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Иностранный язык в профессиональной сфере

Методические указания

для практического освоения дисциплины

для магистров направления

35.04.07 Водные биоресурсы и аквакультура

направленности подготовки

«Аквакультура»

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Методические указания для практических занятий по дисциплине «Иностранный язык в профессиональной сфере» для магистров направления 35.04.07 Водные биоресурсы и аквакультура.

Методические указания для практических занятий предназначены для магистров направления 35.04.07 Водные биоресурсы и аквакультура, направленности подготовки «Аквакультура»

Целью методических указаний является формирование и развитие иноязычных навыков говорения, чтения, письма, понимания устных и письменных речевых сообщений, что обеспечит необходимый уровень сформированности компетенции УК-4.

Методические указания содержат аутентичные текстовые материалы, комплекс упражнений различной направленности, ссылки на учебно-методическую литературу и Интернет-ресурсы по темам рабочей программы дисциплины «Иностранный язык в профессиональной сфере».

Методические указания для практических занятий по дисциплине «Иностранный язык в профессиональной сфере» утверждены на заседании кафедры «СГиОПД» 21 02 2025 г., Протокол № 7.

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1. Введение

Методические рекомендации по выполнению практической работы по дисциплине «Иностранный язык в профессиональной сфере» включают тексты и задания, соответствующие содержанию рабочей программы дисциплины.

Содержательная часть включает следующие темы: Послевузовское образование в стране (странах) изучаемого языка; Перемены в жизни; Информационные технологии в академической и профессиональной деятельности; Ихтиология как раздел биологии; Известные ученые; Анатомия и физиология рыб; Видовое разнообразие рыб Нижневолжского бассейна; Проблема сохранения и защиты рыбных запасов; Аквакультура: объекты аквакультуры и рыборазводные предприятия; Практическое применение научных достижений в аквакультуре. Участие в международной конференции.

Настоящие методические указания позволят обучающимся овладеть фундаментальными знаниями, профессиональными умениями и навыками деятельности и направлены на формирование следующей компетенций:

УК-4– способен применять современные коммуникативные технологии, в том числе на иностранном(ых) языке(ах), для академического и профессионального взаимодействия.

В результате выполнения практических работ по дисциплине «Иностранный язык в профессиональной сфере» обучающиеся должны:

- знать правила и закономерности личной и деловой устной и письменной коммуникации;
- современные коммуникативные технологии на русском и иностранном языках; существующие профессиональные сообщества для профессионального взаимодействия;
- уметь применять на практике коммуникативные технологии, методы и способы делового общения для академического и профессионального взаимодействия;
- владеть методикой межличностного делового общения на русском и иностранном языках, с применением профессиональных языковых форм, средств и современных коммуникативных технологий.

Описание практической работы содержит: название изучаемой темы, текст и задания по тексту и/или теме. Для получения дополнительной, более подробной информации по изучаемым вопросам приведены рекомендуемые источники.

2. Темы рабочей программы и задания для практической работы

2.1. ТЕМА 1. «ПОСЛЕВУЗОВСКОЕ ОБРАЗОВАНИЕ В СТРАНЕ(АХ) ИЗУЧАЕМОГО ЯЗЫКА. ПЕРЕМЕНЫ В ЖИЗНИ. ИНФОРМАЦИОННЫЕ ТЕХНОЛОГИИ В АКАДЕМИЧЕСКОЙ И ПРОФЕССИОНАЛЬНОЙ ДЕЯТЕЛЬНОСТИ».

1.1. «Послевузовское образование в стране(ах) изучаемого языка. Перемены в жизни»

Exercise 1. Read the text and get ready to answer the following questions.

1. What is the main reason for considering postgraduate education?
2. How many types of Master's degree programmes do the universities offer?
3. Which type of Master's degree may be considered an initial step to PhD. Why?
4. What requirements should an individual meet to be registered for the PhD programme?
5. Are there any additional requirements for international students?
6. Who helps a student in undertaking the doctorate research?
7. Which universities are the best ones to undertake the postgraduate work?

POSTGRADUATE EDUCATION

Those who have already earned the first academic degree (i.e. a Bachelor's degree), are keenly interested in a certain subject and want to know more about it should consider postgraduate study. Further study is useful, both for its own sake and because a postgraduate qualification may lead to better prospects of employment. You can choose one field of learning, or conduct interdisciplinary research. You can take full-time or part-time course. Higher degrees (or further degrees) are of two types: *master* and *doctor*. The style of postgraduate work differs for those who are involved: for some this will include taught programmes, for others the primary focus will be on research.

The taught Master's degree in the UK may be called a Master of Arts (MA) in England and Wales, or Master of Letters (MLitt) in Scotland. It is an advanced examination degree, awarded after a year's post-graduate study and some research (12 months), and is viewed as an additional qualification for a profession, for example, teaching. The US degree of this kind follows the same structure of classroom work and research but takes two years to earn. This is because in the UK the taught Master's degree is more focused on the chosen subject from the very beginning, while the USA liberal arts education requires each student to learn a broader curriculum.

The research-based Master's degree can be called different names both in the UK and the USA, including Master of Science (MSc) Master of Science by Research (MRes), and Masters of Philosophy (MPhil). It is normally awarded on acceptance of a thesis (dissertation) based on a short period of research a student undertakes (a research project) rather than classes a student attends. This degree may be considered as an introduction to "real research", that is, work on a *doctoral thesis*, because a part of Master's work is often credited toward the PhD and may serve as a basis for the PhD research area. Many students often begin research-based type of programme and then transfer into a PhD.

Speaking about Doctorates or PhDs (as well as about MPhil), one should keep in mind that the use of the word *philosophy* does not mean that the degree is restricted to philosophy. One may have a PhD (Doctor of Philosophy, Ph.D.) in mathematics, or geography, or economics (e.g. PhD in Economics). This degree is awarded after the successful completion of a programme of research. A post-graduate should submit a thesis which must be an original contribution to knowledge. Research for

this degree usually takes about three years, although the length of time needed varies considerably according to the subject.

In order to be accepted for a PhD programme, one must typically submit a research proposal and have a strong academic background along with some research experience in the relevant subject. In addition to the general admission requirements, international applicants must submit a transcript of university courses and grades, translated into English. They also need to show that they have an adequate knowledge of spoken and written English, i.e. show the results of any international English language test: IELTS, TOEFL, etc.

Academic degrees are taught through the mixture of lectures, seminars, workshops and tutorials. A vital part of all postgraduate programmes is the learning of relevant research methods. Postgraduate research students also undertake certain amount of teaching undergraduate programmes in order to broaden their academic experience. The research project of a postgraduate is guided by a dissertation supervisor (an advisor) in the UK, or a PhD committee in the USA. A supervisor is not the same as a personal tutor. A tutor looks after the student's general academic welfare from the beginning of the programme. A supervisor starts working with a post-graduate student as soon as his or her dissertation topic is chosen. The working relationship of post-graduates with their supervisors as a rule includes the correct degree of guidance and support to enable the research students to gain the most from their studies.

It should be mentioned that there is another type of doctorate, which is sometimes called a *senior doctorate* (Doctor of Letters or Doctor of Science). Though this degree is much higher than the PhD, it does not involve the writing of a thesis (dissertation). A person applying for such a degree submits his published works to a committee, who then decide whether this work justifies the award of the degree.

The best places in which to undertake your postgraduate work are the leading research universities in the UK or the USA with a well-established reputation, a wide range of interest and facilities both for academic work and for social life. Most importantly, they have researchers and scholars of international distinction, and the standard of teaching is very high. Such universities also enjoy close links with industry and commerce, which results in many benefits including the involvement of industrialists and businesses in planning of research and teaching to ensure its relevance to modern-day issues.

Exercise 2. Give Russian equivalents of the following words and word combinations:

to award an academic degree; a supervisor, scholars of international distinction; a research method; employment, social life; a language test; classroom work; submit a research proposal; benefits, dissertation topic.

Exercise 3. Give English equivalents of the following words and word combinations:

послевузовское образование; получать ученую степень; вести преподавательскую работу; очное обучение; уровень преподавания; диссертация (2), вклад в науку; куратор, современные проблемы/вопросы; практические занятия; междисциплинарные исследования; представить опубликованные работы комиссии.

Exercise 4. Change words in brackets for their English equivalents. Read the text and answer the question: *What do Oxford and Cambridge have in common?*

There are some 90 (университеты) in Britain. They appoint their own (штаты/персонал), decide which (студенты) to admit, provide their own (курсы) and (присуждать) their own degrees. Many universities have close links with commerce and industry. (Ученая степень) titles vary according to the practice of each university. In England, Wales and Northern Ireland the most common titles for a first degree are Bachelor of Arts (BA) or Bachelor of Science (BSc) and for a second degree Master of Arts (MA), Master of Science (MSc). Doctor of Philosophy (PhD) is used for the third degree. British degrees are taught through (лекции, семинары) and tutorials. There are combined (or joint honours) (программы) which enable students to study a combination of subjects.

Oxford and Cambridge are the UK's most famous universities. They are also different to other institutions in a number of key ways. Oxford and Cambridge universities consist of a number of (колледжи), each having its own name and its coats of arms. On the territory there is usually a chapel, a dining hall, a (библиотека), rooms for undergraduates, and also rooms for teaching. Most colleges are made of grey stone. They have stood there for many centuries. Sport is a part of students (жизнь) at both universities. There is a great rivalry between the universities and they play all sorts of games between each other like cricket, punting and rowing, which are the most popular sports.

Exercise 5. Translate into English.

1. Тем, кто хочет получить хорошую работу, следует подумать о послевузовском образовании.
2. Студент может сосредоточиться только на выбранном предмете или заниматься по расширенной программе.
3. Послевузовские программы исследовательского характера включают изучение современных методов исследования.
4. Ученая степень доктора философии в какой-либо области науки присуждается по завершении исследований и представлении диссертации комиссии.
5. Многие университеты имеют тесные связи с представителями промышленности и бизнеса, что обеспечивает актуальность обучения и тематики исследовательских проектов в послевузовском образовании.

Exercise 6. Speak on the Master's course you are taking in ASTU. How getting the Master's degree can change your life?

1.2. «Информационные технологии в академической и профессиональной деятельности»

Exercise 1. Read the text. Try to understand its contents.

COMMUNICATION TECHNOLOGIES.

We are living in the age of swiftly changing and developing communication technology. Among these changes is an increasing use of rapid communication devices for both interpersonal and public communication.

New media of communication alter the communication process itself. Each new medium imposes special requirements on the ways in which messages are formulated; it controls the speed and convenience with which information is transmitted or recorded; and it influences ways in which receivers reconstruct meanings from the messages they receive. New media also lead to significant changes in the social, economic, and cultural features of society.

The telephone, along with associated devices such as answering machines and voice-mail networks, continues to be one of the most widely used and important media in our society. It is so familiar that people often fail to follow appropriate norms of usage - procedures that can make it a more

effective means of communication. An old medium (fax) using long-distance lines has gained in popularity as a means of transmitting written messages quickly and inexpensively.

Increasing use is being made of computer networks of various sizes and complexities for the transmission of many categories of information. Electronic mail is typed into a sender's computer to be read on screen at his or her convenience. E-mail is very fast and convenient, and it is replacing slower, paper media for many purposes.

Larger networks of computers linked together in local, national and international systems become now available and they are creating a quiet but profound communication revolution. It has already brought remarkable modifications in the ways by which people communicate in our society. An example is Internet which brings together 2000 other networks in 35 countries. People are able to exchange written messages more rapidly on a worldwide basis. With a 10-cm movement of your mouse and a click of a button you can jump from Australia to Europe in less time than it takes to read this paragraph.

With the various media by which we can communicate quickly and over large distances we must ask how these will have an influence on the human condition. Computer conference can be useful to those who wish to learn about the new goods, books or films, it is simply irreplaceable for fans to chat on a favourite theme with the adherents in all corners of the Earth, and, certainly, for scientific discussions. By means of conference it is possible to discuss an interesting theme in such a company, to collect which in one place for personal meeting would cost a fantastic sum and unpredictable expenses of time and forces.

Will we be brought closer together or will the new communication technologies enable a minority of human beings to become information rich while the vast majority remains outside these systems and information poor?

Exercise 2. Write true (T) or false (F) for each of the sentences below according to the information given in the text.

1. One of the most widely used and important media in our society is a computer.
2. We live in a time of rapid change and revolution in communication technologies.
3. New communication media result in insignificant changes in the social, economic and cultural features of society.
4. People may take advantage of their Internet connectivity at work to obtain information and software (using e-mail and file transfer protocol).
5. Due to Internet people are provided with a point-and-click connection to computer systems throughout the world.
6. The popularity of fax machines as a means of transmitting oral messages quickly and expensively has increased greatly over the past years.
7. The dependence on calculators and computers tends to weaken young people's mental abilities.
8. Electronic mail is faster and more convenient than traditional slow paper media and is beginning to replace them.
9. New communication technologies will enable a lot of people to become information rich.
10. Computer networks of various sizes and complexities for the transmission of many categories of information are being widely used nowadays.

Exercise 3. Read the passage right through and then choose the best continuation for each of the following.

1. We are living in an age ...
 - a. of fax machines, cellular phones, home offices and worldwide communications;
 - b. of quickly changing and developing communication technologies;
 - c. of transition from the defense industry to the commercial sector.
2. Telephone is an instrument ...

- a. for transmitting the sound of the voice by electricity;
 - b. for making copies of documents and sending them down telephone lines to another place;
 - c. for sending information from one computer down telephone lines to another computer.
3. New media of communication lead to
- a. translation from visual language into a verbal language, much as a foreign-born person thinks in his native tongue and then translates in his mind before speaking in English;
 - b. significant changes in the social, economic and cultural features of society;
 - c. a quiet but profound communication revolution.
4. Fax machine is a means of
- a. transmitting written messages quickly and inexpensively;
 - b. copying documents and sending them down telephone lines to another place;
 - c. recording moving pictures and sound.
5. Electronic mail is
- a. typed into a sender's computer to be read on screen at his or her convenience;
 - b. the government system of carrying and delivering letters;
 - c. beginning to replace paper media as it is very fast and more convenient.
6. With the various media
- a. we can communicate quickly and over large distances;
 - b. a minority of people is sure to become information rich;
 - c. a majority of people is certain to become information poor.
7. Due to Internet you are able
- a. to jump from Australia to Europe just with a 10-cm movement of your mouse and a click of a button;
 - b. to exchange written messages more rapidly on a worldwide basis;
 - c. to leave a message in the absence of the owner of the computer.

Exercise 4. Read the paragraph about computers - one of the most important means of communication. Fill in each gap with the appropriate word given in the box.

hands, tubes, kinds, development, replaced, due, calculations, computer, devices, today, boom, faster, example, had, known, these.

Computers may have a short history but prior to their _____, there were many other ways of doing _____. These calculations were done using _____ that are still used _____; the slide rule being a perfect example, not to mention the ten fingers of the human hand. These machines, unlike computers, are non-electronic and were replaced by faster calculating devices. It wasn't until the mid-1940s that the first digital _____ was built. The post-war industrial _____ saw the development of computers take shape. By the 1960s, computers were _____ than their predecessors and semiconductors _____ replaced vacuum _____ which were replaced in a few years by tiny integrated circuit boards. _____ to microminiaturization in the 1970s, circuits were etched onto wafer-thin rectangular pieces of silicon. This integrated circuitry is _____ as a chip and is used in microcomputers of all _____.

Exercise 5. Discuss with your friend the most widely used means of communication. When making up a conversation you may use these questions as starting points:

- a) Which means of communication do you frequently use and why?
- b) Which means of communication would you like to have?
- c) Which do you think is the most convenient and reliable?
- d) What means of communication will prevail in the 21st century? Which one will be of primary importance? What is your point of view?

2.2. ТЕМА 2. «ИХТИОЛОГИЯ КАК РАЗДЕЛ БИОЛОГИИ. ИЗВЕСТНЫЕ УЧЕНЫЕ. АНАТОМИЯ И ФИЗИОЛОГИЯ РЫБ»

2.2.1. «Ихтиология как раздел биологии»

Exercise 1. Read the text. Try to understand its contents.

Ichthyology

Fish is an object of study for many interrelated sciences. First and foremost, fish is investigated and described by **ichthyology** – a branch of zoology representing the biological discipline which involves the study of animals. What we know about fish and their diversity is the product of the efforts of researchers worldwide over several centuries. Ichthyology originated about forty thousand years ago and was developed in several interconnecting epochs, each with various significant advancements. However, it was hardly scientific until the eighteenth century. The oldest known document on fish culture was written by a Chinese politician, Fan-Li, in 475 BC. Between 335 BC–322 BC, Aristotle provided the earliest taxonomic classification of fish, in which 117 species of Mediterranean Sea were accurately described. Furthermore, he observed the anatomical and behavioral differences between fish and marine mammals. Since then, 34,300 species of fish have been officially described. Today, ichthyology is a well-known scientific field investigating such areas related to fish as classification, anatomy, evolution, genetics, ecology, physiology, and conservation. Ichthyology provides scientific data and approach to such branch of agriculture as **aquaculture** – a kind of activity based on the completely controlled production cycle of a fish species: from eggs to breeders.

The practice of ichthyology is associated with aquatic biology, limnology, oceanography. Fish are the most diverse group of vertebrates, but many types of aquatic animals named "fish," such as jellyfish, starfish, and cuttlefish, are not true fish. They, and marine mammals like whales, dolphins, and pinnipeds (seals and walruses) are not a focus of ichthyology.

Exercise 2. Comprehension. Answer the following questions.

1. Branch of what science is ichthyology?
2. When did ichthyology originate?
3. Who wrote the first known document on fish culture?
4. What kind of work did Aristotle complete?
5. How many fish species have been officially described since Aristotle's time?
6. Which aspects of fish does ichthyology investigate nowadays?
7. Are all water organisms involved in ichthyologic studies?

Exercise 3.a) Read and translate the text into Russian.

From the History of Natural Sciences

John Ray and one of his first pupils Mr. Francis Willughby, who both were made fellows of the Royal Society, found that the descriptions and classifications of plants and animals which had been drawn up by earlier naturalists were very imperfect. They formed the project of making a complete classification of all known plants and animals, describing them as far as they were able, and arranging them in groups according to their different characters. Willughby undertook the birds, beasts, and fishes, while Ray devoted himself chiefly to plants; but they worked together in all the branches, and Ray ended up by doing far more than his share of work.

The first book, which was on Quadrupeds, was published in 1693. He divided these first into oviparous, or those that are born from eggs, like frogs and lizards; and viviparous, or those which are born alive, like lambs and kittens. He then divided the viviparous quadrupeds into those which have the hoof all in one piece, like the horse, and those with a split hoof, like the ox and goat. Those with split hoofs he divided again according as they chewed the cud like the ox, or did not like the pig. Then came the animals whose hoofs are split into many parts, as the hippopotamus and rhinoceros; then those which have nails only in place of toes, as the elephant; then those which have toes but no separation between the fourth and fifth toes, as the cat, dog, and mole; and lastly, those which have the fifth finger, or toe, quite separate as the monkeys. After this he divided them more fully, by their teeth, and thus made a very fair classification of quadrupeds.

The book upon Birds, which comes next in order, had already been published by Ray in 1677, four years after Willughby's death. In it birds were divided first into land-birds and water-birds, and were then classified by the shape of their beak and claws, and according as they fed upon flesh like the vulture, or upon fruit and seeds like the parrot. The water-birds were also divided into those which were long-legged, as the flamingo, or short-legged, as the duck, and according as the web between their toes was more or less complete.

The 'History of Fishes' is given as the joint work of Ray and Willughby; the groups into which the friends divided them are nearly the same as those now used.

b) Find information about contemporary British or American naturalists or ichthyologists and write a brief account of their achievements (12-15 sentences). Search British or American Internet sources.

2.2.2 «Анатомия и физиология рыбы»

Exercise 1. Read the text. Try to understand its contents.

Fish basic anatomy

The knowledge of basic anatomy is fundamental to appreciating fish biology. Like any vertebrate, fish is a bilaterally symmetrical animal, with its right and left sides mirror images. The skeleton is made up of many bones and provides much of the framework as it supports the remainder of the body and gives it rigidity. The skull, or cranium, is the part of the axial endoskeleton. It is a complex structure made of several components that enclose and protect the brain which is divided into several regions, and such sense organs as eyes and ears. The part of the skull called branchiocranium or visceral cranium is formed as a series of arches which support gills. The upper and lower jaws bear teeth, though skulls differ among the basic groups of fishes as to the presence of teeth and jaws.

The vertebral column runs along the upper part of the body cylinder. It is made of a series of bony or cartilaginous discs and is usually divided into precaudal and caudal vertebrae with various bony elements projecting from them. Dorsally, there is an elongated neural spine within which a neural arch is located, the spinal cord passing inside. Attached to the vertebrae are pleural ribs, usually from the third vertebra to the last precaudal one. They are distinct from intermuscular bones and serve to protect the viscera.

A characteristic of fishes are the fins. Most fishes have two sets of paired fins – the pectorals, just behind the gills on the side of the head, and the pelvics, usually situated farther back. The median or unpaired fins consist of the dorsal, anal and adipose fins. The dorsal fin located along the mid-line on the top of the body may be subdivided into a spiny and a soft part, depending on the material of fin rays. At the very back is the caudal, or tail fin which in different fish species can vary in both external shape

and internal anatomy. Scales are the characteristic external covering of fishes. There are four basic types of scales: placoid, cosmoid, ganoid, cycloid.

The viscera includes muscles, cardiovascular system, alimentary canal, gas bladder, kidneys, liver, pancreas, intestine, gall bladder, gonads, and nervous system. Fish muscle is structurally similar to that of other vertebrates and are divided into three types: skeletal, smooth, or nonskeletal, and cardiac, or heart muscle. The heart consists of two chambers: auricle (or atrium) and ventricle. It is located posterior and ventral to the gills. The cardiovascular system also includes arteries, veins and capillaries. The basic flow of blood is straightforward: from the heart that works like a pump to the gills, to the organ systems, and back to the heart. The gas bladder (or swimming bladder) is a thin-walled sac filled with gas. It is located between the alimentary canal and paired kidneys. The length of intestine varies according to fish feeding habits. It is much shorter in carnivorous species in comparison to herbivorous ones.

Exercise 2. Comprehension. Answer the questions.

1. What makes fish similar to other vertebrates?
2. Which part of the fish skeleton encloses the brain?
3. What is the composition of the vertebral column?
4. Where does the spinal cord pass?
5. Which bones are attached to the vertebrae?
6. What kind of fins do fish possess?
7. What is the external covering of fishes?
8. Which organs are included in the viscera?
9. What are muscle types in fish?
10. How is the cardiovascular system in fish characterized?
11. What is a gas bladder in its form and content?
12. Why does the intestine length vary in different fish species?

Exercise 3. Match words in A and B.

A. Плавник, хрящевой, печень, сердце, нервный тяж, тазовый, ребро, позвоночник, пищеварительный тракт, мышца, предсердие, позвонок, вена, желудочек, кость, чешуя, почки, мозг, артерия, челюсть, спинной, зубы, пластинкообразный, желчный пузырь, грудной, кишечник, нейральная дуга, хвост, поджелудочная железа, висцеральный череп, внутренности, жабры, остистый отросток верхней дуги позвонка.

B. Jaw, alimentary canal, liver, visceral cranium, dorsal, heart, brain, rib, fin, viscera, placoid, auricle, pancreas, gall bladder, ventricle, teeth, gills, kidneys, neural arch, neural spine, spinal cord, intestine, cartilaginous, bone, pelvic, pectoral, tail, vertebral column, artery, vein, muscle, vertebra, scale.

Exercise 4. Find definitions to the following words:

branchiocranium, cardiovascular system, gills, viscera, alimentary canal, anatomy, fins, nervous system, artery, kidneys.

1. Wing-like structures, small or large, which give fish stability in water and aid them in moving or steering.
2. a) The scientific study of the physical structure of an animal or plant; b) The body of an animal (or human), or its structure.

3. Paired longitudinal structures located ventral to the vertebral column and involved in excretion and osmoregulation.
4. A part of a scull consisting of a series of endoskeletal arches that form gill arch supports.
5. A large blood vessel that brings blood to and from the gills.
6. The tract which consists of the mouth, pharynx, esophagus, stomach, intestine and rectum.
7. A system divided into cerebrospinal system (composed of the central nervous system and the peripheral one) and autonomic systems.
8. The organs and organ systems called “guts” in everyday language.
9. Organs located on either side of the pharynx and made up of threadlike structures called “filaments”.
10. A system that serves all bodily functions in fish: respiration, digestion, excretion, osmoregulation, etc.

Exercise 5. Read the text. Translate it into Russian.

The main life processes in fish

During their life fishes face metabolic and energetic challenges which they cope with thanks to morphological and physiological adaptations providing them success in a wide range of aquatic environments. Metabolism is defined as a sum total of all biochemical processes which take place within the organism of a fish, resulting in a certain amount of heat as their byproduct. Measure of this heat is called “a metabolic rate” which is influenced by such factors as age, sex, reproductive status, food in the gut, physiological stress, activity, season, and temperature. In fishes the rate of oxygen consumption is considered the best indicator of metabolic rate.

It is necessary for the fish to extract dissolved oxygen from the water and distribute it to all the organs fast enough to meet the demand of metabolism. Most fish exchange gases by using gills, each filament of which contains a network of capillaries that allow a large surface area for the exchange of oxygen and carbon dioxide. Fish exchange gases by pulling oxygen-rich water through their mouths and pumping it over their gill filaments. The blood in the capillaries flows in the opposite direction to the water, causing counter current exchange. They then push the oxygen-poor water out through openings in the sides of the pharynx. Gills will function efficiently only if water moves across them in the same direction, so when oxygen is limited some fishes come to the water surface to breathe.

Digestion is also estimated as a part of a fish’s metabolism because fishes obtain the energy to meet metabolic demands through feeding. In fish, food is ingested through the mouth, and moves down the esophagus into the distensible stomach. Secretion of mucus by epithelial lining lubricates the food passing along the gut. When it enters the stomach, the food is further broken down due to acidic secretion. Chemical digestion continues in the intestine, aided by bile from the liver. Pancreas adds juice containing bicarbonate to neutralize the acid from the stomach and various enzymes to complete the process. The intestine is the site of absorption of the products of digestion.

Fish swimming is a metabolically costly thing. The hind part of the brain controls fish swimming, balance, and buoyancy. Fish nervous system is also involved in contraction of locomotor muscles, enabling the entire body to move in undulating motions from side to side. Involuntary physiological functions, such as control of internal organ functions, are related to the work of autonomous nervous system. Neural signals from the central nervous system travel via ganglia to the target organs, e.g. the gas bladder. To save energy, fishes must be able to regulate the volume of the gas bladder by the release or addition of gases as fishes change depths.

Different parts of brain perform a number of functions associated with hormones and homeostasis, respiration and osmoregulation, maintaining circadian rhythms, controlling colour changes,

and detecting light. Nearly all daylight fish have color vision that is at least as good as that of human. Many fish also have specialized cells known as chemoreceptors responsible for extraordinary senses of taste and smell. Although they have ears in their heads, many fish may not hear sounds very well. However, they have sensitive receptors forming the lateral line system which allows for many fishes to detect gentle currents and vibrations, as well as to sense the motion of other nearby fish and prey.

Exercise 6 .Fill in the blanks with appropriate words and word combinations given in italics:

distensible, pharynx, countercurrent, intestinal, lateral line, enzymes, to breathe, nerve, ear, carbon dioxide.

1. The ... flow ensures that as the blood picks up oxygen from the water it moves along the exchange surface to an area where the adjacent water has an even higher oxygen concentration.

2. Most of the ... combines with water to form carbonic acid.

3. Some fishes have special adaptations which allow them ... air.

4. Many fishes have bony arches deep in the ... that are equipped with toothlike projections.

5. The esophagus is very ... , so choking in fish is rare, but miscalculation of prey size can lead to the death of predators.

6. The cods (*Gadidae*) have small tubular glands in the ... wall.

7. Sensory ... endings function as receptors, responding to stretching or slackening of the gas bladder.

8. In low light conditions many fishes rely on their

9. Hearing in fishes is mainly connected with the sensitivity of the inner

10. Various ... are produced in some fishes to catalyze the same reaction more efficiently at different temperatures.

2.3. ТЕМА 3. «ВИДОВОЕ РАЗНООБРАЗИЕ НИЖНЕВОЛЖСКОГО БАССЕЙНА И КАСПИЙСКОГО МОРЯ»

Exercise 1. Read and understand the text.

Composition of aquatic ecosystems

It is a well-known fact that fishes can be found practically in all major aquatic habitats: lakes, big and small rivers, ice-covered oceans, tropical seas, ponds, etc. Together with other aquatic inhabitants they form aquatic ecosystems in which they are considered a dominant component. Aquatic biodiversity varies from region to region, and it is essential to the functioning of ecosystems. The greatest biodiversity is found in tropical latitudes with their estimated 3,000 species of fish and 4,000 species of mollusks. Unique aquatic groups are more typical of fresh-water habitats due to the fact that they are often isolated from one another by natural barriers. Nonetheless, Antarctic habitats also support such unique aquatic groups as the albatross, penguin, and large marine mammals: whale and seal. Species in the ecosystem perform different or overlapping functions and their interactions may even be restricted only to those of the food webs.

To survive in a variety of environments fishes have evolved all kinds of adaptations: anatomical, physiological, behavioral, and ecological. Genetic variation also allows species to adapt to changing habitat. Examples are numerous. Some Arctic fishes have no hemoglobin. Many deep-sea forms can swallow prey larger than themselves. Others have modified their body parts to attract prey. Some species significantly change the shape of their bodies to deter predators, or even produce large amounts of high-voltage electricity for this purpose. Pelagic sharks and tunas have circulatory systems designed

to maintain their body temperatures higher than their surroundings. Gender change is common among fishes. It is also not unusual that fishes grow and change their ecological role several times throughout their lives.

Coral reefs, ocean depths, mountain rivers, estuaries and other types of water-based ecosystems are particularly fragile. The loss of a single species can have profound effects for the ecosystem as a whole. Habitats with little diversity generally suffer most as a disturbance of one species may cause the collapse of the entire network of interactions. The deterioration of biota habitat can be caused by such natural phenomena like earthquakes, floods, draught. Aquatic biodiversity is threatened by human activities as well. These may result in pollution of habitats from industry effluents, agriculture use of fertilizers or pesticides. Building of dams and marshy areas drainage destroys many river ecosystems. Overfishing is the largest threat to biodiversity in rivers, seas and oceans. Thus, to preserve aquatic biodiversity it is necessary to keep water-based ecosystems and their environment intact.

Exercise 2. Comprehension. Answer the questions.

1. What component is considered dominating in aquatic ecosystems?
2. In which areas is aquatic biodiversity the greatest?
3. Why are unique aquatic groups more typical of fresh-water habitats?
4. Which unique aquatic groups can be found in Arctic habitats?
5. How can the interaction of different species in an ecosystem be characterized?
6. What helps fishes to survive in a variety of environments?
7. Which modification is common among fishes?
8. Why is a loss of a single species harmful for the ecosystem?
9. What are the natural causes of an ecosystem deterioration?
10. How can human activity destroy an aquatic biodiversity?

Exercise 3. Match words in **A** and **B**.

A. Моллюск, место обитания, добыча, гемоглобин, наводнение, акула, биота, избыточный вылов, пресноводный, морские млекопитающие, вид, кровеносная система, биоразнообразие, хищник, гендер (пол), разрушать, кит, хрупкий, мидия, пищевая цепь, тропические широты, форма тела.

B. Biodiversity, habitat, gender, marine mammals, species, food web, whale, prey, predator, mussel, tropical latitudes, mollusk, fresh-water, flood, circulatory system, destroy, shape of the body, fragile, hemoglobin, shark, biota, overfishing.

Exercise 4. Find definitions to the following words:

plankton, marine mammals, flowing-water habitat, salinity, biodiversity, variation, pelagic organisms, deep-sea forms, predators, inhabitant.

1. Changes in biological organisms caused by changes in their environment.
2. Tiny biological organisms that float along with currents and provide food for fish and whales.
3. What is understood as the variety of biological organisms in a given area, habitat, or ecosystem.
4. Benthic species living on the ocean bottom.
5. Aquatic habitats characterized by water currents.
6. Biological organisms (e.g. animals) that kill other biological organisms (prey) in order to survive.

7. A biological organism that lives in a particular place.
8. The mass of grams of dissolved inorganic matter in water or soils (concentrations expressed in ‰; PSU).
9. Aquatic organisms living in water column.
10. Aquatic mammals that constitute an element of ocean or aquatic ecosystems.

Exercise 5. Fill in the blanks with appropriate words and word combinations given in italics:

adaptations, supports, temperatures, fishing, biota, fertilizers, prey, fresh-water, species, mammals.

1. The book describes the number of different ... of plants and animals within the wetlands area.
2. Unlike oceans, ... habitats often are isolated from one another.
3. ... and diversity are interwoven throughout the evolutionary history of fishes.
4. The Great Barrier Reef, off the coast of Australia, ... over 700 species of coral.
5. Many fishes in the Antarctic Ocean possess special molecular properties to deal with the cold water ...
6. Some sharks have a placental structure as complex as any found in ...
7. Predatory tactics include attracting ... with modified body parts.
8. Living organisms, i.e. ... have scientific and educational value.
9. Agricultural runoff may contain residues of ... or pesticides.
10. ... is a powerful evolutionary force which can affect population structure.

Exercise 6. Complete the sentences and translate them.

1. Biodiversity describes ...
 2. Gender variation allows species ...
 3. Natural barriers in fresh-water habitats result ...
 4. Scientists have shown that habitats with greater biodiversity ...
 5. Preservation of large, intact areas of habitat is necessary ...
 6. Extensive fossil record proved that fishes are excellent ...
 7. The intertidal zone has the greatest density of living organisms ...
- a. in the evolution of distinct species.
 - b. are better able to recover from various disturbances.
 - c. the variety of biological organisms in a given habitat, or ecosystem.
 - d. showcases of the evolutionary process.
 - e. among marine environments.
 - f. for the continued function of ecosystems.
 - g. to adapt to changes in their environment.

Exercise 7. Change Russian words for their English equivalents. Read and translate the text.

Biodiversity of the Caspian Sea habitat

The biodiversity of the Caspian Sea is poor, probably, due to the variable salinity. For (пресноводный) fauna and flora the salinity levels of the Caspian Sea is too high, and for (морские виды) the salinity is too low. Thus, the modern Caspian Sea is only suitable for species

(адаптировавшийся) to slightly saline waters. Despite these particular salinity (условия), the Caspian Sea is home to 87 species of microphytes and many species of green algae.

The Caspian Sea was isolated from other (океаны) thousands of years ago which resulted in the extreme variety of biotopes as well as biotic and abiotic conditions. There also has developed distinctive species of ichthyofauna endemic to the Caspian Sea. The only endemic (млекопитающее) in the Caspian Sea is the Caspian (тюлень) (*Phocacaspica*).

The greatest variety of inhabitants in the Caspian Sea is within (рыба) and crustaceous species. These species, along with species of protozoa, invertebrates, vertebrates and parasitic organisms have developed good osmoregulatory (способности), so they are capable of living in a very wide range of salinities.

However, the important feature of the present day fauna and flora of the Caspian Sea is a large number of introduced species to which endemic species are often poor competitors. These organisms are of different (происхождение): Arctic, Atlantic, Mediterranean. But some species originated from the Caspian Sea have also been introduced into different (экосистемы). The example is 'zebra (мидии)' (*Dreissenapolyomorpha*) which were introduced into Europe and later to the Americas during the 19th Century. It is a well-known fact that introduced species can cause (экологический) imbalances within the new ecosystem which may lead to further environmental problems.

2.4. ТЕМА 4. «ПРОБЛЕМА СОХРАНЕНИЯ И ЗАЩИТЫ РЫБНЫХ ЗАПАСОВ. ОСЕТРОВЫЕ КАК ОБЪЕКТ ПРИРОДООХРАННОГО ЗАКОНОДАТЕЛЬСТВА. МОРАЛЬНЫЕ ЦЕННОСТИ»

Exercise 1. Read and understand the text. Give an answer the question in each passage.

THE INFLUENCE OF CLIMATE CHANGE ON WATER-BASED ECOSYSTEMS

1. What kind of problems does the deterioration of aquatic organism habitat cause?

Water-based ecosystems are particularly vulnerable to climate change, as they experience its direct influence. The threats of the climate change to aquatic habitats include changes in water temperature, location and timing of ocean currents, increased precipitations causing changes in estuaries and rising sea level, more frequent and extreme storms which imperil habitats, etc. Droughts can cause changes in lake water levels and river flows. The deterioration of aquatic organism habitat causes not only environmental problems. It can as well threaten human communities dependent on fisheries and aquaculture, reducing the global fish supply for consumption.

2. How can local ecosystems alter in fish stock?

When the sea surface temperature rises, there frequently observed harmful algae blooming. As a consequence, the level of dissolved oxygen in water decreases, plankton composition changes, fouling organisms such as parasites and pests cause incidence of diseases. Local ecosystems are altered in the composition and abundance of fish stock as to competitors, predators and invasive species. Changes in location and size of suitable range for particular species are followed by changes in timing and success of migrations and spawning. Higher sea temperature is a major cause of coral bleaching and damage to coral reef ecosystems, especially to breeding habitats, around the globe.

3. What are the causes of wild fish stock depletion?

Rising sea level can damage and destroy many coastal ecosystems such as mangroves and salt marshes, which are essential to maintaining wild fish stock. Availability of wild fish will also be harmed by higher inland water temperatures and worsening water quality. Inland temperature changes provide favourable conditions for bringing new pathogens and predators. The abundance of food available to fishery species decreases reducing fish growth and potential yields. It even can lead to the loss of some species. It should be noted that ocean currents altering their location and timing can account for nutrient supply in surface waters and, consequently, wild fish stock productivity.

4. Why is the predicted global warming considered a threat to aquatic organisms?

Increase in frequency and intensity of storms and draughts cause changes in water salinity and water quality which may lead to the loss of wild and cultured stock. Changes in precipitation and water availability can force some species to migrate. This can result in altered distribution, composition and abundance of fish stock. Under the scenario of 2 - 6° C global warming, precipitation is forecast to decline in South-Asian regions during the dry season and increase during the wet season, expanding flood-prone areas by 23-39%. It might reduce spawning success of river fishes due to higher wet season river flows and fish survival in lower dry season flows. Human responses, like hydraulic engineering projects, can lead to the loss of habitat for many aquatic organisms, fish species included.

Exercise 2. Read the text and understand its main idea. Get ready to speak on the key problem mentioned in the text.

PROBLEMS OF FISH PROTECTION. STURGEON AS AN ENDANGERED SPECIES

Historically, the oceans and seas were considered limitless and thought to harbor enough fish to feed an ever-increasing human population. However, the demands of a growing population, particularly in poorer countries, now far outstrip the sustainable yield of the seas. At the same time, fishing has become more industrialized which also resulted in wild fish stock depletion. As fisheries become depleted and fish got harder to catch, many fishermen and governments have responded with improvement in equipment and technology to be longer, harder and farther away from their home ports.

Radio and satellite navigation allows fishermen to better locate fishing grounds, while new fish-aggregating devices intensify the harvest. These changes put immense pressure on the fish and leaves fewer regions out of reach so that fish can reproduce unmolested, thus exacerbating the effects of over-harvesting. Besides, there are examples of unintended by-catch, such as the capture of juvenile finfish by shrimp trawls, which have drawn severe criticism from environmental groups as they also put heavy pressure on existing stocks.

The Caspian Sea occupies the first place in the world in sturgeon species diversity, quantity and catches. The most commonly fished species are the Russian and Persian sturgeon (*Acipenser persicus*), beluga (*Huso huso*) and the sevruga (*Acipenser stellatus*). Sturgeon (*Acipenseridae*) is by far the most commercially valuable fish. It is fished for its meat as well as for caviar which is in great demand throughout the world market. As a result, the sturgeon are subjected to a lot of illegal poaching and considered to be in a precarious condition.

The governments, fishermen and environmentalists realize that certain measures to protect wild fish stock should be taken immediately: catch limitations, minimum size limits or even capture moratoria should be imposed based on the current assessment of overexploitation of certain fish stocks. Replenishing of fish stock through using hatcheries should be provided. The urgent measures on sturgeon conservation should include the following: to stop poaching; to allow sturgeon to their spawning grounds; to increase production of juveniles at the fish farms, to prevent pollution of the Caspian Sea and the Volga-river.

2.5. ТЕМА 5. «АКВАКУЛЬТУРА: ОБЪЕКТЫ АКВАКУЛЬТУРЫ И РЫБОРАЗВОДНЫЕ ПРЕДПРИЯТИЯ. ПРАКТИЧЕСКОЕ ПРИМЕНЕНИЕ НАУЧНЫХ ДОСТИЖЕНИЙ В АКВАКУЛЬТУРЕ. ОТКРЫТИЯ И ИЗОБРЕТЕНИЯ»

Exercise 1. Read and understand the text. Get ready to retell it.

AQUACULTURE

The word aquaculture "is understood to mean the farming of aquatic organisms including fish, molluscs, crustaceans and aquatic plants. Subsets of aquaculture include Mariculture (aquaculture in the ocean); Algaculture (the production of kelp/seaweed and other algae); Fish farming (the raising of catfish, tilapia and milkfish in freshwater and brackish ponds or salmon in marine ponds); and the growing of cultured pearls. Extensive aquaculture is based on local photosynthetic production while intensive aquaculture is based on fish fed with an external food supply.

Aquaculture has been used since ancient times and can be found in many cultures. Pond growing of carp in China and tilapia in Egypt, was being done in 2000 BC. The Romans grew fish in "viviers". In Europe, fish farming in ponds developed in the middle ages with the spread of the monasteries. In the 15th century, fish were captured as they swam up into brackish waters and were maintained in pools. Currently in Europe, aquaculture accounts for about 20% of fish production and directly employs some 80 000 people.

The farming of fish is the most common form of aquaculture. It involves raising fish commercially in tanks, ponds, or ocean enclosures, usually for food. Fish farming is mainly done in fresh water (87 %), and is above all a type of subsistence aquaculture, providing animal protein for local populations. Marine fish farming represents 9% of world fish production. Farming implies some form of intervention in the rearing process to enhance production, such as regular stocking, feeding, protection from predators, etc. Farming also implies individual or corporate ownership of the stock being cultivated.

Some profitable aquaculture cooperatives promote sustainable practices. New methods lessen the risk of biological and chemical pollution through minimizing fish stress. Vaccines are being used more and more to reduce antibiotic use for disease control. Onshore recirculating aquaculture systems, facilities using polyculture techniques, and properly sited facilities (for example, offshore areas with strong currents) are examples of ways to manage negative environmental effects.

Exercise 2. Read the text below and complete the tasks (A) and (B).

(A). Put the parts of the text in the appropriate order after the first reading without extra help. Think of a suitable heading for the text.

(B). Translate the paragraphs. Determine and put the main ideas of each paragraph into your own words.

1. _____

For decades, the possible occurrence of the Japanese broad tapeworm on the Pacific coast of North America was ignored, but since 2008, human infection with adult tapeworms and natural infection of carnivores (wolves and bears) with adult tapeworms have been confirmed by use of molecular markers (1,8–10). We report finding Japanese broad tapeworm plerocercoids in North America. Our main intent is to alert parasitologists and medical doctors about the potential danger of

human infection with this long tapeworm resulting from consumption of infected salmon imported (on ice) from the Pacific coast of North America and elsewhere.

2. _____

The Japanese broad tapeworm, *Diphyllobothrium nihonkaiense* is the second most common causative agent of diphyllobothriosis in humans; $\approx 2,000$ cases have been reported, mainly from northeastern Asia. However, recent studies that used molecular methods indicate that the number of human cases caused by this tapeworm may have been highly underestimated. In addition, increasing popularity of eating raw fish is probably responsible for the increased number of imported cases in regions where this infection is not endemic.

3. _____

In July 2013, we examined 64 wild Pacific salmon of 5 species: 1 chinook salmon (*O. tshawytscha*), 1 coho salmon (*O. kisutch*), 23 pink salmon, 8 rainbow trout (*O. mykiss*), and 31 sockeye salmon in south-central Alaska, USA. The salmon were collected by angling (under permit no. SF2013–218) or obtained from local fishermen. The musculature was filleted to narrow slices, and internal organs were observed under a magnifying glass. Several morphotypes of diphyllobothriid plerocercoids were found, including a single larva in the musculature of pink salmon collected in Resurrection Creek (near Hope, Alaska). This plerocercoid, which was later identified as that of the *D. nihonkaiense* tapeworm, was found unencysted, deep in the musculature of the anterior part of the fish, near the spinal cord (Figure). It was highly motile, had a retracting scolex, and was 8–15 mm long, depending on the state of elongation or contraction. After fixation with hot water, the plerocercoid was 10 mm long, had an elongate scolex 1.05 mm long and 0.60 mm wide, and possessed 2 narrow bothria opened on the apical end (Figure). The sequences of the *cox1* and 28S rRNA genes (lsrDNA) were almost identical to those of the Japanese broad tapeworm available in the GenBank database (sequence similarities of 99% [GenBank accession no. KY000483] and 100% [KY000484], respectively), thus providing unequivocal support that this plerocercoid was a larva of the *D. nihonkaiense* tapeworm reported from North America.

4. _____

In 1986, the Japanese broad tapeworm was recognized as a human parasite separate from the most common broad fish tapeworm, *Diphyllobothrium latum*, in Japan. The validity of the Japanese broad tapeworm was later confirmed by molecular data, especially the *cox1* gene sequences. Evidence indicates that virtually all previous cases of diphyllobothriosis in humans in Japan, South Korea, and the Pacific coast of Russia that were attributed to *D. latum* tapeworms were caused by *D. nihonkaiense* tapeworms. Moreover, *D. klebanovskii* from the Pacific coast of Russia was recently synonymized with the Japanese broad tapeworm.

5. _____

Studies on the transmission of the Japanese broad tapeworm in Japan and eastern Russia (Primorsky Region) have identified 4 species of Pacific salmon as the principal sources of human infection: chum salmon (*Oncorhynchus keta*), masu salmon (*O. masou*), pink salmon (*O. gorbuscha*), and sockeye salmon (*O. nerka*). These anadromous fish become infected in brackish water along the coast of the North Pacific Ocean. Tapeworm larvae infective for humans (plerocercoids) have been described in only a few studies performed in eastern Russia and Japan, (e.g., as plerocercoids type F from the musculature of chum salmon in Kamchatka, Russia).

[<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5283844/>]

2.6. ТЕМА 6. «МЕЖДУНАРОДНАЯ НАУЧНАЯ КОНФЕРЕНЦИЯ. СООБЩЕНИЕ РЕЗУЛЬТАТОВ НАУЧНЫХ ИССЛЕДОВАНИЙ. КУЛЬТУРА И ИСКУССТВО»

Exercise 1. Read the text “Scientific methods” and understand it. Which sentences best express the essential information of the text?

If we knew what it was we were doing, it would not be called research, would it?

Albert Einstein

Science and non-science can be distinguished by the kinds of laws and rules that are constructed to unify the body of knowledge. Science involves the continuous testing of rules and principles by the collection of new facts. In science, these rules are usually arrived at by using the scientific method—observation, questioning, exploring resources, hypothesis formation, and the testing of hypotheses.

Scientific inquiry often begins with an observation that an event has occurred repeatedly. An **observation** occurs when we use our senses (smell, sight, hearing, taste, touch) or an extension of our senses (microscope, tape recorder, X-ray machine, thermometer) to record an event. The information gained by direct observation of the event is called **empirical evidence** (empiric = based on experience; from the Greek empirikos = experience). Empirical evidence is capable of being verified or disproved by further observation. If the event occurs only once or cannot be repeated in an artificial situation, it is impossible to use the scientific method to gain further information about the event and explain it.

As scientists gain more empirical evidence about an event they begin to develop questions about it. A question that is too broad or too complex may be impossible to answer; therefore a great deal of effort is put into asking the question in the right way. Once a decision has been made about what question to ask, scientists explore other sources of knowledge to gain more information. After exploring the appropriate literature, a decision is made about whether to continue to explore the question. If the scientist is still intrigued by the question, a formal hypothesis is constructed and the process of inquiry continues at a different level.

A **hypothesis** is a statement that provides a possible answer to a question or an explanation for an observation that can be tested. A hypothesis is based on observations and information gained from other knowledgeable sources and predicts how an event will occur under specific circumstances. Scientists test the predictive ability of a hypothesis to see if the hypothesis is supported or is disproved. If you disprove the hypothesis, it is rejected and a new hypothesis must be constructed.

The test of a hypothesis can take several forms. It may simply involve the collection of pertinent information that already exists from a variety of sources. In other cases a hypothesis may be tested by simply making additional observations. Another common method for testing a hypothesis involves devising an experiment. An **experiment** is a recreation of an event or occurrence in a way that enables a scientist to support or disprove a hypothesis. This can be difficult because a particular event may involve a great many separate happenings called **variables**. To help unclutter such situations, scientists use what is known as a **controlled experiment**.

A **controlled experiment** allows scientists to construct a situation so that only one variable is present. Furthermore, the variable can be manipulated or changed. A typical controlled experiment includes two groups; one in which the variable is manipulated in a particular way and another in which there is no manipulation. The situation in which there is no manipulation of the variable is called the **control group**; the other situation is called the **experimental group**. In an experiment there should only be one independent variable and the dependent variable is expected to change as a direct result of manipulation of the independent variable. After the experiment, the new data (facts) gathered would be analyzed.

Scientists are not likely to accept the results of a single experiment because it is possible a random event that had nothing to do with the experiment could have affected the results and caused people to think there was a cause-and-effect relationship when none existed. Furthermore, scientists often apply statistical tests to the results to help decide in an impartial manner if the results obtained are **valid** (meaningful, fit with other knowledge) and **reliable** (give the same results repeatedly) and show cause and effect, or if they are just the result of random events. During experimentation, scientists learn new information and formulate new questions that can lead to even more experiments. One good experiment can result in 100 new questions and experiments. When general patterns are recognized, theories and laws are formulated.

Theories and hypotheses are different. A hypothesis provides a possible explanation for a specific question; a theory is a broad concept that shapes how scientists look at the world and how they frame their hypotheses. A **scientific law** is a uniform or constant fact of nature that describes what happens in nature. While laws describe what happens and theories describe why things happen, in one way laws and theories are similar. Often as observations are made and hypotheses are tested, a pattern emerges which leads to a general conclusion, principle, or theory. This process of developing general principles from the examination of many sets of specific facts is called **induction** or **inductive reasoning**. Once a rule, principle, or theory is established, it can be used to predict additional observations in nature. When general principles are used to predict the specific facts of a situation, the process is called **deduction** or **deductive reasoning**.

If a rule is not testable, or if no rule is used, it is not science. **Pseudoscience** (pseudo = false) is not science but uses the appearance or language of science to convince, confuse, or mislead people into thinking that something has scientific validity. When pseudoscientific claims are closely examined, it is found that they are not supportable as valid or reliable.

The scientific method can be applied only to questions that have factual bases. Questions concerning morals, value judgments, social issues, and attitudes cannot be answered using the scientific method. Science is also limited by the ability of people to pry understanding from the natural world. People are fallible and do not always come to the right conclusions because information is lacking or misinterpreted, but science is self-correcting. As new information is gathered, old incorrect ways of thinking must be changed or discarded.

Exercise 2. Complete the tasks.

- a) Read the text and make sure you understand it.

INTERNATIONAL SCIENTIFIC EVENTS

In order to share research findings, network with their colleagues and explore new ideas, scientist with common interests try to participate in various scientific meetings. Being the heart of scientist's professional life, such meetings are organized either in collaboration or on their own by professional associations, scientific societies, institutions of higher education. Quite a lot of scientific events are held by international learned societies and may come under different names: a congress, a conference, a symposium, a workshop. A large meeting is usually called "*a conference*". It is devoted either to a particular topic, or encompasses a wide variety of related topics. International scientific events are typically held annually or on some other regular basis, e.g. every other year.

To ensure a successful international science conference, an organizing committee should be chosen. There is no doubt that to organize a scientific meeting is a real challenge for the members of organizing committee. That is why it is very important for the members of the committee to assume responsibilities for certain activities and follow a well-known procedure (or observe certain simple

“rules”). The work on organizing a scientific event should start as early as possible, preferably from nine to twelve months ahead of the conference. A host country should be chosen, venue selected, date and timing decided, sponsors are found. Choosing a location that is easily accessible for most of the attendees from around the world is important. Deciding whether a conference should be held during the working week or over a long weekend is also necessary.

The information about the conference is announced via the Internet and an invitation or Call for Papers (CFP)/Call for Abstracts is sent to prospective presenters using a mailing list. The CFP describes the topics to be discussed, advises on the formalities: what kind of abstract or paper an attendee is expected to submit, to whom, how and by what deadline, the information on registration fees, venue and accommodation. A member of organizing committee in charge reviews, accepts or declines scientific submissions and makes a list of participants. The science being the most important thing, another important step is to invite outstanding keynote speakers (keynotes) i.e. scientists who are leaders in their field. It is recommended to have some backup speakers on standby in case of cancellation. The topic of the conference should meet the needs of the target audience, so it is a good idea to offer the invited speakers some guidelines as to the issues to be covered in their talks.

The programme of the conference includes plenary sessions, panels, poster presentation. The organizers appoint the chairman who directs the course of the conference and runs the plenary session, while the work of panels are directed by moderators chosen by the organizing committee from the participants. The duties of the chairman and moderators include announcing the agenda, introducing speakers, opening, directing and closing debates/discussion. The chairing person may require a speaker to stick to the time limit. The schedule of the conference should allow for enough coffee breaks which provide participants with perfect opportunity to learn about others' ideas and research, to socialize, to be face known in the community. As a rule, the organizing committee considers optional cultural activities: a tour of the city, a visit to a museum, a theatre trip.

Organizing committee also considers the need for conference rooms of various sizes, space for poster presentation, technical support, proceedings publishing, awards, etc. The delegated responsibilities may vary from content and design of the Web site promoting the scientific meeting, uploading videos of the conference talks and/or photos, facilities for teleconference (WiFinetworks) to manning the registration tables, carrying microphones during debates, checking presentations ahead of time as well as other things which are easily forgotten. The feedback about the event from the participants helps evaluate the conference as successful.

b) Comprehension. Answer the questions.

1. Under which names are scientific events known?
2. What is the aim of international scientific conferences?
3. Which issues does the organizing committee consider at the early stage of their work?
4. What kind of information does the CFP contain?
5. How is the schedule of the conference organized?
6. Whom do organizers prefer to invite as keynote speakers?
7. What are the duties of the chairman and moderators?
8. What are the routine responsibilities of organizing committee members?
9. Why is the feedback from the participants important for the organizers of any scientific event?

Exercise 3. Give English equivalents of the following Russian words and word combinations.

Принимающая страна; участник (2), пленарное заседание; председатель, раз в два года; учесть потребности целевой аудитории; укомплектовать штатом столы регистрации; рассылать

приглашения; культурные мероприятия; общение, спонсоры, научные сообщества; доступный, размещать в сети Интернет.

Exercise4. Give Russian equivalents of the following English words and word combinations.

Organizing committee; a panel (session); to encompass a wide variety of topics; responsibilities, to be in charge of; a mailing list; conference talks; keynote speakers, moderator, venue, timing, poster presentation; to schedule the conference; ahead of time; the agenda; to hold a scientific event; issues to be covered.

Exercise5. Complete the text with the appropriate words and word combinations choosing from the given in italics. Read the text and translate it into Russian.

registration fees; poster presentations; to organize, cultural activities; delegates, local, rather than; coffee breaks; keynote speakers; sponsors, publication costs; ahead, scientific matters; previous similar conferences; senior scientists; the opportunity

Well-known researchers are often called upon ... a science conference or medical symposium. To rise to the challenge they should aim for a balance of young researchers as well as ... that are typically invited as When planning a scientific meeting which attracts international ... the organizers send a large number of invitations, but they also should consider bringing in ... speakers whenever possible in order to provide them with ... for exchanging ideas, disseminating research and learning. It is well worth planning the event at least ten months ... , so to give attendees plenty of time to work on their talks or It is practical to have fewer, more extended talks ... more numerous, shorter ones.

It is a good idea to allow for plenty of ... and consider having coffee stands in the poster presentation area to promote networking opportunities. The primary source of funds for the expenses are ... that should be attracted by the organizers, next coming the delegates' The latter also include the ... for proceedings in a journal. Optional ... such as a theater performance, a tour of the city or a sport event also should be considered to provide a refreshing breaks from concentration on A template that others have used for ... can be a big help for the organizers of a scientific event.

Exercise 7. Review conversational formulas, write up the paper and take part in the simulation of a scientific conference (role play).

**Список информационных источников
представлен в рабочей программе дисциплины**