up in copses and ravines; the horse in light harness and under saddle is used for transportation, particularly on seasonably encountered slick roads and in winter during snow flurry and, of course, on mountainous paths far away from water ways. Various breeds of heavy-draught horses (athletes), study riding and packhorses have been developed to be most effectively used. And the sportsmen are in need of the horses on which one could win in major events at hippodromes, in cross-country races, in overtaking complex obstacles, in dressing competitions.

Answer the following questions:

1. How many horse breeds do you know?
2. What are the horses usually used for?
3. Where do sportsmen need horses?

Give definitions to the following terms:

Breed, harrowing, ploughing, racking up in copses, saddle, heavy-draught horse, athletes, packhorses, hippodrome.

5. Dairy Cattle Nutrition

Read and translate the text:

During the first lactation the cow needs sufficient feed for continued growth as well as for milk production. In succeeding lactations more feed will de needed for the normally expected increase in milk production and for body maintenance. During the last stages of pregnancy the cow requires sufficient nutrients for building up reserve body tissue, minerals and vitamins for use during the next lactation. These nutrient requirements, established through research and feeding trails, are presented in form of feeding standards. Feeds used by the dairy cow are divided into two general classes: roughages and concentrates. Roughages contain a relatively high percentage of fibber and have a comparatively low-feeding value (hays, pastures and silages). Classed as concentrates are grains and oil-bearing seeds such as cottonseed, linseed and soybean.

Answer the following questions:

1. In what period does the cow need more sufficient feed?
2. How can it succeed good lactation?
3. Is body maintenance important during lactation?
4. What does the cow need during the last stages of pregnancy?
5. What are feeding standards?
6. What classes of feeds do you know?
7. What is feeding value of roughages?
8. How much fibber does it contain?
9. What samples of roughages do you know?
10. What are samples and feeding value of concentrates?

Give definitions to the following terms:

Lactation, milk production, feed, pregnancy, nutrients, reserve body tissue, minerals, vitamins, roughages, concentrates, fibber, low-feeding value.

6. Poultry

Read and translate the text:

The domestically fowl (chickens, turkeys, ducks etc.) has been working for man more than 5,000 years. We can't know exactly who their ancestors were but they were probably wild jungle fowl, which had to roost high in trees to keep from being eaten by jungle beasts. The bird has food requirements just as we have. The foods are supplied in a balanced mixture: grains (corn, wheat, barley) for carbohydrates; soybean meal, meal and bone meal and other sources of protein; alfalfa meal, fish products, milk products and vitamin concentrates for vitamins; salt ground limestone and sources of other needed minerals. Inside every fertile egg are all the food nutrients needed to develop a baby chick. An embryo grows, develops and hatches in 21 days.

Answer the following questions:

1. How long does the man use the domestically fowl?
2. Who were the poultry's ancestors?
3. What are the bird's main food requirements?
4. How much time does it take the embryo to grow, develop and hatch?

Give definitions to the following terms:

Fowl, carbohydrate, protein, vitamin concentrates, minerals, fertile egg, food nutrients, an embryo, to hatch.

7. The Combs. The Colony

Read and translate the text:

In nature bees attach their combs to the roof and sides of the recess in which they live, but the beekeeper persuades them to build within a moveable wooden frame so that any individual comb may be removed, examined and replaced without damage. Cells are built on either side of vertical sheet (the midrib) of wax. The cells are not opposite to one

another but staggered and the bases are in form of shallow three sided pyramids. The uniformity of size has been over-emphasized because there are four kinds of cell in a hive and all four may occur on the same comb. Worker cell. There are the most usual type of cell and they are about 1/2 inch deep. A queen lays eggs in these cells and the resulting larvae feed, grow and finally emerge as full-grown workers. Bees also use them for the receipt of nectar and for the storage of pollen and honey.

A hive is the house, in which the bees live. The inhabitants together with their combs are known as a colony. An average colony will contain 20,000 - 40,000 bees. Recent discoveries have shown that through certain formal movements, known as dances, bees can communicate with one another, so some of the visible activity may be put down as conversation. We must hesitate before thinking that any of their comings and goings are aimless since all activity generates muscular heat and, this is the bees' method of keeping the hive warm. A colony contains three types of bees. The queen is the perfect female. The drones are the males. There are several hundred of these. The workers are sometimes described as neuters, though they are really females with undeveloped reproductive organs.

Answer the following questions:

1. Where can you find the bee's combs in nature?
2. What do the beekeepers build for them?
3. How do they use wooden frames?
4. What kinds of cells are there in a hive?
5. How do the bees use worker cell?
6. What is a hive?
7. What is a colony?
8. How many bees does the average colony contain?
9. How do the bees use their dances?
10. How many types of bees do you know?

Give definitions to the following terms:

Comb, midrib, hive, nectar, pollen, honey, colony, queen, drone, worker.

8. The Ayrshire Cow. Beef Cattle

Read and translate the text:

As human population expands, more cereal grains will be used as food and we may have to rely on more roughage for our dairy cows. So we will require a cow that can consume large quantities of roughage, maybe less grain, and convert it into large quantities of milk. Efficiency will become more important. We think that the cow of the future will be taller than in the past, but maybe with more emphasis on width of chest and overall strength. To make these higher yields year after year our cows must have dairy capacity and strength. The taller cow will have an udder higher off the ground and less chance for injury. She will be sharp at the shoulders but still have great width of chest. These cows may not be as deep bodies in the past, but will have more length of body. Calves and yearlings must be taller and longer but still have quality.

Scottish agriculture employs 3% of Scotland's working population. Agriculture is a modern efficient industry applying the most up-to-date technology with a high level of mechanization and a highly skilled work force. Livestock products generally account about 75 % of farm output. On this land (mainly hills and upland) years-round grazing of hardy stock is possible. Several breeds of beef cattle are native to Scotland - the Black Aberdeen Angus is noted for its early maturing and superb quality of meat. Shorthorn, prized for its robustness and beef quality is noted throughout the world for its ability of improving poorer breeds by crossing the Galloway of slower growth but great hardiness; the Luing breed, officially recognized in 1966 and particularly suitable for producing good beef in the poor wet conditions of the North-West.

Answer the following questions:

1. What will the cow of the future look like?
2. How many people does Scottish agriculture employ?
3. What is agriculture?
4. Is years-round grazing of hardy stock possible in Scotland?
5. What native Scotland breeds do you know?
6. What is the Black Aberdeen Angus noted for?

7. What is Shorthorn prized for?
8. When was Luing breed officially recognized?
9. What is this breed suitable for?

Give definitions to the following terms:

Roughage, dairy cow, chest, dairy capacity, an udder, calf, yearling, grazing, breed, beef cattle, Aberdeen Angus, Shorthorn, Galloway, Luing breed.

9. Breeds. Beef Breeding

Read and translate the text:

A breed may be defined as a group of animals related by descent and developed for a special function. Thus, dairy cattle breeds are breeds developed primarily for milk production. In the United States cattle kept primarily for milk production belong to the Ayrshire, Brown Swiss, Holstein and Jersey breeds. In addition two breeds: the Milking Shorthorn and Red Polled are kept for milk but their numbers are small in comparison with the previously mentioned dairy breeds. Cattle were kept for dairy purposes long before the modem breeds developed. For example, in Holland butter production from cow's milk became so important that specialized buildings "butter houses" were constructed for butter storage and distribution before 1288. In the eighteenth century Bakewell was one of the first men to apply modern methods to the improvement of animals.

The beef breeding herd of approximately half a million cows is largely composed of cross-bred animals derived from the five native breeds, although rapid expansion in the breeding herd since the early 1905-s has been assisted by the increasing use of dairy crossbreds as beef cows - notably the Hereford - Friesian cross. The native brown and white Ayrshire, noted for its ability to thrive and produce milk under a wide range of farming conditions, accounts for just under half of the dairy herd. Recent years have also seen an increasing interest on the part of Scottish farmers in the use of breeds of foreign origin and several breeds have now been improved. A fall in the number of milk producers and an increase in then average herd size have been occurring in the Scottish dairy industry

for many years.

Answer the following questions:

1. What does the term “breed” mean?
2. What are dairy cattle breeds?
3. What dairy cattle breeds do you know?
4. What are “butter houses”?
5. Who was the first men to apply modern methods to the improvement of animals?

Give definitions to the following terms:

Dairy cattle breed, Ayrshire, Brown Swiss, Holstein, Jersey, Milking Shorthorn, Red Polled, butter house, herd, cross-bred, Hereford - Friesian cross.

10. Leghorn

Read and translate the text:

The Single Comb White Leghorn is the most important breed kept for egg production in America, as well as in most countries of Europe. The Leghorn is characterized by an active and flighty disposition, early sexual maturity, excellent laying ability and a relatively small body size. They are well adapted to the extremes in the climate of the North America. The Leghorn lays white eggs and chicks are early feathering and grow rapidly. Leghorn were first imported into America about 1855 from Italy. The relatively small size of the Leghorn is an advantage from the standpoint of early maturity and rate of egg production. Small size birds are more economically efficient egg producers because less feed is required for body maintenance. The Leghorn however is inferior as a meat bird and most the hens after completing their production year are utilized in the manufacture of chicken soup and other prepared foods.

Answer the following questions:

1. What is the most important breed kept for egg production in America?

2. What is Leghorn characterized by?
3. When were Leghorn first imported into America?
4. Is relatively small size of the Leghorn advantage or disadvantage?
5. Is this breed used for meat production?

Give definitions to the following terms:

Single Comb White Leghorn, flighty disposition, sexual maturity, laying ability, feathering, egg production, body maintenance.

III. BIOTECHNOLOGIES AND BIOENGINEERING

1. Cytology as a Science

Read and translate the text:

Cytology means "the study of cells". Cytology is that branch of life science, which deals with the study of cells in terms of structure, function and chemistry. Based on usage it can refer to cell biology.

Cell biology is a scientific discipline that studies cells – their physiological properties, their structure, the organelles they contain, interactions with their environment, their life cycle, division and death. This is done both on a microscopic and molecular level. Cell biology research encompasses both the great diversity of single-celled organisms like bacteria, as well as the many specialized cells in multicellular organisms such as humans.

The cell is the functional basic unit of life discovered by Robert Hooke. It is the smallest unit of life that is classified as a living thing, and is often called the building block of life. Some organisms, such as most bacteria, are unicellular (consist of a single cell). Other organisms, such as humans, are multicellular. Humans have about 100 trillion cells; a typical cell size is 10 micrometers and a typical cell mass is 1 nanogram. The largest known cells are unfertilized ostrich egg cells, which weigh 3.3 pounds.

The cell theory, first developed in 1839 by Matthias Jakob Schleiden and Theodor Schwann, states that all organisms are composed of one or more cells, that all cells come from preexisting cells, that vital functions

of an organism occur within cells, and that all cells contain the hereditary information necessary for regulating cell functions and for transmitting information to the next generation of cells. The word *cell* comes from the Latin *cellula*, meaning, a small room. The descriptive term for the smallest living biological structure was coined by Robert Hooke in a book he published in 1665 when he compared the cork cells he saw through his microscope to the small rooms monks lived in.

The cell consists of different proteins. Each type of protein is usually sent to a particular part of the cell. Most proteins are synthesized by ribosomes in the rough endoplasmic reticulum. This process is known as protein biosynthesis.

Appreciating the similarities and differences between cell types is particularly important to cell and molecular biology as well as to biomedical fields such as cancer research and developmental biology. Therefore, research in cell biology is closely related to genetics, biochemistry, molecular biology, immunology and developmental biology.

Answer the following questions:

1. What does “cytology” mean?
2. What does cell biology study?
3. Who was the cell discovered by?
4. Are there any organisms consisting of only one cell?
5. How many cells does human have?
6. When was the cell theory first developed?
7. What does it state?
8. What is the origin of the word “cell”?
9. What science is cell biology closely related to?
10. What is protein biosynthesis?

Give definitions to the following terms:

Cytology, cell, cell biology, bacteria, unicellular, ribosome, protein biosynthesis, immunology.

2. What is Embryology?

Read and translate the text:

Embryology is the study of the formation of life, part of the studies with which developmental biology is concerned. Developmental biology examines how all forms of life begin, and how they develop into fully formed and functioning organisms.

Embryology looks at the very beginning of life from the one-celled organism, egg or sperm. Embryologists examine fertilization and track the development of the embryo until it bears a resemblance to its progenitors. For example, in human conception, embryologists would be interested in both sperm and egg, and the meeting of the two, and then would follow egg implantation and the growth of an embryo until it reaches the fetal stage. So in humans, the study of an embryo would last until about the second month of a pregnancy.

Aristotle was one of the first to champion the theory of epigenesis, the concept that life forms develop into complex organisms from fertilization. This was not a popular concept and was largely discarded in favor of the theory of preformation, which suggested that each human sperm was already a person in waiting. In the mid 18th century, Caspar Fredriech Wolff again set forth the concept of epigenesis. Through his study of chick embryos, Wolff realized that the body of an organism has stages of development. Through vivisection, he observed the complexity of specific organs and contended that their development could not simply have occurred spontaneously, but must have developed over time.

Later scientists followed his studies, and with the development and subsequent improvements of the microscope, Wolff's theories were found to be quite accurate. Wolff is credited as the "Father of Embryology", even though he did not first conceptualize epigenesis. Today, the theories of embryology are easier to prove because of the accuracy with which we can examine DNA codes within a cell.

There are several practical applications of embryology in the modern world. Embryology has given doctors the tools to create fertilized eggs for in vitro implantation. Embryology can also identify risk factors for serious genetic conditions within the fertilized egg and select the most viable eggs for implantation. The study of embryology has led directly to the concept of cloning, either for a whole organism or parts of an

organism.

Answer the following questions:

1. What is embryology?
2. What does developmental biology examine?
3. What do embryologists examine?
4. What is epigenesis?
5. Who was the first to champion this theory?
6. What did the theory of preformation suggest?
7. Who is called the "Father of Embryology"?
8. Why are the theories of embryology easier to prove nowadays?
9. What are the main practical applications of embryology in the modern world?
10. What concept has this study led directly to?

Give definitions to the following terms:

Embryology, developmental biology, fertilization, an embryo, epigenesis, preformation, sperm, vivisection, cloning.

3. Physiology of Plants and Animals

Read and translate the text:

Although you may place organisms without difficulty in either the plant or the animal kingdom, it is essential to know the basic differences between these two groups. That's why we can distinguish physiology of plants and animals.

Plant physiology. It is a subdiscipline of botany concerned with the functioning, or physiology of plants. Closely related fields include plant morphology (structure of plants), plant ecology (interactions with the environment), photochemistry (biochemistry of plants), cell biology, and molecular biology. The scope of plant physiology as discipline may be divided into several major areas of research. First, the study of photochemistry (plant chemistry) is included within the domain of plant physiology. To function and survive, plants produce a wide array of

chemical compounds not found in other organisms. Photosynthesis requires a large array of pigments, enzymes, and other compounds to function. Secondly, plant physiology includes the study of biological and chemical processes of individual plant cells. Plant cells have a number of features that distinguish them from cells of animals, and which lead to major differences in the way that plant life behaves and responds differently from animal life. Thirdly, plant physiology deals with interactions between cells, tissues, and organs within a plant. Different cells and tissues are physically and chemically specialized to perform different functions. Fourthly, plant physiologists study the ways that plants control or regulate internal functions. Like animals, plants produce chemicals called hormones which are produced in one part of the plant to signal cells in another part of the plant to respond. Finally, plant physiology includes the study of how plants respond to conditions and variation in the environment, a field known as environmental physiology.

Animal physiology. It is the study of animal functions. Animal physiology is subdivided into the four main parts, such as general physiology, special physiology, comparative physiology and age physiology.

General physiology deals with the analysis of such universal and important processes as blood circulation, metabolism, respiration etc. Special physiology applies general physiological principles in order to investigate characteristics of a particular animal species. Comparative physiology concentrates on similarities and differences of physiological functions of various living organisms. The problem of how physiological functions change with animal age is of special interest to age physiology. The main approach in animal physiology is to study the evolutionary origins of the physiological mechanisms in order to understand the significance of these mechanisms for modern animals. Modern physiology which is based on chemical, physical and anatomical methods investigates biological organization of the animal body at different levels, that is, cells, tissues, organs.

One of the parts of special physiology is devoted to farm animal physiology. The aim of this science is not only to study physiological functions of the farm animal body, but to control them in order to increase the production of eggs, offspring, milk, meat and wool.

Other major branches of scientific study that have grown out of physiology research include biochemistry, biophysics, biomechanics, pharmacology, cytology as well as genetics which are known as the

biological bases for rational animal husbandry.

Answer the following questions:

1. What is plant physiology?
2. What are its major areas of research?
3. Why does plant physiology include the study of biological and chemical processes of individual plant cells?
4. What does it deal with?
5. Does it include the study of environmental physiology?
6. What is animal physiology subdivided in?
7. What does general physiology deal with?
8. What does special physiology apply?
9. What is of special interest to age physiology?
10. What is farm animal physiology?

Give definitions to the following terms:

Plant physiology, plant morphology, plant ecology, photochemistry, cell biology, molecular biology, photosynthesis, hormones, animal physiology, general physiology, special physiology, comparative physiology, age physiology, metabolism, respiration.

4. Biological Chemistry

Read and translate the text:

Biochemistry, sometimes called biological chemistry, is the study of chemical processes in living organisms, including, but not limited to, living matter. Biochemistry governs all living organisms and living processes. By controlling information flow through biochemical signaling and the flow of chemical energy through metabolism, biochemical processes give rise to the incredible complexity of life.

Over the last 40 years biochemistry has become so successful at explaining living processes that now almost all areas of the life sciences from botany to medicine are engaged in biochemical research. Today the main focus of pure biochemistry is in understanding how biological

molecules give rise to the processes that occur within living cells which in turn relates greatly to the study and understanding of whole organisms.

Among the vast number of different biomolecules, many are complex and large molecules (called biopolymers), which are composed of similar repeating subunits (called monomers). Each class of polymeric biomolecule has a different set of subunit types. For example, a protein is a polymer whose subunits are selected from a set of 20 or more amino acids. Biochemistry studies the chemical properties of important biological molecules, like proteins, and in particular the chemistry of enzyme-catalyzed reactions.

The biochemistry of cell metabolism and the endocrine system has been extensively described. Other areas of biochemistry include the genetic code (DNA, RNA), protein synthesis, cell membrane transport, and signal transduction.

Researchers in biochemistry use specific techniques native to biochemistry, but increasingly combine these with techniques and ideas from genetics, molecular biology and biophysics. There has never been a hard-line between these disciplines in terms of content and technique. Today the terms molecular biology and biochemistry are nearly interchangeable.

Answer the following questions:

1. What is biological chemistry?
2. What does it govern?
3. What is engaged in biochemical research?
4. Where is the main focus of pure biochemistry today?
5. What is protein?
6. What does biochemistry study?
7. What techniques do researchers use in biochemistry?
8. Are genetics, molecular biology and biophysics closely connected with each other?
9. What terms are nearly interchangeable nowadays?
10. Do the areas of biochemistry include the genetic code (DNA, RNA), protein synthesis, cell membrane transport, and signal transduction?

Give definitions to the following terms:

Biochemistry, living matter, metabolism, living cell, biomolecule, biopolymer, monomer, amino acid, enzyme-catalyzed reactions, endocrine system, DNA, RNA, signal transduction.

5. The Bridge Between Biology and Physics

Read and translate the text:

Biology studies life in its variety and complexity. It describes how organisms go about getting food, communicating, sensing the environment, and reproducing. On the other hand, physics looks for mathematical laws of nature and makes detailed predictions about the forces that drive idealized systems. Spanning the distance between the complexity of life and the simplicity of physical laws is the challenge of biophysics. Biophysicists study life at every level, from atoms and molecules to cells, organisms, and environments.

Biophysics discovers such questions as how atoms are arranged to work in DNA and proteins. Protein molecules perform the body's chemical reactions. They push and pull in the muscles that move your limbs. Proteins make the parts of your eyes, ears, nose, and skin that sense your environment. They turn food into energy and light into vision. They are your immunity to illness. Proteins repair what is broken inside of cells, and regulate growth. They fire the electrical signals in your brain. They read the DNA blueprints in your body and copy the DNA for future generations. So, biophysicists discover how proteins work. Understanding these differences in people's respond to proteins opens new possibilities in drug design, diagnosis, and disease control.

Biophysics is a wellspring of innovation for our high-tech economy. The applications of biophysics depend on society's needs. In the 20th century, great progress was made in treating disease. Biophysics helped to create powerful vaccines against infectious diseases. It described and controlled diseases of metabolism, such as diabetes. And biophysics provided both the tools and the understanding for treating the diseases of growth as cancers. Today we are learning more about the biology of health and society is deeply concerned about the health of our planet.

Advanced instruments created by biophysicists provide the life-saving treatment methods of kidney dialysis, radiation therapy, cardiac

defibrillators, and pacemakers. Biophysicists invented instruments for detecting, purifying, imaging, and manipulating chemicals and materials.

Nowadays society is facing physical and biological problems of global proportions. How will we continue to get sufficient energy? How can we feed the world's population? How do we remediate global warming? How do we preserve biological diversity? How do we secure clean and plentiful water? Biophysics provides the insight and technologies for meeting these challenges, based on the principles of physics and the mechanisms of biology.

Biophysics discovers how to modify microorganisms for biofuel (replacing gasoline and diesel fuel) and bioelectricity (replacing petroleum products and coal for producing electricity). Biophysics discovers the biological cycles of heat, light, water, carbon, nitrogen, oxygen, heat, and organisms throughout our planet. Biophysics harnesses microorganisms to clean our water and to produce lifesaving drugs.

Answer the following questions:

1. What does biology describe?
2. What do biophysicists study?
3. What are the body's chemical reactions performed by?
4. What possibilities were opened as a result of protein discovery?
5. What do the applications of biophysics depend on?
6. What diseases were treated due to biophysics?
7. What problems is society facing nowadays?
8. What does biophysics discover?

Give definitions to the following terms:

Biology, physical laws, metabolism, kidney dialysis, radiation therapy, cardiac defibrillators, pacemaker.

6. Three Branches of Biophysics

Read and translate the text:

Medical Biophysics studies physics to describe or affect biological process for the purpose of medical application. Like many areas of study that have emerged in recent times, it relies on broad interdisciplinary knowledge between the so-called traditional fields such as physics (i.e. medical physics, radiation physics or imaging physics) and advanced biology fields such as biochemistry, biophysics, physiology, neuroscience etc. Some important areas of research in medical biophysics include medical imaging (e.g. MRI, computed tomography, and PET), oncology and cancer diagnosis, and vasculature and circulatory system function.

Molecular biophysics is an evolving interdisciplinary area of research that combines concepts in physics, chemistry, engineering, mathematics and biology. It studies biomolecular systems and explain biological function in terms of molecular structure, structural organization, and dynamic behavior at various levels of complexity (from single molecules to supramolecular structures, viruses and small living systems). The discipline requires specialized equipment and procedures capable of imaging and manipulating minute living structures, as well as novel experimental approaches.

Biophysical chemistry is a relatively new branch of chemistry that covers a broad spectrum of research activities involving biological systems. The most common feature of the research in this subject is to seek explanation of the various phenomena in biological systems in terms of either the molecules that make up the system or the supra-molecular structure of these systems.

Biophysical chemists employ various techniques used in physical chemistry to probe the structure of biological systems. These techniques include spectroscopic methods like nuclear magnetic resonance (NMR) and X-ray diffraction. Also biophysical chemists study protein structure and the functional structure of cell membranes. For example, enzyme action can be explained in terms of the shape of a pocket in the protein molecule that matches the shape of the substrate molecule or its modification due to binding of a metal ion. Similarly the structure and function of the biomembranes may be understood through the study of model supramolecular structures as liposomes or phospholipid vesicles of

different compositions and sizes.

Answer the following questions:

1. What does medical biophysics study?
2. What does molecular biophysics study?
3. What does biophysical chemistry research?
4. What is its the most common feature?
5. What techniques does it use to probe the structure of biological systems?

Give definitions to the following terms:

Medical Biophysics, radiation physics, imaging physics, neuroscience, medical imaging, molecular biophysics, biomolecular systems, biophysical chemistry, nuclear magnetic resonance, X-ray diffraction, cell membranes, biomembranes, supramolecular structures, liposomes, phospholipid vesicles.

7. Physicochemical Methods of Analysis: What Are These?

Read and translate the text:

It seems that this term can be met only in Ukrainian. In the English language literature, they usually speak and write about instrumental methods of analysis. The name instrumental is evidently not ideal; analytical balances or titrimeters used in classical chemical methods also belong to instruments.

Physicochemical methods of analysis have wider application. Without them it is hard to control and manage production processes and research. It should be noted that physicochemical methods of analysis solve the problems of chemical control and analysis; they constitute to one of the parts of analytical chemistry. The essence of the physical and chemical methods of analysis is to study relations between structure and properties of systems. For the analysis of substances chemical reactions are widely used. They are accompanied by changes in the physical properties of the analyzed system, for example, the color intensity of

fluorescence, etc. So physicochemical methods of analysis is a field of analytical chemistry that investigates analyses using scientific instruments. There are several types of instrumental analyses.

Spectroscopy measures the interaction of the molecules with electromagnetic radiation. Spectroscopy consists of many different applications such as atomic absorption spectroscopy, atomic emission spectroscopy, ultraviolet-visible spectroscopy, x-ray fluorescence spectroscopy, infrared spectroscopy, Raman spectroscopy, nuclear magnetic resonance spectroscopy, photoemission spectroscopy and so on.

Mass spectrometry measures mass-to-charge ratio of molecules using electric and magnetic fields. There are several ionization methods: electron ionization, chemical ionization, electrospray, fast atom bombardment, matrix-assisted laser desorption/ionization, and others.

Crystallography is a technique that characterizes the chemical structure of materials at the atomic level by analyzing the diffraction patterns of electromagnetic radiation or particles that have been deflected by atoms in the material. X-rays are most commonly used. From the raw data the relative placement of atoms in space may be determined.

Electroanalytical methods measure the electric potential in volts and/or the electric current in amps in an electrochemical cell containing the analyte. These methods can be categorized according to which aspects of the cell are controlled and which are measured. The three main categories are potentiometry (the difference in electrode potentials is measured), coulometry (the cell's current is measured over time), and voltammetry (the cell's current is measured while actively altering the cell's potential).

Calorimetry and thermogravimetric analysis measure the interaction of a material and heat.

Separation processes are used to decrease the complexity of material mixtures. Chromatography and electrophoresis are representative of this field.

Microscopy. The visualization of single molecules, single biological cells, biological tissues and nanomaterials is very important and attractive approach in analytical science.

Also, hybridization with other traditional analytical tools is revolutionizing analytical science. Microscopy can be categorized into three different fields: optical microscopy, electron microscopy, and scanning probe microscopy. Recently, this field is rapidly progressing because of the rapid development of the computer and camera industries.

Combinations of the above techniques produce a "hybrid" or "hyphenated" technique. Several examples are in popular use today and new hybrid techniques are under development, for example, gas chromatography-mass spectrometry, gas chromatography-infrared spectroscopy, liquid chroma- tography-mass spectrometry and so on.

A general method for analysis of concentration involves the creation of a calibration curve. This allows for determination of the amount of a chemical in a material by comparing the results of unknown sample to those of a series known standards. If the concentration of element or compound in a sample is too high for the detection range of the technique, it can simply be diluted in a pure solvent. If the amount in the sample is below an instrument's range of measurement, the method of addition can be used. In this method a known quantity of the element or compound under study is added, and the difference between the concentration added, and the concentration observed is the amount actually in the sample.

Answer the following questions:

1. What application do physicochemical methods have?
2. What problems do they solve?
3. What does spectroscopy do?
4. What ionization methods do you know?
5. What does crystallography characterize?
6. When are separation processes used?
7. What is microscopy?
8. What are three different fields of microscopy?

Give definitions to the following terms:

Instrumental methods of analysis, analytical balance, titrimeter, physicochemical methods, fluorescence, spectroscopy, atomic absorption spectroscopy, atomic emission spectroscopy, ultraviolet-visible spectroscopy, x-ray fluorescence spectroscopy, infrared spectroscopy, Raman spectroscopy, nuclear magnetic resonance spectroscopy, photoemission spectroscopy, electron ionization, chemical ionization, electrospray, fast atom bombardment, matrix-assisted laser desorption/ionization, mass spectrometry, crystallography, electroanalytical methods, potentiometry.

8. A Magnificent Protector

Read and translate the text:

Inside your body there is an amazing protection mechanism called the immune system. It is designed to defend you against millions of bacteria, microbes, viruses, toxins and parasites that would love to invade your body. To understand the power of the immune system, all that you have to do is to have a look at one's death. That sounds gross, but it will show you important things about your immune system. When something dies, its immune system (along with everything else) shuts down. In a matter of hours, the body is invaded by all sorts of bacteria, microbes, parasites... None of these things are able to get in when your immune system is working, but the moment your immune system stops the door is wide open. Once you die it only takes a few weeks for these organisms to completely dismantle your body and carry it away, until all that's left is a skeleton. Obviously your immune system is doing something amazing to keep all of that dismantling from happening when you are alive.

When a virus or bacteria (also known generically as a germ) invades your body and reproduces, it normally causes problems. Generally the germ's presence produces some side effect that makes you sick. For example, the strep throat bacteria (Streptococcus) releases a toxin that causes inflammation in your throat. The poliovirus releases toxins that destroy nerve cells (often leading to paralysis). Some bacteria are benign or beneficial (for example, we all have millions of bacteria in our intestines and they help digest food), but many are harmful ones; they get into the body or the bloodstream.

The job of your immune system is to protect your body from these infections. The immune system protects you in three different ways. First and foremost, it creates a barrier that prevents bacteria and viruses from entering your body. Then, if a bacteria or virus does get into the body, the immune system tries to detect and eliminate it before it can make itself at home and reproduce. Thirdly, when the virus or bacteria is able to reproduce and start causing problems, your immune system is in charge of eliminating it.

There are many diseases that, if you catch them once, you will never catch again. Measles is a good example, as is chicken pox. What happens with these diseases is that they make it into your body and start

reproducing. The immune system gears up to eliminate them. Cells recognize the virus and produce antibodies for it. This process takes time, but the disease runs it course and is eventually eliminated.

A vaccine is a weakened form of a disease. It is either a killed form of the disease, or it is a similar but less virulent strain. Once inside your body your immune system mounts the same defense, but because the disease is different or weaker you get few or no symptoms of the disease. Now, when the real disease invades your body, your body is able to eliminate it immediately.

Many diseases cannot be cured by vaccines, however. The common cold and influenza are two good examples. These diseases either mutate so quickly or have so many different strains in the wild that it is impossible to inject all of them into your body. Each time you get the flu, for example, you are getting a different strain of the same disease. Thus, it's only our immune system which helps us to be defended.

Answer the following questions:

1. What is immune system?
2. What is its role in your life?
3. What happens when something dies?
4. What kinds of bacteria are there?
5. What are three different ways of immune system protection?
6. What is vaccine?
7. What diseases cannot be cured by vaccines?

Give definitions to the following terms:

Immune system, bacteria, microbes, viruses, toxins, parasites, germ, strep throat bacteria, poliovirus, chicken pox, influenza.

9. The Fantastic World

Read and translate the text:

Microbiology is the study of microorganisms, which are microscopic and unicellular organisms. This includes eukaryotes such as fungi and protists, and prokaryotes. Viruses, though not classed as living organisms, are also studied. Microbiology typically includes the study of the immune system, or Immunology. And immune systems obviously interact with pathogenic microbes.

Microbiology includes virology, mycology, parasitology, bacteriology and other branches. Microbiological procedures usually must be aseptic, and use a variety of tools such as light microscopes with a combination of stains and dyes, agar plates in petri dishes, biochemical test and running tests against particular growth conditions.

Microbiology is researched actively. Many microbes are responsible for beneficial processes such as industrial fermentation, antibiotic production and others. Bacteria can be used for the industrial production of amino acids. *Corynebacteriumglutamicum* is one of the most important bacterial species with an annual production of more than two million tons of amino acids.

A variety of biopolymers, such as polysaccharides, polyesters, and polyamides, are produced by microorganisms. Microorganisms are used for the biotechnological production of biopolymers with tailored properties suitable for high-value medical application such as tissue engineering and drug delivery.

Microorganisms are beneficial for microbial biodegradation of domestic, agricultural and industrial wastes. The ability of each microorganism to degrade toxic waste depends on the nature of each contaminant.

There are also various claims concerning the contributions to human and animal health by consuming probiotics (bacteria potentially beneficial to the digestive system) and/or prebiotics (substances consumed to promote the growth of probiotic microorganisms). Recent research has suggested that microorganisms could be useful in the treatment of cancer.

Answer the following questions:

1. What is microbiology?
2. What are many microbes responsible for?
3. What can microorganisms be used for?

Give definitions to the following terms:

Microbiology, microorganisms, eukaryotes, prokaryotes, immunology, pathogenic microbes, virology, mycology, parasitology, bacteriology, antibiotic, corynebacteriumglutamicum, biopolymers, polysaccharides, polyesters, polyamides, biodegradation, probiotics, prebiotics.

10. Virology and Viruses

Read and translate the text:

Virology is the study of viruses and virus-like agents: their structure, classification and evolution, their ways to infect and exploit cells for virus reproduction, the diseases they cause, the techniques to isolate and culture them, and their use in research and therapy. Virology is often considered as a part of microbiology. A major branch of virology is virus classification. Viruses can be classified according to the host cell they infect: animal viruses, plant viruses, fungal viruses, and bacteriophages (viruses infecting bacteria, which include the most complex viruses). Another classification uses the geometrical shape of their capsid (often a helix or an icosahedron) or the virus's structure (e.g. presence or absence of a lipid envelope). Viruses range in size from about 30 nm to about 450 nm, which means that most of them cannot be seen with light microscopes. The shape and structure of viruses has been studied by electron microscopy, NMR spectroscopy, and X-ray crystallography.

A virus is a small infectious agent that can replicate only inside the living cells of organisms. Viruses infect all types of organisms, from animals and plants to bacteria. Since the initial discovery of the tobacco mosaic virus in 1898, about 5,000 viruses have been described in detail, although there are millions of different types. Viruses are found in almost every ecosystem on Earth.

Virus particles (known as virions) consist of two or three parts: the genetic material made from either DNA or RNA, long molecules that

carry genetic information; a protein coat that protects these genes; and in some cases an envelope of lipids that surrounds the protein coat when they are outside a cell. The average virus is about one one-hundredth the size of the average bacterium.

Viruses cause a number of diseases in eukaryotes. In humans, smallpox, the common cold, influenza, herpes, polio, rabies and AIDS are examples of viral diseases.

Viral infections in animals provoke an immune response that usually eliminates the infecting virus. Immune responses can also be produced by vaccines. However, some viruses including those causing AIDS and viral hepatitis evade these immune responses and result in chronic infections. Antibiotics have no effect on viruses, but several antiviral drugs have been developed.

The origins of viruses in the evolutionary history of life are unclear: some may have evolved from plasmids – pieces of DNA that can move between cells – while others may have evolved from bacteria.

The evolution of viruses, which often occurs in concert with the evolution of their hosts, is studied in the field of viral evolution.

While viruses reproduce and evolve, they don't engage in metabolism and depend on a host cell for reproduction. The often-debated question of whether they are alive or not is a matter of definition that does not affect the biological reality of viruses.

Answer the following questions:

1. What is virology?
2. Is virology considered as a part of microbiology?
3. How are viruses classified?
4. What is the size of virus?
5. How can we study the shape and structure of viruses?
6. How many viruses have been described?
7. Where can they be found?
8. What are the examples of viral diseases?
9. How can immune responses be produced?

Give definitions to the following terms:

Virology, virus-like agents, microbiology, bacteriophages, helix or an icosahedron, lipid envelope, NMR spectroscopy, X-ray crystallography, virions, smallpox, influenza, herpes, polio, rabies, AIDS, plasmids.

IV. FOOD TECHNOLOGIES

1. Food and its Sources

Read and translate the text:

Food is any substance, usually comprised primarily of carbohydrates, fats, vitamins, water and/or proteins, that can be eaten or drunk by animals (including humans) for nutrition and/or pleasure. Most cultures have a recognisable cuisine: a specific set of cooking traditions, preferences and practices, the study of which is known as gastronomy.

The study of food is called food science. In English, the term food is often used metaphorically or figuratively as "food for thought". The main food sources are plants and animals. Many plants or plant parts are eaten as food. There are around two thousand plant species that are cultivated for food, and many have several distinct cultivars. Plant-based foods can be classified as follows: seeds, the ripened ovules of some plants, carry a plant embryo inside them along with the nutrients necessary for the plant's initial growth. Because of this, seeds are often packed with energy, and are good sources of food for animals, including humans. In fact, the majority of all foods consumed by human beings are seeds. These include cereals (such as maize, wheat, and rice), legumes (such as beans, peas, and lentils), and nuts. Oilseeds are often pressed to produce rich oils, including sunflower, rape (including canola oil), and sesame. Fruits are the ripened ovaries of plants, including the seeds within. Fruits are made attractive to animals so that animals will eat the fruits and excrete the seeds over long distances. Fruits, therefore, make up a significant part of the diets of most cultures. Some fruits, such as pumpkin and eggplant, are eaten as vegetables. Vegetables are other plant matter which is eaten as food. These include root vegetables (such as potatoes and carrots), leaf vegetables (such as spinach and lettuce), stem vegetables (such as bamboo shoots and asparagus), and inflorescence vegetables (such as globe artichokes and broccoli). Many herbs and spices

are highly-flavourful vegetables. When animal tissue is eaten as food, this is known as meat. Many different kinds of animals are eaten, but mammals make up the majority of meat. The most common mammal-based meat include beef, lamb, pork, and mutton. Poultry is meat from a bird; the most common poultries are chicken and turkey. Seafood is meat from a fish or other sea creature, such as shellfish or lobster. Some cultures eat other forms of meat, including insects, snails, reptiles, or amphibians. Often animal products are eaten as well. Mammals produce milk, which in many cultures is drunk or processed into dairy products such as cheese or butter. Birds and other animals lay eggs, which are often eaten. Many cultures eat honey, produced by bees, and some cultures eat animal blood. Some foods do not come from animal or plant sources. These include various edible fungi, including mushrooms. Fungi and ambient bacteria are used in the preparation of fermented and pickled foods such as leavened bread, wine, beer, cheese, pickles, and yoghurt. Many cultures eat seaweed or blue-green algae (cyanobacteria) such as spirulina. Additionally, salt is often eaten as a flavouring or preservative, and baking soda is used in food preparation. Both of these are inorganic substances, as is water, an important part of human diet.

Answer the following questions:

1. What is food?
2. What are the main sources of food?
3. How many species of plants are cultivated by people for food?
4. Why are seeds good sources of food?
5. What groups can vegetables be classified into?
6. What is meat?
7. What meats do people eat?
8. What other products do animals give?
9. Does all food come from plants and animals?
10. What inorganic substances are used for food preparation?

Give definitions to the following terms:

Carbohydrate, vitamin, protein, nutrition, gastronomy, food science, embryo, ovaries, leaf vegetables, stem vegetables, inflorescence vegetables, poultry, mammal, fungi, ambient bacteria, cyanobacteria.

2. There are Many Kinds of Food

Read and translate the text:

Since most of us eat their meals with a family, suppose we talk about family meals. First there are the foods rich in animal protein, like milk, meat, eggs, fish and cheese. It is rather easy to build an adequate diet for growth when we use liberal amounts of the protein foods, which come from animals. But still a large number of people in the world have to depend on plants (these include fruits, vegetables and cereals) rather than meat to give them protein because this kind of food can be produced most cheaply. It also provides vitamins and minerals for our diet. Have you ever thought of all kinds of foods which come from cereals? First think of bread, made from wheat, from rye, from oats, from corn. Then there are the so called pastas like macaroni, spaghetti, vermicelli and many others. Barley is used in delicious soups. Next let us talk about fruits and vegetables. Can you imagine how drab our meals would be if we had no gardens? We would miss most of the colour in our meals — the colour of a ripe tomato, a bright orange, the greenness of fresh peas, the rosiness of red apples. We would also miss much flavor in our meals. Yellow, orange and green are important colors when we consider nutritive value. Associated with these colors in fruit and vegetables is the important vitamin A. Vitamin C is also found in vegetables of the cabbage family, turnips, onions, white potatoes. Vitamin C does not like the heat of cooking, it is better to have one raw fruit and one raw vegetable each day. Sugars and fats furnish extra calories for our diet. Fats also have another important function in nutrition: it is the property of making us feel satisfied. Children and most adults like some extra fat, for example, butter or margarine on bread or fat used in cooking. Now sugar is another matter. We have become sugareaters. We eat ten times as much as our great-grandmothers did. But sugar is a good energy food. Also it is capable of making us feel satisfied at the end of a meal. As for milk and milk products, they form a special class of foods because in addition to the excellent protein they contain, they are also rich in calcium, which is one of the most important minerals used in building bones.

Answer the following questions:

1. Is it possible to build an adequate diet for growth without high-protein food?
2. Do many people in the world have to depend on plants to get protein because plants are tastier?
3. Does plant food provide vitamins and minerals for our diet?
4. Is bread made from pastas?
5. What is Vitamin A associated with ?
6. Is Vitamin C destroyed by heat?
7. Do fats make us feel satisfied?
8. What is milk rich in?
9. Is sugar energy food?
10. What is one of the most important minerals used in building bones?

Give definitions to the following terms:

Diet, protein, cereal, vitamin, pasta, flavor, calories, nutrition.

3. Constituents of Food

Read and translate the text:

Nutrients in food are grouped into several categories. Macronutrients means fat, protein, and carbohydrates. Micronutrients are the minerals and vitamins. Additionally food contains water and dietary fiber. Carbohydrates are the most important source of energy. From them we get most of energy which we need to act and move, perform work and live. They contain the elements Carbon, Hydrogen and Oxygen. The first part of the name “carbo-” means that they contain Carbon. The second part of the name “-hydr-” means that they contain Hydrogen. The third part of the name “-ate-” means that they contain Oxygen. In all carbohydrates the ratio of Hydrogen atoms to Oxygen atoms is 2:1 just like water. We obtain most of our carbohydrate in the form of starch. This is found in potato, rice, spaghetti, bread and cereals. Our digestive system turns all this starch into another carbohydrate called glucose. Glucose is carried around the body in the blood and is used by our tissues as a source of energy. Any glucose in our food is absorbed without the need for digestion. We also get some of our carbohydrate in the form of sucrose;

this is the sugar which we put in our tea and coffee. Both sucrose and glucose are sugars, but sucrose molecules are too big to get into the blood, so the digestive system turns it into glucose. Proteins are required for growth and repair. The living tissues of plants and animals consist of protein material which is continually destroyed in the maintenance of life and must be restored. Proteins contain Carbon, Hydrogen, Oxygen, Nitrogen and sometimes Sulphur. Proteins are very large molecules, so they cannot get directly into our blood; they must be turned into amino-acids by the digestive system. There are over 20 different amino-acids. Our bodies can turn the amino-acids back into protein. When our cells do this they have to put the amino-acids together in the correct order. There are many millions of possible combinations or sequences of amino-acids; it is our DNA which contains the information about how to make proteins. Our cells get their amino-acids from the blood. Proteins can also be used as a source of energy. When excess amino-acids are removed from the body the Nitrogen is excreted as a chemical called urea. The liver makes urea and the kidney puts the urea into our urine. Fats make our meals palatable and satisfying. Like carbohydrates, fats contain the elements Carbon, Hydrogen and Oxygen. Fats are used as a source of energy: they are also stored beneath the skin helping to insulate us against the cold. Some fats and oils are important sources of vitamins A, D, E and K. They provide various amounts of fatty acids which are essential in diet. Vitamins are known to be exceedingly important in nutrition even though they are required only in small amounts. They are essential for good nutrition and health and for normal growth. Vitamin A: good for your eyes. Vitamin B: about 12 different chemicals. Vitamin C: needed for your body to repair itself. Vitamin D: can be made in your skin, needed for absorption of calcium. Minerals are inorganic elements. Most of them can be found in the body, but only fifteen of them are known to be essential and must be taken from food. The main functions of minerals are: they are constituents of the bones and teeth; they help to control the composition of body fluids and salts; they are essential adjuncts to many enzymes, and other proteins such as haemoglobin. The major minerals are calcium, phosphorus, magnesium, sodium, chlorine, potassium, iron and sulphur. Fibre. We do not/can not digest cellulose. This is a carbohydrate used by plants to make their cell walls. It is also called roughage. If you do not eat foods materials which contain fibre you might end up with problems of the colon and rectum. The muscles of your digestive system mix food with the digestive juices and push food along the intestines by

peristalsis; if there is no fibre in your diet these movements cannot work properly.

Answer the following questions:

1. What nutrients are found in food?
2. What reasons are carbohydrates important for?
3. What do carbohydrates contain?
4. What forms do we get carbohydrates in?
5. We need proteins for growth and repair, don‘t we?
6. Can proteins get directly into our blood? Why?
7. What is DNA?
8. What role do fats play?
9. Are vitamins important for good nutrition?
10. How many minerals are essential for the body?

Give definitions to the following terms:

Macronutrients, micronutrients, dietary fiber, digestive system, glucose, amino-acid, fatty acid, inorganic elements, haemoglobin, roughage.

4. Food Preparation, Cooking and Manufacture

Read and translate the text:

Food preparation. While some food can be eaten without preparation, many foods undergo some form of preparation for reasons of safety, palatability, or flavor. At the simplest level this may involve washing, cutting, trimming or adding other foods or ingredients, such as spices. It may also involve mixing, heating or cooling, pressure cooking, fermentation, or combination with other food. In a home, most food preparation takes place in a kitchen. Some preparation is done to enhance the taste or aesthetic appeal; other preparation may help to preserve the food; and others may be involved in cultural identity. A meal is made up of food which is prepared to be eaten at a specific time and place. The preparation of animal-based food will usually involve slaughter,

evisceration, hanging, portioning and other operations. Cooking. The term "cooking" encompasses a vast range of methods, tools and combinations of ingredients to improve the flavor or digestibility of food. It generally requires the selection, measurement and combining of ingredients in an ordered procedure in an effort to achieve the desired result. Success greatly depends on the variability of ingredients, ambient conditions, tools and the skill of the individual cooking. The diversity of cooking worldwide is a reflection of the myriad nutritional, aesthetic, agricultural, economic, cultural and religious considerations that impact upon it. Cooking requires applying heat to a food which usually, though not always, chemically transforms it, thus changing its flavor, texture, appearance, and nutritional properties. Cooking was practiced at least since the 10th millennium BC with the introduction of pottery. There is archaeological evidence of roasted foodstuffs at Homo erectus campsites dating from 420,000 years ago. Food manufacture. Packaged foods are manufactured outside the home for purchase. This can be as simple as a butcher preparing meat, or as complex as a modern international food industry. Early food processing techniques were limited by available food preservation, packaging and transportation. This mainly 45 involved salting, curing, curdling, drying, pickling and smoking. During the industrialisation era in the 19th century, food manufacturing arose. This development took advantage of new mass markets and emerging new technology, such as milling, preservation, packaging and labelling and transportation. It brought the advantages of pre-prepared time saving food to the bulk of ordinary people who did not employ domestic servants. Nowadays advanced technologies have come to change food manufacture. Computer-based control systems, sophisticated processing and packaging methods, and logistics and distribution advances, can enhance product quality, improve food safety, and reduce costs.

Answer the questions:

1. What processes can food preparation include?
2. What are the reasons of food preparation?
3. What does the term "cooking" mean?
4. What determines the diversity of cooking in the world?
5. Does cooking require heat?
6. What did early food processing techniques include?
7. What technologies did the industrialisation era bring?

8. What technologies are used in food processing nowadays?
9. What can enhance product quality, improve food safety, and reduce costs?
10. Did food manufacturing arise during the industrialisation era?

Give definitions to the following terms:

Flavor, fermentation, slaughter, evisceration, hanging, portioning, cooking, salting, curing, curdling, drying, pickling, smoking, food manufacturing, milling, preservation, packaging, labelling, transportation.

5. Milk and its Composition

Read and translate the text:

Man used milk and milk products long ago. It is known from the history that people who subsisted on diets with a large proportion of milk and its products were usually healthy, vigorous and well-developed. Scientists proved that milk and its products have exceptional nutritional value. No other single food in the world can compare with milk in this respect. Milk is such a complete food because it contains, in varying amounts, all the ingredients needed to keep us fit and healthy. First of all, there are the different fats which give us energy. The complex composition of milk fat includes at least 64 different fatty acids, containing from 4 to 26 carbon atoms with a relatively high proportion of short-chain, saturated fatty acids, many of which are not found in other fats. In general, the 60 fatty acids in milk fat are about 66% saturated, 30% monosaturated and 4% polyunsaturated. The second ingredient is protein, which has many forms. One of them, called casein, is found only in milk. The proteins in milk are composed of 20 amino acids, eight of which are essential for adults because they can't be made by the body and must be obtained from food. The other 12 can be made by the body so are non-essential amino acids. Casein makes up 82 percent of the protein in milk. The various proteins are vital to all living things, helping them to grow, gain strength and overcome illness or injury. One litre of milk a day will provide the average adult with more than a third of his required proteins.

Milk is the only food source of the carbohydrate lactose, although it is the only significant carbohydrate in milk; traces of others such as glucose and glucosamines are also present. Lactose, a sugar, provides half of the total solids in milk and contributes 30 percent of the food energy in whole milk. Lactose has many beneficial characteristics. It stimulates the growth of intestinal micro-organisms that synthesize the B vitamins. It produces organic acids which provide an ideal protective medium by checking the growth of undesirable bacteria in the intestine. In addition, lactose increases the absorption of calcium, phosphorus and magnesium, and favorably affects the intestinal flora. Everyone also needs a regular supply of important vitamins to keep healthy, and milk contains more of these than any other food. Vitamins A and D, found in the butterfat, help our eyesight and protect us against disease. Vitamin B2, also known as riboflavin, is an essential part of a child's diet, promoting growth and keeping the skin clear. This, together with Vitamin C, which keeps colds and flu at bay, is found in the watery part of the milk. Milk contains many minerals too. It is particularly rich in calcium, which strengthens our bones and teeth. Among the others are phosphorus (good for the brain cells), potassium (tones up the nervous system), sodium (helps us absorb calcium) and iron (keeps the blood healthy). At present milk and its products are daily requirements for the population in most parts of the world. From the Equator, where the Arabs still use camel's milk, to the far North, where the Eskimos use reindeer caribou milk, this product is the number one food item in human diet. For babies, milk from the mother's breast is the easiest, cleanest and best way to obtain the nourishment needed for the first, difficult months of life. For young children, dairy milk provides the calcium needed to strengthen growing bones and teeth. For adults, it gives energy without too much fat. And for old people it is an easily-prepared and easily-digested form of natural food.

Answer the following questions:

1. Why do people consider milk to be the most complete food in the world?
2. What is the composition of milk fat?
3. Which protein is found only in milk?
4. What is lactose? What are its functions?
5. What vitamins does milk contain?

6. What mineral is milk particularly rich in?
7. Why is milk the number one food item in human diet?

Give definitions to the following terms:

Diet, nutritional value, fat, fatty acid, protein, casein, lactose, glucosamines.

6. Milk Processing

Read and translate the text:

Processing of fluid bottled milk for sale involves removing all traces of sediment by filtration or clarification; heat treating the product by an accepted pasteurization process to destroy any possible pathogenic organisms present; cooling to temperature of 40 F or under; and packaging in the final container which may be a glass bottle, a paper or fibre container, or a can for large quantities. Milk is usually filtered at the farm. It frequently is filtered again at a receiving station, at milk plants the product being subjected to a final treatment before it is packaged. In former years, filtering had been made by a cotton or flannel filter. When properly used the method removed all visible sediment and had little effect on creaming ability. Later it was found that filtration does not remove leukocytes, large bacteria cells and extremely dirt. These materials accumulated at the bottom of the container in the form of a dirty gray sludge. Clarification which does remove the leukocytes, other large cells and dirt prevents the sludge formation in homogenized milk. To prevent curdling, a process has been developed which breaks up the fat globules in the milk. This stops them from floating to the top and forming a cream. This is called homogenizing the milk, which really means that it is being made into a uniform mixture. To improve the keeping quality of liquid milk, various heat treatments can be used. The most widely used treatment is pasteurization. Pasteurization is the process of heating milk to about 72 C for 15 seconds to make it bacteriologically safe and to increase its keeping quality. Ultra-Pasteurization is the process of heating milk to a higher temperature than that used for pasteurization in order to extend the shelf life of this product under refrigeration. Ultra High Temperature milk is processed in a similar way to ultra-pasteurized milk,

but is packaged in sterilized containers. It can be stored without refrigeration up to three months. Once opened, it should be refrigerated. Fortification involves the addition of one or more vitamins, minerals or protein. For example, vitamin D is added to 98 percent of fluid milk marketed in the U.S. and vitamin A is added to all lowfat and skim milk. By taking some of the water content out of milk, it can be made lighter and easier to transport. And, if sealed in airtight tins, it will last for several years. The two earliest methods of doing this, still widely in use today, are condensing and evaporating. Condensed milk is first of all homogenized, and cane sugar is added. This improves the keeping qualities of the milk. It is then heated and held at 80°C for a short time, before being pumped into a vacuum tank, where it is boiled until it thickens to about two-and-a-half times its original consistency. Evaporated milk is made in much the same way, except that no sugar is added, and the final product is not quite so concentrated. Such milk has many uses. In the food industries this product is used extensively in ice-cream factories, in bakeries, in the manufacture of confectionery. Most preserved milk is now made by drying, which reduces the weight considerably.

Answer the following questions:

1. What does processing of fluid bottled milk involve?
2. Where is milk usually filtered?
3. What is milk homogenizing?
4. What should we do to improve the keeping quality of liquid milk?
5. What is ultra-pasteurization?
6. What vitamins are usually added to milk?
7. How is evaporated milk made?

Give definitions to the following terms:

Pasteurization, pathogenic organisms, filtering, leukocytes, fat globules, homogenizing, Ultra-Pasteurization, condensing, evaporating, confectionery.

7. The Different Dairy Products

Read and translate the text:

Only about half of the world's milk is drunk when fresh. The other half is turned into a huge variety of foods, partly as a way of preserving the extra milk, and partly because many of the products form an important part of our diet. The simplest of these is cream. We have seen how the globules of butterfat will collect at the top of the milk because they are lighter than the water in the serum. This is the cream, which today is made by machines which speed up the process of separation. It comes in four main varieties – single (which is thin), double, sterilized (for long life) and clotted. Cream is used for decorating cakes and puddings, or for thickening soups and sauces. Although cream is thought of as a luxury, most of it is in fact used for making butter. In modern creameries, the buttermaking follows directly after the cream separation in a continuous process. It takes more than 22 litres of milk to produce 1 kilo of butter, which contains 80 per cent fat. The other major milk product is cheese, which is made in hundreds of different varieties all over the world. The milk is made to clot, and the liquid whey is drained from the solid curd, which is then ripened to gain its tastiness. Cheese is one of the most economical ways of getting the proteins that we need. It is also very versatile and can be eaten at any meal, sweet or savoury, cooked or raw. Milk can also be preserved in many other ways. It can be dried to a powder, made thicker and more stable by evaporating or condensing it, or frozen in bulk. In this way, it can be sent to poorer countries with no dairy industry, bringing instant nourishment. Yoghurt, dairy ice cream, milk chocolate, tinned puddings and baby food are just a few of the many other uses that we make of milk.

Answer the following questions:

1. How much milk is drunk when fresh?
2. What is done to the other half of milk?
3. What is the simplest form of milk processing?
4. How is cream made?
5. What are the varieties of cream?
6. What is cream used for?
7. How many litres of milk do you need to make one kilo of butter?

8. What is the other major product of milk?
9. How is cheese made?
10. How can milk be preserved?

Give definitions to the following terms:

Globules, separation, protein, savoury, evaporating, condensing.

8. Types of Meat

Read and translate the text:

Animal tissue suitable for use as food is called meat. While meat can be obtained from nearly every species of animal, most of the meat consumed by humans comes from domesticated and aquatic animals. Meat from domesticated animals is generally subdivided into two categories: red meat and poultry. Red meat, the largest category, consists of beef, pork, veal, lamb and mutton. Poultry meat is the flesh of domesticated birds. It includes chickens, turkeys, geese, ducks and fowl. Seafood includes fish, lobsters, oysters, clams and crabs. Another type, game meat, consists of the flesh of all nondomesticated animals. In many countries humans eat the meat of horses, water buffalo, camels, goats and rabbits. The names for the various types of meat apply to the specific animals from which they are obtained. The term beef, for instance, refers to meat from cattle over 9 months old. Meat from cattle that are 3 to 9 months of age is classified as calf. Veal comes from calves ranging in age from 1 to 3 months. Pork is derived from hogs that are generally 5 months of age or older. Lamb comes from sheep less than 14 months of age and usually weighing from 90 to 140 pounds (40 to 65 kilograms). Mutton refers to meat from sheep over 14 months of age. Variety meats include liver, heart, tongue, brain, kidney, sweetbread (thymus gland), tripe (stomach of ruminant) and chitterlings (large intestine of pig). Each of these meats has a distinctive flavor and consistency when it is cooked. Long ago, primitive tribes believed that eating heart gave them strength and courage. Today, few of us bother to test that theory. It's our loss, because heart is tender and has a very delicate flavor. Kidneys are nutritious and, if properly prepared, delicious. Veal kidneys and lamb kidneys are prized for their delicate flavor and tenderness. Liver is rich in

iron and Vitamin A and has an unabashed flavor that nicely complements that of its usual companion, onion. Calf's liver is considered to be the best, but lamb liver and beef liver are almost as good. Miscellaneous variety meats. This category includes brains, tongue, tripe, and sweetbreads.

Answer the following questions:

1. What is called meat?
2. What does it come from?
3. What does red meat consists of?
4. What does seafood include?
5. What animals do the terms beef, veal, pork lamb, mutton apply to?
6. What do the variety meats include?

Give definitions to the following terms:

Red meat, poultry, seafood, game meat, term beef, veal, pork, lamb, mutton, tripe, chitterlings, miscellaneous variety meats.

9. Meat Composition and Nutritional Value

Read and translate the text:

A typical cut of meat is made up primarily of skeletal muscle, connective tissue, fat, bone, and a small amount of smooth muscle such as arteries and veins. Skeletal muscle is made up of muscle fibres. Each muscle fibre consists of rodshaped myofibrils. Myofibrils and connective tissue are components of muscle. They have the greatest effect upon meat tenderness. Many of the meat-processing procedures tenderise these components. The nutritional value of meat comes from its proteins, vitamins, minerals, and fats. Although nutritionists no longer advice meat at every meal, meat is a good source of calories, proteins, fats and carbohydrates. Its major contribution to the diet, however, is a high quality and quantity of protein and a supply of fatty acids, B-complex vitamins, and minerals, including iron, potassium, phosphorus, magnesium, sodium and zinc. Meat proteins are largely those of the muscle and connective tissues. Generally, meats with more fat have less protein. In addition to its protein content, meat provides a highquality,

digestible protein; at least 97 percent of the protein is digested. 100-gram of cooked meat provides about 45 to 55 percent of the recommended daily allowance of protein for humans. The nutritional value of meat is also influenced by fat content. The content depends on the animal type, how much the animal is fattened prior to slaughter, the amount of fat trimmed during processing, the amount of fat used in processed meats, and the method of cooking. Generally described as a saturated fat, meat fat is actually a mixture of both saturated and unsaturated fatty acids. Variety meats are excellent sources of vitamins. Pork, bacon and ham are in particular rich in thiamine. Liver and kidneys are also rich in vitamin A, folic acid, iron, riboflavin and B-vitamins. Tripe also contains more calcium than other meats.

Answer the following questions:

1. What does a typical cut of meat consist of?
2. What are the main structural components of muscle?
3. What has the greatest effect upon meat tenderness?
4. What is the major meat contribution to the diet?
5. Is protein of meat well-digestible?
6. What does the fat content of meat depend on?
7. What vitamins and minerals are found in meat?

Give definitions to the following terms:

Cut of meat, smooth muscle, skeletal muscle, rodshaped myofibrils, connective tissue, fatty acid, digestible protein, slaughter, saturated fat, ham, thiamine, folic acid, riboflavin.

10. Fish: a Nutritious Family Food

Read and translate the text:

The best change for any meal of the day is fish. It is a vital source of food for many people. It is man's most important single source of high-quality protein, providing 16% of the animal protein consumed by the world's population. It is a particularly important protein source in regions where livestock is relatively scarce - fish supplies less than 10% of animal

protein consumed in North America and Europe, but 17% in Africa, 26% in Asia and 22% in China. About one billion people world-wide rely on fish as their primary source of animal protein. Fish and shellfish are an important part of a healthy diet. Fish and shellfish contain high-quality protein and other essential nutrients, are low in saturated fat, and contain omega-3 fatty acids. A well-balanced diet that includes a variety of fish and shellfish can contribute to heart health and children's proper growth and development. So, women and young children in particular should include fish or shellfish in their diets due to the many nutritional benefits. The amount of fat in different kinds of fish varies greatly. The flesh of white fish, such as cod, haddock, whiting contains only 1-2 per cent fat. But its amount in fatty fish (herring, mackerel, trout, salmon) varies from 10 per cent to more than 20 per cent. The vitamin content of white fish is similar to that of lean meat. The fat-soluble vitamins A and D are present in the flesh of fatty fish and in the livers of fish, such as cod. Fish flesh also contains a certain amount of minerals including iodine. If the bones are eaten, as for example in sardines and canned salmon, these are good sources of calcium, phosphorus and fluoride. The changes that occur when fish is cooked are similar to those in meat but the shrinkage is not so great. Losses of mineral salts are proportional to the loss of water. The vitamins A and D in fatty fish are both heat stable. When fish is canned or cured by smoking there is some loss of thiamin, but generally these processes have little effect on the nutrients in fish. Modern methods of freezing do not affect the nutritive value. Substituting fish for meat is one of the best dietary changes you can make for your family. Fish is a top-of-the-line nutrientdense food. It's low in fat and high in many good things.

Answer the following questions:

1. Why can we call fish the best change for any meal of the day?
2. In what parts of the world is fish particularly important for people?
3. What are the nutritional benefits of fish?
4. Does the amount of fat vary in different kinds of fish?
5. What vitamins and minerals are present in fish?
6. What effect does the process of cooking have on the nutrients in fish?

Give definitions to the following terms:

Animal protein, livestock, nutrients, saturated fat, fatty acids, white fish, fatty fish, fat-soluble vitamins, iodine, smoking, nutritive value, nutrientdense food.

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Навчальне видання

АНГЛІЙСЬКА МОВА

методичні рекомендації

Укладач: **Саламатіна** Ольга Олександрівна

Формат 60х84 1/16. Ум. друк. арк. 13,14.
Тираж 25 прим. Зам. №__

Надруковано у видавничому відділі
Миколаївського національного аграрного університету
54029, м. Миколаїв, вул. Георгія Гонгадзе, 9

Свідоцтво суб'єкта видавничої справи ДК №4490 від 20.02.2013 р.