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А. Э. Зайцева

ОСНОВЫ АНАТОМИИ И ФИЗИОЛОГИИ ЖИВОТНЫХ

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**Рецензенты:**

**Т. В. Штатская** – доцент кафедры иностранных языков,   
кандидат филологических наук

(Кубанский государственный технологический университет);

**Т. С. Непшекуева** – доктор филологических наук профессор

(Кубанский государственный аграрный университет)

**Зайцева А. Э.**

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Пособие включает тексты для чтения. Содержит упражнения позволяющее обеспечить должный уровень закрепления навыков чтения, повторение и изучения лексики и грамматики и совершенствование навыков говорения.

Предназначено для студентов-бакалавров и магистров факультета ветеринарной медицины и ветеринарно-санитарной экспертизы.

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**ПРЕДИСЛОВИЕ**

Учебно-методическое пособие по английскому языку “Animal physiology and anatomy” предназначено для работы в группах студентов-бакалавров и специалистов, совершенствующих свои навыки в английском языке.

Целью пособия является расширение активного словарного запаса, приобретения навыков профессионально ориентированного чтения и коммуникации на английском языке. Данное пособие предназначено для аудиторной и самостоятельной работы студентов под руководством преподавателя. Тексты пособия не адаптированы, взяты из современных источников и отражают разнообразие современного английского языка.

Учебный материал рассчитан, как на базовый, так и на продвинутый уровень обучения, что дает возможность для самостоятельной работы студентам более высокого уровня подготовки.

Пособие составлено в соответствии с требованиями программы по иностранным языкам для неязыковых вузов и включает в себя 8 разделов, в каждом из которых аутентичные тексты на английском языке по специальности, поурочный словарь, а также упражнения, направленные на развитие навыков говорения, чтения и перевода оригинальной литературы в профессиональной сфере.

В каждом разделе имеются предтекстовые задания, для подготовки к работе с текстом и активизации ранее изученного материала, послетекстовые упражнения ориентированы на проверку понимания содержания текста, и упражнения, стимулирующие творческую устную и письменную коммуникацию. Грамматический материал изучается на практических занятиях с преподавателем, а также прорабатывается обучающимися самостоятельно. В пособии имеется краткий грамматический справочник.

# UNIT 1

**ANIMAL PHYSIOLOGY**

**Ex. 1. Give Russian equivalents for the international words and scientific terms:**

antibiotic, biochemical, biochemistry, biomechanics, biophysics, characteristics, cytology, to design, enzyme, evolution, function, hormone, mechanism, metabolism, microelement, organ, organism, parameter, pharmacology, physical, physiologist, physiology, principle, reaction, standard, sterility, vitamin

**Ex. 2. Define parts of speech and translate the words:**

1) analyze, analysis, analytical, analyst;

2) special; specialist, to specialize;

3) science, scientific, scientist;

4) physics, physical, physicist, biophysics;

5) chemistry, biochemistry, chemical, biochemical, chemist;

6) origin, original, to originate;

7) application, to apply;

8) milk, milking, to milk, milkman;

9) different, differences, to differ;

10) to investigate, investigator, investigation

**Ex . 3. Vocabulary to the text. Learn new words.**

1. analysis (analyses), to analyze – анализ, анализировать
2. application, to apply – применение, применять
3. approach – приближаться, подход к решению проблемы
4. basis (bases) – основа
5. breed – порода, выводить породу
6. cell – клетка
7. datum (data)-данные
8. difference – разница, различие
9. feature – черта, особенность
10. feeding, feeding ration – кормление, рацион питания
11. research – исследование
12. importance – важность, значимость
13. level – уровень
14. offspring – отпрыск, потомок
15. origin – происхождение
16. significance – значимость, важность
17. similarity – сходство
18. species, type, variety, strain – вид, род, сорт, особь
19. tissue– ткань
20. use – использовать
21. value -ценность
22. concentrate (on) – концентрироваться на чем либо
23. consider – рассматривать, принимать во внимание
24. consist (of) – состоять из
25. deal (with) – сталкиваться , иметь дело с чем либо
26. depend (on) – зависеть от
27. devote (to) – посвящать чему либо
28. divide (in/into) – делить(ся) на
29. investigate – исследовать
30. maintain – поддерживать, сохранять
31. originate (from) – происходить от,(из)
32. relate (to) – связывать с
33. for instance – на пример
34. in general – в основном
35. in order to – для того, чтобы
36. to take into account – принимать во внимание
37. throughout – везде, повсюду

**Ex. 4. Match the Russian word-combinations with their English equivalents.**

Шерстная порода овец ; морозоустойчивая порода животных; местная порода; сорт риса; биологический вид; клеточный штамм; гибридная линия; яйценоская линия/порода птиц; тип породы; порода сального типа (свиней); свиньи беконного типа; яйценоский тип (птицы); смушковый тип овец; тип шерсти; морозоустойчивый сорт; яровой сорт; местные виды (разновидности) свиней

spring variety; hardy animal breed; egg type; local pig varieties; lard-type breed of pigs; biological species; local/native breed; hybrid strain; fur type of sheep; rice variety; cell strain; wool breed; bacon-type pigs; laying strain; frost resistant variety; breed type; wool type.

**Ex. 5. Read the text find English equivalents for the Russian ones:**

1. живой организм
2. сравнительная физиология
3. возрастная физиология
4. кровообращение
5. дыхание
6. современные животные
7. лечить больных животных
8. проблема, вызванная недостаточным питанием
9. искусственное осеменение
10. разведение животных

**Ex. 6. Translate the text:**

**ANIMAL PHYSIOLOGY**

The word "physiology" originated from the Greek language and it consists of two parts: physics which means "nature" and logos which is "word". In general, physiology is the study of mechanical, physical, and biochemical functions of living organisms. Physiology has traditionally been divided into plant physiology, animal physiology and human physiology but the physiology principles are universal, even if a particular organism is being studied.

Animal physiology is the study of animal functions, that is the study of "how animals work". The rapid development of animal physiology as a distinct discipline began in the 19th century and was stimulated by , the requirements of animal husbandry and veterinary science. 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 problems of how physiological functions change with animal age are 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-day animals. Modern physiology which is based on chemical, physical and anatomical methods investigate 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. The problem of how to maintain good health of farm animals throughout a long lifetime of high production is of great importance to farm specialists as well.

Farm animal physiology is closely related to veterinary science as it is necessary to know physiological standards and the physiological reactions which take place in the body of a healthy animal in order to cure sick animals and prevent different animal diseases. The problems of sterility and nutritional disorders are studied by physiologists as well as by veterinary surgeons.

Animal requirements in nutrients and energy depend on their physiological features, so feeding rations are calculated on the basis of physiological data. The feeding systems for rearing young animals are being developed on physiological parameters as well. Physiological characteristics such as age and weight are considered by the scientists when animals are fed with vitamins, antibiotics, microelements or hormones.

Farmers should take into account some important physiological features of animals in different situations, for instance, when a farmer is going to use artificial insemination or train sport horses or dogs.

Physiological parameters of farm animals are of special value to engineers who design different farm mechanisms, such as milking or feeding ".

Other major branches of scientific study that have grown out, of physiology research include biochemistry, biophysics, biomechanics, pharmacology, cytology as well as genetic which are known as the biological bases for rational animal husbandry.

**EXERCISES TO THE TEXT**

**Ex. 7. Finish the sentences and translate them:**

1. Physiology is a study of…
2. The rapid development of…
3. General physiology deals…
4. Comparative physiology focuses…
5. The problem of …good health of…
6. age and weight are considered…
7. are of special value to engineers…

**Ex. 8. Mark the sentences with true (T), false (f), or not stated (NS):**

1. Physiology has traditionally been divided into plant physiology and animal physiology.
2. Comparative physiology concentrates on similarities and differences of physiological functions of various living organisms.
3. The problems of how physiological functions change with age have great importance.
4. One of the parts of special physiology is devoted to farm animal physiology.
5. The problems of sterility and nutritional disorders are studied by physiologists as well as by veterinary surgeons.
6. Physiological characteristics such as age and weight are considered by the scientists when animals are growth.
7. Other major branches of scientific study that have grown out, of physiology research include biochemistry, biophysics, biomechanics, pharmacology, cytology as well as genetic which are known as the biological bases for rational animal husbandry.

**Ex. 9. Answer the questions.**

1. What does physiology study?
2. What are the main parts of physiology?
3. What stimulated the development of animal physiology?
4. What problems are of special interest to animal physiologists?
5. What are the main principles of physiological study?
6. Why is farm animal physiology of great practical value?
7. How can the knowledge of physiological reactions help to maintain healthy farm animals?
8. What influences animal requirements in nutrients?
9. When do farm specialists take into account physiological characteristics of animals?
10. What sciences are based on physiology research?

**Ex. 10. Translate the word-combinations into English using ‘’noun + noun’’:**

физиология растений; физиология человека; физиологические принципы; функции животных; виды животных; тело животного; синтез фермента; физиология сельскохозяйственных животных; специалисты по сельскому хозяйству; здоровье животных; болезни животных; ветеринарная наука; потребности животных; спортивные лошади; сельскохозяйственные механизмы; исследования по физиологии; физиологические характеристики; физиологические функции; физиологические стандарты; физиологические реакции; физиологические данные.

**Ex. 11. Translate from Russian into English:**

1. Физиология имеет огромное значение среди функциональных наук, которые тесно связаны с медициной.
2. Сегодня изучение физиологии животных состоит в том, чтобы исследовать функции организма на клеточном и молекулярном уровнях.
3. Использование новых открытий в области физиологии представляет большой интерес для врачей, фармацевтов и фермеров.
4. Физиологические характеристики отдельного животного учитываются во многих случаях.
5. Сравнительная физиология изучает процессы размножения и лактации у различных видов сельскохозяйственных животных.

**Ex. 12. Think and tell about:**

1. What problems are animal physiologists investigating now?

2. Give examples when a farmer takes into account physiological features of a particular animal.

# UNIT 2

**ANIMAL ANATOMY**

**Ex. 1. Give Russian equivalents for the international words and scientific terms:**

Term, form,struc­ture, typical, system, identification, material, observa­tion, texture, micro­scope, section, optical, electron, techniques, laboratory, type, method, physical, combina­tion, spe­cialize, characteristic, classification, portion.

**Ex. 2. Define parts of speech and translate the words:**

1. Anatomy, anatomists, anatomical
2. Developmental , develop, development
3. Struc­ture , struc­tural, construc­t
4. Speaking , speak, speaker
5. Injected, injection, inject
6. Use, useful,usefulness
7. Teaching, teach, teacher
8. Chemistry, chemist, chemical
9. Relation, relate, relating
10. Con­siderable , con­sider, con­sideration

**Ex. 3. Vocabulary to the text. Learn new words.**

1. to refer to – называться
2. to cut apart – отрезать
3. dissection – расчленение
4. cadaver – труп
5. preserve – сохранять
6. embalming – бальзамирование
7. pan – резервуар
8. vas­cular system – сосудистая система
9. facilitate – облегчать
10. shape – форма
11. texture – текстура
12. location – местоположение
13. relations – связь
14. visible – видимый
15. gain – получать
16. con­siderable refinement – значительное уточнение
17. staining – окрашивание
18. cell – клетка
19. tissue – ткань
20. subdivision – подразделение
21. unaided eye – невооруженный глаз
22. conception (fertilization of the egg) – оплодотворение
23. fre­quently – часто
24. approach – подход
25. bipedal – двуногие
26. quadrupedal stance – четвероногая позиция
27. nomenclature – наименования
28. leads to confusion – привести к замешательству

**Ex. 4. Match the Russian word-combinations with their English equivalents.**

Расчленение трупа, сохранять бальзамированием, значительное уточнение, первые анатомы, красящее вещество, видимый невооруженным глазом, привести к заблуждению, как внешние, так и внутренние, важно для понимания, при помощи, в паре с, сфера знаний, отдельные клетки, настолько обширная.

early anatomists, dissection of a cadaver, preserved by embalming, colored material, coupled with, visible to the unaided eye, essential for understanding, con­siderable refinement, become so extensive, with the aid of, brunchof knowledge *,* the root word, leads to confusion, individual cells, both internal and external.

**Ex. 5. Read the text find English equivalents for the Russian ones:**

1. Наука, касающаяся формы и строения организмов
2. Макроскопическая анатомическая лаборатория
3. Резервуары сосудистой системы
4. Облегчать определение сосудов
5. Нет другого способа
6. Тщательно подготовленные отрезки тканей
7. Работая над исследованиями
8. Применять принципы
9. Охватывая период
10. Изучение тканей и клеток

**Ex.6. Translate the text:**

**ANATOMY OF ANIMALS**

The term *anatomy* has come to refer to the science that deals with the form and struc­ture of all organisms liberally, the word means *to cut apart;* it was used by early anatomists when speaking of complete dissection of a cadaver.

Study in a typical grossanatomy laboratory is based primarily on dissection of animal cadav­ers. These usually have been preserved by embalming, and one or more pans of the vas­cular system have been injected with a colored material to facilitate identification of the vessels. Careful dissection coupled with close observa­tion gives the student a concept of the shape, texture, location, and relations of structures visible to the unaided eye that can he gained in no other way.

Similarly, the use of the micro­scope with properly prepared tissue sections on slides is essential for understanding structures that are so small they cannot be seen without optical or electron microscopic assistance.

Anatomists and physiologists working in research use some of the same techniques that are used in teaching laboratories but with con­siderable refinement. Both types of scientists use equipment and methods developed in the physical sciences, particularly chemistry and physics. The anatomist applies the principles of physics to the use of microscopes and applies knowledge of chemistry in the staining of various parts of cells and tissues. The combina­tion of chemistry and microscopic anatomy is known as *histochemistry.*

The science of anatomy has become so extensive that it is now divided into many spe­cialized branches. In fact, *Dorland's Medical* Dic­tionary defines 30 subdivisions of anatomy. This text chiefly describes gross *(macroscopic) anatomy.* This is the study of the form and relations (relative positions) of the structures of the body that can be seen with the unaided eye. *Comparative anatomy* is a study of the structures of various species of animals, with particular emphasis on those characteristics that aid in classification.*Embryology* is the study of developmental anatomy, covering the period from conception (fertilization of the egg) to birth. Another large branch of anatomy consists of the study of tissues and cells that can be seen only with the aid of a microscope. This is known as *microscopic anatomy,* or *histology.*

The most recent development in the study of anatomy is *ultrastructural cytology,* which deals with portions of cells and tissues as they are visualized with the aid of the electron microscope. The term *fine structure* is used fre­quently in reference to structures seen in elec­tron micrographs (photographs made with the electron microscope). Our approach to the study of anatomy will be chiefly by systems – *systematic anatomy* .To name the study, the suffix *-logy,* which means brunchof knowledge orscience*,* is added to the root word referring to the system.

Many terms of direction differ signifi­cantly between human and domestic animal anatomy because of the orientation of bipedal versus quadrupedal stance. Although use of human anatomical nomenclature in quadru­peds usually leads to confusion, the terms inferior,posterior, superior, and interiorare frequently used to describe the eye and aspects of denial anatomy of both human organs, or individual cells to changes in their environment (both internal and external).

**Nomenclature for Systematic Anatomy**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| *System* | *Name of Study* | | *Chief Structures* | |
| Skeletal system | Osteology | | Bones | |
| Articular system | Arthrology | | Joints | |
| Muscular system | Myology | | Muscles | |
| Digestive system | Splanchnology | | Stomach and intestines | |
| Respiratory  system | Splanchnology | | Lungs and airways | |
| Urinary system | Splanchnology | | Kidneys and urinary bladder | |
| Reproductive  system | Splanchnology | | Ovaries and testes | |
| Endocrine system | Endocrinology | Ductless glands | |
| Nervous system | Neurology | Brain,spinal cord, and nerves | |
| Circulatory system | Cardiology | Heart and vessels | |
| Sensory system | Esthesiology | Eye and ear | |

**Ex. 7. Finish the sentences and translate them:**

1. is based primarily on dissection of animal cadav­ers.
2. scientists use equipment and methods developed in the…
3. Anatomists and physiologists working in research use some of the same
4. The combina­tion of chemistry and microscopic anatomy…
5. is a study of the structures of various species of animals, with particular
6. Our approach to the study of anatomy will be chiefly …
7. between human and domestic animal anatomy because of the orientation of bipedal versus quadrupedal stance.

**Ex. 8. Mark the sentences with true (T), false (f), or not stated (NS):**

1. The term anatomy was used by early anatomists when speaking of complete dissection of a cadaver.
2. Similarly, the use of the micro­scope with properly prepared tissue sections on slides is not essential for understanding structures.
3. Anatomists and physiologists working in research use different techniques that are used in teaching laboratories but with con­siderable refinement.
4. The combina­tion of chemistry and microscopic anatomy is known as histology.
5. Comparative anatomy is a study of the origination of various species of animals, with particular emphasis on those characteristics that aid in classification.
6. The study of tissues and cells that can be seen only with the aid of a microscope is known as microscopic anatomy, or histology.
7. To name the study, the suffix -logy, which means brunch of knowledge or science, is added to the root word referring to the system.

**Ex. 9. Answer the questions.**

1. What does term anatomy mean?
2. What does study in a typical grossanatomy laboratory is based on?
3. What do anatomists and physiologists use working in their research?
4. What principles and knowledge do the anatomist applies?
5. What is histochemistry?
6. What is gross(macroscopic) anatomy?
7. What is embryology?
8. What is comparative anatomy?
9. What is histology?
10. What doesultrastructural cytology deal with?

**Ex. 10. Find the infinitive and determine its function in the sentences.**

1. The termanatomy has come to refer to the science that deals with the form and struc­ture of all organisms.
2. These usually have been preserved by embalming, and one or more pans of the vas­cular system have been injected with a colored material to facilitate identification of the vessels.
3. To name the study, the suffix *-logy,* which means brunchof knowledge orscience*,* is added to the root word referring to the system.
4. The terms inferior,posterior, superior, and interiorare frequently used to describe the eye and aspects of denial anatomy of both human organs, or individual cells to changes in their environment (both internal and external).
5. The experiment does not seem to provide enough evidence for the theory.

**Ex. 11. Translate from Russian into English:**

1. Термин анатомия используется для описания науки, касающейся, форм и структур всех живых организмов.
2. Обучение в макроскопических анатомических лабораториях в первую очередь основано на расчленении трупов животных.
3. Аккуратное расчленение наряду с внимательными наблюдениями дают студентам возможность понять форму, текстуру, расположение, связь структур, видимых невооруженным глазом.
4. Анатомы применяют принципы и знания физики и химии, изучая строение тканей и клеток.
5. Гистология – это изучение тканей и клеток при помощи микроскопа.

**Ex. 12. Retell the text using the ex. 9.**

# UNIT 3

**MUSCULARSKELETAL SYSTEM**

**Ex. 1. Give Russian equivalents for the international words and scientific terms :**

Skeleton,oste­ology, basis, structure, adaptation, lymphatic, nerves**,** stress, function,protection, form, mineral, element, arthrology, articulation, classify,

anatomy, specialize, muscle, specific, material, organ, identify, individual, term,

microscope, characteristic, protein, locomotion, position, respiration, stimulation.

**Ex. 2. Define parts of speech and translate the words:**

1. Adjust, adjustable, adjustability
2. Basis, basically, base
3. Differ­ence , differ, different
4. Found, founder, foundation
5. Know, knowledge, known
6. Living, live, life
7. Movement, move, moving
8. Structure, structural, construct
9. Regulate, regulation, regulated
10. Responsible, response, respond

**Ex. 3. Vocabulary to the text. Learn new words:**

1. Appearance – внешний вид
2. Bone – кость
3. Framework – каркас, основа
4. Vertebrate – позвоночные
5. Share – делиться
6. Striking – поражающий
7. Blood vessels – кровеносные сосуды
8. Undergo – подвергаться
9. Repair – восстанавливать
10. Adjust – регулировать
11. Stress – напряжение
12. Provid­e – обеспечивать
13. Protection – защита
14. Rigidity –твердость
15. Acting – действующий
16. Levers – рычаги
17. Storing – хранение
18. Cellular – клеточный
19. Joint – сустав
20. Scheme – проект
21. Tissue – ткань
22. Cartilage – хрящ
23. Muscle – мышца
24. Smooth – гладкий
25. Cardiac – сердечный
26. Distinct – отчетливый
27. Intrinsically – присуще, внутренне
28. Permit – позволять
29. Locomotion – движение
30. Lungs – легкие
31. Thoracic cavity – грудная полость

**Ex. 4. Match the Russian word-combinations with their English equivalents.**

1) отражать приспособленность: 2) движение конечностей: 3) обеспечивающий защиту: 4) стенки кровеносных сосудов: 5) действующий как рычаги; 6) короткие, повторяющиеся сокращения; 7) подвергаться заболеваниям; 8) степень движения; 9) продвигать пищу; 10) толщина стенки; 11) каркас тела; 12) давать основу; 13) основная мышечная масса; 14) ответственный за; 15) реагировать на изменения.

framework of the body, give a basis, reflect adaptations, subject to disease, adjust to changes, provid­ing protection, acting as levers, degree of movement, the bulk of the muscle, responsible for, movements of the limbs, brief repetitive contractions, thickness of the wall, propel food, walls of blood vessels.

**Ex. 5. Read the text find English equivalents for the Russian ones:**

1. Внешняя структура
2. Позвоночные животные
3. Особый образ жизни
4. Состоит из костей
5. Свободное движение
6. Особые задачи
7. Изменять объем
8. Выработка тепла
9. Отсутствие сокращений
10. Стенки желудка и кишечника

**Ex. 6. Translate the text:**

**MUSCULARSKELETAL SYSTEM**

The study of the bones that make up the skeleton, or framework of the body, isoste­ology*.* The skeleton gives a basis for the external structure and appearance of most vertebrate animals as we know them. All mammals share a basic body plan with striking similarities in skeletal structure. Differ­ences reflect adaptations to specific lifestyles.

The skeleton of a living animal is made up of bones that are themselves living structures. They have blood vessels, lymphatic vessels, and nerves; they are subject to disease; they can undergo repair; and they adjust to changes in stress. The functions of bones include provid­ing protection, giving rigidity and form to the body, acting as levers, storing minerals, and forming the cellular elements of blood.

Syndesmology (arthrology) is the study of the articulations (unions) between bones, which are commonly called joints. Joints may be classified by a variety of schemes, usually by that of anatomy or degree of movement. The tissue that unites the bones of a joint is generally fibrous tissue or cartilage. The structure and arrangement of these tissues is specialized for the joint's specific task.

Based on their structure and the material that unites them joints may be classified as fibrous, cartilaginous, or synovial.

Types of Muscle Tissue.

The three types of muscle are skeletal, smooth, and cardiac. The bulk of the muscle in the body is skeletal muscle, and it is responsible for producing the voluntary movements of the limbs, trunk, and head. It is also the muscle tissue with which we are most familiar as the meat of our domestic animals. The muscle cells (fibers) of skeletal muscle tissue are grouped into distinct organs of variable size identified as individual muscles. These are usually attached to the bones of the skeleton (hence the term skeletal muscle) arid are under voluntary control of the animal. Under the microscope, skeletal muscle fibers exhibit a characteristic striped pattern arising from the orderly arrangement of the contractile proteins within the cells.

Skeletal muscles permit locomotion by contracting to change the relative positions: bones during movement and by maintaining joint angles against the pull of gravity during support. The skeletal muscles of respiration move air into and out of the lungs by contracting to change the volume of the thoracic cavity. In addition, heat production through shivering is the result of brief repetitive contractions of skeletal muscle throughout the body.

Smooth muscle is found in systems of the body with autonomic function. Thus, smooth muscle is a major component of the wall of organs of the digestive and urogenital systems and most blood vessels. Contraction of smooth muscle is an intrinsic property of the fibers themselves, which means that contraction does not generally require stimulation by a nerve; however, the contractility of smooth muscle is regulated and coordinated by the autonomic nervous system.

Cardiac muscle is characterized by fibers with visible striations, so it is considered a type of striated muscle. However, cardiac muscle, like smooth muscle, contracts intrinsically and is not under voluntary control. Cardiac muscle is restricted to the heart, where it constitutes most of the thickness of the wall. Its rhythmic contraction is responsible for the circulation of blood.

Functions of the Muscular System

Vertebrate muscle has only one function: contraction. "Relaxation" is a passive process, a lack of contraction. Thus, the varied functions of the muscular system are all based on contraction (or shortening) of muscle fibers, layers of smooth muscle in the walls of the stomach and intestines contract to mix and propel food along the gastrointestinal tract; smooth muscle layers in the walls of blood vessels control the distribution of blood, which is propelled by the contraction of the cardiac muscle of the heart. In the eye, smooth muscle fibers adjust the diameter of the pupil and thickness of the lens for optimal vision, while in the skin, contraction of smooth muscles causes the hair to stand up.

Besides serving as organs of support and protection, and providing levers for motion, the bones through the medium of their red marrow manufacture the red blood corpuscles and some types of white blood corpuscles. Another function is that of storage for minerals to be drawn upon when the needs of the body demand a supply of inorganic materials not readily available from the feed.

**Ex. 7. Finish the sentences and translate them:**

1. …gives a basis for the external structure and appearance of…
2. All mammals share a basic body plan…
3. …is made up of bones that are themselves living…
4. …is the study of the articulations between…
5. The muscle cells of skeletal muscle tissue are grouped into distinct organs…
6. The heat production through shivering is the result of …
7. …smooth muscle fibers adjust the diameter of the pupil and thickness of …

**Ex. 8. Mark the sentences with true (T), false (f), or not stated (NS):**

1. Oste­ology is the study of the bones that make up the skeleton.
2. All mammals share a basic body plan with striking differ­ences in skeletal structure.
3. Joints may be classified by that of anatomy or degree of movement.
4. The tissue that unites the bones of a joint is generally mucous tissue.
5. Skeletal muscle fibers exhibit a characteristic striped pattern arising from the orderly arrangement of the contractile proteins within the cells.
6. Smooth muscle is a major component of the wall of organs of movements.
7. Contraction of smooth muscles causes the hair to erect.

**Ex. 9. Answer the questions.**

1.What is the osteology?

2. What is the function of skeleton?

3. From what are the bones made up, what are their functions?

4. What is arthrology?

5. How may joints be classified, what is their function?

6. How many types of muscle do you know? Name them.

7. What do you know about skeletal muscle?

8. Describe smooth muscle?

9. What is cardiac muscle?

10. Name the functions of muscle?

**Ex. 10. Find the ing-form and determine is it Participle I or Gerund ?**

1. All mammals share a basic body plan with striking similarities in skeletal structure.
2. hhe functions of bones include provid­ing protection, giving rigidity and form to the body, acting as levers, storing minerals, and forming the cellular elements of blood.
3. The skeletal muscle is responsible for producing the voluntary movements of the limbs, trunk, and head.
4. Under the microscope, skeletal muscle fibers exhibit a characteristic striped pattern arising from the orderly arrangement of the contractile proteins within the cells.
5. The skeletal muscles of respiration move air into and out of the lungs by contracting to change the volume of the thoracic cavity. In addition, heat

**Ex. 11. Translate from Russian into English:**

1. Скелет животного состоит из костей, которые в свою очередь являются живыми структурами.
2. Скелет - это каркас тела, на который крепятся мышцы.
3. Одной из функций костей является накопление минеральных веществ.
4. Суставы служат для соединения костей, прикрепляясь к ним фиброзными тканями.
5. Существует три типа мышц: скелетные, гладкие и сердечные.
6. Скелетные мышцы осуществляют движение тела, конечностей и головы.
7. Гладкие мышцы являются составляющим компонентом внутренних органов.
8. Сердечная мышца –это составляющая стенок сердца, отвечающая за кровообращение.

**Ex. 12. Retell the text using the ex. 9.**

# UNIT 4

**THE DIGESTIVE SYSTEM**

**Ex. 1. Give Russian equivalents for the international words and scientific terms :**

digestive system, mucous membrane, primary functions, absorption of food, pharynx, esophagus, glandular stomach, small intestine, large intestine, rectum, gland, salivary glands, liver, pancreas, diaphragm, the components of the digestive tract, abdominal and pelvic cavities, microorganisms, production and secretion.

**Ex. 2. Define parts of speech and translate the words:**

*tion –* function, mastication, digestion, absorption, elimination

*ity –* cavity, majority, similarity, motility

*ive –* nutritive, distinctive, digestive

*al –* external, several, histological, esophageal, abdominal

*ly –* unfortunately, directly, correspondently, immediately

*ous –*mucous, continuous, nutritious, squamous

**Ex. 3. Vocabulary to the text. Learn new words:**

1. Digestive пищеварительный
2. Mouth рот
3. Mastication жевание
4. Constituents составляющие
5. Compounds соединения
6. Pharynx глотка
7. Esophagus пищевод
8. Ruminants жвачные
9. Glandular железистый
10. Small intestine тонкий кишечник
11. Large intestine толстый кишечник
12. Rectum прямая кишка
13. Duodenum 12-перстная кишка
14. Salivary glands слюнная железа
15. Liver печень
16. Pancreas поджелудочная железа
17. Abdominal and pelvic cavities брюшная и тазовая полость
18. Rumen рубец
19. Mucus слизистая
20. Reticulum преджелудок (сетка)
21. Omasum книжка
22. Abomasum сычуг
23. Reticular groove ретикулярный паз
24. Sulcus борозда
25. Bolus пилюля
26. Gastric pits желудочные ямки
27. Bloat (acute tympany) запор
28. Squamous epithelium чешуйчатый эпителий
29. Distal дистальный
30. Epiglottis надгортанник
31. Gallbladder- желчный пузырь
32. Bile- желчь
33. Tongue- язык
34. Stomach- желудок

**Ex. 4. Match the synonyms:**

1. Continuous a) progressive
2. Absorb b) prevent
3. Building c) fluid
4. Consists of d) to subject
5. Simple e)availability
6. Presence f)take up
7. Protect g)make up
8. Liquid h)common
9. To affect i) to decrease
10. To shorten j) construction

**Ex. 5. Read the text find English equivalents for the Russian ones:**

1) жевание; 2) мышечная трубка; 3) поглощение и использование; 4) включение; 5) рассеянные; 6) камера; 7) полость; 8) отдел; 9) мозговой ствол; 10) объемные карманы.

**Ex. 6. Translate the text:**

**Text**

**THE DIGESTIVE SYSTEM**

**The digestive system** (digestive tract) consists of a muscular tube lined with mucous membrane that is continuous with the external skin at the mouth and at the anus. Its primary functions are mastication, digestion, and absorption of food, and elimination of solid wastes. The digestive system reduces the nutritious constituents of the food to molecular compounds that are small enough to be absorbed and used for energy and for building other compounds for incorporation into body tissues.

Elements of the digestive system are the mouth, pharynx, esophagus, forestomach (ruminants), glandular stomach, small intestine, large intestine, rectum, and the accessory glands (salivary glands, liver, and pancreas).

Caudal to the diaphragm, the components of the digestive tract lie within the abdominal and pelvic cavities. Here they are invested with a simple squamous epithelium that is also called a mesothelium or serosa. Within these body cavities, the serosa is identified as peritoneum. The base of the tongue folds the epiglottis over the laryn­geal opening as it moves back. The pharynx shortens, and a peristaltic (milking) action of the pharyngeal muscles forces the bolus into the esophagus.

The third stage of deglutition consists of reflex peristalsis of the esophagus initiated by the presence of food in the esophagus. Peristal­sis consists of alternate relaxation and contrac­tion of rings of muscle in the wall coupled with regional contraction of longitudinal muscles in the area of the bolus. Peristalsis carries solid and semisolid food through the esophagus of the horse at 35 to 40 cm/second. Liquids travel about five times as fast by a squirting action of the mouth and the pharynx. Vomiting is a protective response to remove potentially harmful ingesta from the stomach and upper small intestine. Vom­iting is a highly coordinated reflex that is controlled by a reflex center in the brain­stem.

**The ruminant stomach** is actually a single stomach modified by marked expansion of the esophageal region into three distinct and voluminous diverticula, the rumen, reticulum, arid omasum. These are lined with nonglandular stratified squamous epithelium and comprise a series of chambers where food is subjected to digestion by microorganisms before passing through the digestive tract to the smaller glandular portion of the stomach in the ruminant, the abomasum.

**The rumen** of the simple stomach features several histologically distinct regions whose names are similar to the gross parts of the stomach but that unfortunately do not directly correspond to these.

Exclusive of the esophageal region, the mucosa of the simple stomach is glandular. The cardiac glands that give this region its name are short, branched tubular glands whose major secretoring product is mucus. The equine cardiac gland region is small, but it covers nearly half of the interior of the porcine stomach. Enteroendocrine cells are scattered throughout the mucosa of the glandular stomach. These secrete hormones that affect the secretory arid muscular activity of the gut and its accessory organs (e.g., liver and pancreas).

**Ruminoreticulum.** Because of their functional and anatomic relatedness, the reticulum and rumen are often collectively called the ruminoreticulum. This is the sulcus ruminoreticulum (variously called the esophageal, gastric, or reticular groove). In nursing ruminants, the act of suckling initiates a reflex contraction of the muscular walls of the sulcus, transforming it from a groove to a closed tube that connects the cardia with the omasum. By this reflex, swallowed milk bypasses the ruminorcticulum and is instead delivered to the more distal parts of the stomach; this ensures that the milk will not be allowed to sour in the forestomach. The reticulum is the most cranial compartment of the forestomach.

**Fermentative Digestion.** No mammal can directly digest the complex car­bohydrates that constitute plant cell walls (cel­lulose and hemicellulose), because mammals do not produce the enzyme cellulose, which is nec­essary to break the unique chemical bonds in these compounds. The ruminant forestomach provides an excellent environment for the growth of bacteria, protozoa, and possibly other microbes that do produce cellulose.

Methane and carbon dioxide are produced by fermentative digestion and accumulate as a gaseous layer above the ingesta in the rumen and reticulum. Bloat (acute tympany) results in enlargement of the rumen and reticulum.

Similar to the regulation of gastric secre­tions, the regulation of **gastric motility** can be divided into cephalic, gastric, and intestinal phases. Stimulation during cephalic regulation occurs via the parasympathetic nerves, and this increases in response to sight, smell, or taste of food. The hormone gastrin stimulates overall gastric motility to promote mixing (gastric phase).

**The small intestine** is the primary site of chemi­cal digestion and absorption of nutrients. The exocrine secretions of the pancreas contain most of the enzymes for chemical digestion in the rumen of the small intestine, but the epithelial cells that line the small intestine also have in their cell membranes enzymes that participate in the final steps of chemical digestion. Most of the products of carbohy­drate, protein, and lipid digestion are absorbed as the digesta pass through the small intes­tine. The small intestine is also the primary site

The two primary types of movement by the small intestine aresegmentation and peristal­sis. Segmentation movements, which occur when food is in the small intestine, are charac­terized by alternating local areas of contraction and relaxation. Strong peristaltic contractions of the small intestine in fasting animals or several hours after a meal propel ingesta down the tract, presumably to clean the small intestine of undigested foodstuffs before the next meal.

**Тhe liver** is the largest gland of the orgаnism. It plays а great rоlе in the mеtаbоlism of the body. It is situated in the upper right quadrant of the abdominal cavity, and а part of its surface attaches to the diарhrаgm.

The primary digestive func­tion of the liver is to provide bile salts, which facilitate the enzymatic digestion of lipids.Тhе lobule of the liver in cross-section has five, six оr sеvеn sides. Тhе diameter of the cross-section is decidedly smаllеr than the height of the lobule. **Liver cells** (hepatocytes) arc responsible for bile formation. Bile is a greenish-yellow salt solu­tion consisting primarily of bile salts, cho­lesterol, phospholipids, and bile pigments (bilirubin). Hepatocytes synthesize the bile salts (primarily sodium salts of glycocholic and taurocholic acids) from cholesterol. These salts assist in digestion and absorption of lipids (triglycerides), and the production and secretion of these salts is the most important digestive function of the liver. In all farm animals except the horse, bile is stored in the **gallbladder**. It is a small sac which sits just beneath the liver and its only role is to concentrate gall and then release it when food is passing through the small intestine. Since the horse has no gallbladder, the bile passes directly from the liver to the duodenum. The gallbladder stores bile for intermittent dis­charge into the duodenum and concentrates the bile by reabsorbing water from the stored bile. Since food entering the duodenum stimulates the release of cholecystokinin, this coordinates the release of bile with the presence of food. The liver can eliminate excessive dietary cholesterol via the bile. Cho­lesterol is insoluble in water, but the bile salts and lecithin normally change it to a soluble form so that it can exist in the bile.

**Ex. 7. Finish the sentences and translate them:**

1. Its primary functions are mastication, digestion, and ..
2. …with a simple squamous epithelium that is also called a …
3. The cardiac glands that give this region its name are short, branched …
4. …region is small, but it covers nearly half of the interior of the porcine stomach.
5. The reticulum is the most cranial…
6. …of the small intestine in fasting animals or several hours after a meal propel ingesta down the tract, presumably to clean the small …
7. …horse has no gallbladder, the bile passes directly from the liver to the duodenum by way of the bile duct and us tributaries at a …

**Ex. 8. Mark the sentences with true (T), false (f), or not stated (NS):**

1. The digestive system reduces the nutritious constituents of the food to molecular compounds that are too big to be absorbed and used for energy and for building other compounds for incorporation into body tissues.
2. Caudal to the diaphragm, the components of the digestive tract lie within the abdominal and pelvic cavities.
3. This nonglandular region is unlimited in swine and in the horse, in which it lines the saccus cecum.
4. The primary digestive func­tion of the liver is to provide bile salts, which facilitate the enzymatic digestion of lipids.
5. Swallowed milk bypasses the ruminorcticulum and is instead delivered to the less distal parts of the stomach; this ensures that the milk will be allowed to sour in the forestomach.
6. The small intestine is the primary site of absorption for lipids.
7. In all farm animals except the sheep, bile is stored in the gallbladder.

**Ex. 9. Answer the questions.**

1. Give the definition of digestive system.
2. What are the main functions of digestive system?
3. What are the main elements of digestive system?
4. How many compartments does ruminant stomach have?
5. What is the rumenoreticulum function?
6. How the regulation of gastric motility can be divided?
7. What is the intestine, how many compartment does it have?
8. What are the intestine functions?
9. What is a liver and what physiological functions does it have?
10. What is the main function of gallbladder?

**Ex. 10. Transform the verbs in the sentences from active into passive voice. Translate the sentences.**

1. The digestive system reduces the nutritious constituents of the food.
2. The fermentative digestion produces methane and carbon dioxide.
3. The hormone gastrin stimulates overall gastric motility to promote mixing (gastric phase).
4. The gallbladder stores bile for intermittent dis­charge into the duodenum.
5. The liver can eliminate excessive dietary cholesterol via the bile.

**Ex.11 Translate from Russian into English:**

1.Основные элементы пищеварительной системы жвачных – это ротовая полость, глотка, пищевод, четырехкамерный желудок, кишечник, печень и желчный пузырь.

2.Пища, попадая в желудочно-кишечный тракт, подвергается ферментации.

3.Желудок жвачных состоит из четырех отделов: рубца, сетки, книжки и сычуга.

4.Кишечник играет важную роль в процессе пищеварения, в нем происходит всасывание микроэлементов и эвакуация отработанных веществ.

5. Печень – это орган, участвующий, как в процессе кроветворения, так и пищеварения.

6. Клетки печени участвуют в образовании желчи, которая накапливается в желчном пузыре и, поступая в двенадцатиперстную кишку, расщепляет жиры.

**Ex. 12. Retell the text using the questions from the ex. 9.**

# UNIT 5

**RESPIRATORY SYSTEM**

**Ex. Give Russian equivalents for the international words and scientific terms :**

respiratory system, pharynx, oral and nasal, larynx, substances, trachea, regulate, alveolar, vibration, terminal, diaphragm, gases, pulmonary capillaries, blood plasma, epithelial cell, pulmonary artery, collapsed lung.

**Ex. 2. Transform the verbs into the nouns:**

1. to include

2. to maintain

3. to contract

4. to protect

5. to solve

6. to create

7. to bound

8. to enter

9. to present

10. to divide

**Ex. 3. Vocabulary to the text. Learn new words:**

1. respiratory system – дыхательная система
2. pharynx – глотка
3. oral and nasal cavities – ротовая и носовая полости
4. middle ears – среднее ухо
5. the larynx – гортань
6. unpaired cartilages – непарные хрящи
7. hence – следовательно
8. vocal ligament – голосовые связки
9. lobar – долевая
10. cartilaginous plates – хрящевые пластины
11. alveolar ducts – альвеолярный проток
12. cluster – кластер (слой)
13. thorax – грудная клетка
14. thoracic vertebrae – грудной отдел позвоночных
15. ventral part – брюшная часть
16. sternum – грудина
17. inlet – вход
18. dome – shaped diaphragm-куполообразная диафрагма
19. pulmonary vessels – легочные сосуды
20. lung – легкое
21. lobe – доля
22. squamous epithelial cell – чешуйчатая эпителиальная клетка
23. fragile – хрупкий
24. extracellular fluid – внеклеточная жидкость

**Ex. 4. Define are the next words countable or uncountable make them in plural:**

Tissue, food, air, tube, ear, cavity, airway, esophagus, size, voice, phonation, swine, abnormality, lung, blood.

**Ex. 5. Read the text find English equivalents for the Russian ones:**

Слуховые трубы, относительно друг друга, изменять натяжение связок,

грудной вход, размер дыхательных путей, ребра и костные хрящи, слияние базальной мембраны, тончайшее место, примерно коническое, отступ.

**Ex. 6. Translate the text:**

**RESPIRATORY SYSTEM**

The pharynx is a common soft tissue conduit for food and air, lying caudal to the oral and nasal cavities. Openings into the pharynx include the two caudal narcs, two auditory tubes from the middle ears, the oral cavity, the larynx, and the esophagus.

The larynx is the gatekeeper to the entrance of the trachea. It maintains a rigid, boxlike shape via a series of paired and unpaired cartilages that are moved relative to one another by striated laryngeal muscles. The larynx's primary function is to regulate the size of the airway and to protect it by closing to prevent substances other than air from entering the trachea. The larynx is the organ of phonation (vocalization), hence its common name, voice box. Contraction of muscles in the larynx changes the tension on ligaments that vibrate as air is drawn past them; this vibration produces the voice. Horses and swine also possess a vestibular (ventricular) ligament cranial to the vocal ligament.

Animals require a supply of energy to survive. This energy is needed to build large molecules like proteins and glycogen, make the structures in cells, move chemicals through membranes and around cells, contract muscles, transmit nerve impulses and keep the body warm. Animals get their energy from the large molecules that they eat as food. Glucose is often the energy source but it may also come from other carbohydrates, as well as fats and protein. The energy is made by the biochemical process known as**cellular respiration** that takes place in the **mitochondria** inside every living cell.

The air in the alveoli is rich in oxygen while the blood in the capillaries around the alveoli is deoxygenated. This is because the haemoglobin in the red blood cells has released all the oxygen it has been carrying to the cells of the body. Oxygen diffuses from high concentration to low concentration. It therefore crosses the narrow barrier between the alveoli and the capillaries to enter the blood and combine with the haemoglobin in the red blood cells to form **oxyhaemoglobin**.

The narrow diameter of the capillaries around the alveoli means that the blood flow is slowed down and that the red cells are squeezed against the capillary walls. Both of these factors help the oxygen diffuse into the blood (see diagram 9.2).

When the blood reaches the capillaries of the tissues the oxygen splits from the haemoglobin molecule. It then diffuses into the tissue fluid and then into the cells.

**Inspiration**

The diaphragm is a thin sheet of muscle that completely separates the abdominal and thoracic cavities. When at rest it domes up into the thoracic cavity but during breathing in or **inspiration** it flattens. At the same time special muscles in the chest wall move the ribs forwards and outwards. These movements of both the diaphragm and the ribs cause the volume of the thorax to increase. Because the pleural cavities are airtight, the lungs expand to fill this increased space and air is drawn down the trachea into the lungs (see diagram 9.4 a).

**Expiration**

**Expiration** or breathing out consists of the opposite movements. The ribs move down and in and the diaphragm resumes its domed shape so the air is expelled (see diagram 9.4b). Expiration is usually passive and no energy is required (unless you are blowing up a balloon)

The principal bronchi branches into secondary (also called lobar), then tertiary bronchi, subsequent branches becoming smaller and smaller. The walls of these bronchi are supported by cartilaginous plates. The bronchiole eventually branches into several alveolar ducts, which terminate in clusters of air sacs, the alveoli. It is here that the exchange of gases with the blood takes place. Some terminal bronchioles have alveoli in their walls, hence are called respiratory bronchioles.

The thorax is bounded cranially by the first pair of ribs, the first thoracic vertebra, and the cranial part of the sternum. This ring of skeletal elements is the thoracic inlet. The dorsal part of the thorax is defined by the thoracic vertebrae and axial muscles, and the ventral part, by the sternum. The ribs and costal cartilages, linked by intercostal muscles, create the lateral walls. The overall shape of the thorax is that of a cone with the apex at the thoracic inlet. The base of the cone is covered by the dome-shaped diaphragm.

Each lung is roughly conical, with the base resting against the cranial side of the diaphragm and the apex in or close to the thoracic inlet. The medial aspect of each lung features an indentation, where the principal bronchus, pulmonary vessels, lymphatics, and nerves enter and leave the lung. Lobes of the lungs are defined by the presence of lobar (secondary) bronchi.

Gas exchange between the blood and alveolar air in the lungs occurs across the walls of alveoli. At its thinnest point, the alveolar wall barrier between blood plasma and alveolar air consists of the endothelial cell of pulmonary capillaries, a type I squamous epithelial cell lining the alveoli, and a fused basement membrane contributed by both cells. Gases readily move back and forth across this very thin and fragile structure. Any abnormality that thickens this barrier (e.g., pulmonary edema with an accumulation of extracellular fluid in the alveolar wall) can greatly reduce the efficiency of exchange.

The lack of airflow in the collapsed lung means that oxygen and carbon dioxide in alveolar air and a pulmonary capillary. Plasma entering pulmonary capillaries from the pulmonary arteries contains the highest concentration of carbon dioxide and the lowest of oxygen.

To be most efficient, the rate of pulmonary artery blood flow into an area of the lung must be balanced with the rate of air movement in and out of the alveoli in the same area. To appreciate the importance of this balancing, consider an extreme case in which one lung is collapsed so that air movement is impossible, but the collapsed lung receives the same amount of blood flow as the inflated normal lung.

**Ex. 7. Finish the sentences and translate them:**

1. … include the two caudal narcs, two auditory tubes from the middle ears, the oral cavity, the larynx, and the esophagus.
2. … is to regulate the size of the airway and to protect it by closing to prevent substances other…
3. … into several alveolar ducts, which terminate in clusters of air sacs, the alveoli.
4. The dorsal part of the thorax is defined … and the ventral part…
5. … an indentation, where the principal bronchus, pulmonary vessels…
6. … move back and forth across this very thin and...
7. …the importance of this balancing, consider an extreme case in which one lung is collapsed so that air movement is impossible, but the collapsed …

**Ex. 8 Mark the sentences with true (T), false (F):**

1. The larynx's primary function is to regulate the shape of the airway and to protect it by opening to prevent substances other than air from entering the trachea.
2. Horses and swine also have a vestibular (ventricular) ligament cranial to the vocal ligament.
3. Some terminal bronchioles have alveoli in their walls, hence are called the sternum.
4. The ribs and costal cartilages, connected by intercostal muscles, form the lateral walls.
5. Gases hardly move back and forth across this very thin and fragile structure.
6. The lack of airflow in the collapsed lung means that o O2 and CO2in alveolar air and a pulmonary capillary.
7. The collapsed lung receives the same amount of blood flow as the inflated normal lung.

**Ex. 9. Answer the questions.**

1. What is a pharynx?
2. What are the functions of the larynx?
3. How a voice may be produced?
4. Describe the bronchi.
5. What is the shape and function of thorax?
6. Describe the lung.
7. What is the gas exchange?
8. What does the lack of airflow in the collapsed lung mean?
9. Why is the rate of pulmonary artery blood flow into an area of the lung must be balanced with the rate of air movement in and out of the alveoli?
10. What may be happen if one lung is collapsed so that air movement is impossible?

**Ex.10 Translate the sentences choose the right form of the modal verbs:**

1. In order to maintain animals in healthy condition farmer (can/must) follow certain sanitary requirements.
2. Farmers (were able to/ought to) control the epidemic in the region last summer.
3. I.P. Pavlov was known as a skillful surgeon and he (could\might) do very difficult operations on animals.
4. Scientists (were able to\ could) elaborate the main principles of animal physiology when they had collected enough experimental data.
5. Animal health (may\ is to) ensure the efficient production of wholesome animal products.

**Ex.11 Translate from Russian into English:**

1. Дыхательная система представлена следующими органами: ротовая и носовая полсти, носоглотка, гортань, трахеи, бронхи, легкие.
2. Основная функция гортани - регуляция объема поступающего воздуха и защита трахеи от попадания инородных тел.
3. Гортань также участвует в звукообразовании.
4. Основные бронхи делятся на вторичные и третичные, соответственно уменьшаясь в размере.
5. Грудная клетка имеет куполообразную форму, окруженную ребрами, внутри нее расположены легкие.
6. Легкие позволяют организму, получать кислород при вдохе и выделять углекислый газ при выдохе.
7. Газообмен кислорода крови и альвеол происходит в тонких альвеолярных стенках легких.
8. Поток крови в легочной артерии должен быть сбалансирован с количеством вдыхаемого и выдыхаемого воздуха.

**Ex. 12. Retell the text using the sentences from the ex. 11.**

# UNIT 6

**CARDIOVASCULAR SYSTEM**

**Ex. 1. Give Russian equivalents for the international words and scientific terms :**

The cardiovascular system,arteries,veins,pul­monarycirculation,systemic circulation, conceptu­ally, central organ, pericardium, muscle organ, pulmonary artery and aorta.

**Ex. 2. Translate the next word combinations pay attention to the preposition and unions:**

The system consists of, system of vessels, vessels for distribu­tion of the blood to the tissues, whether or not the blood is oxygenated, vessels that carry blood away from, vessels that carry blood toward, back to the heart, out to every part, each round trip in about a minute, which is placed between, coming in and out of it, behind the trunks.

**Ex. 3 .Vocabulary to the text. Learn new words:**

1. cardiovascular – сердечнососудистая система
2. heart – сердце
3. vessel – сосуд
4. distribu­tion of the blood – кровоснабжение
5. separate – разделять
6. low-pressure pump – насос низкого давления
7. housed – располагаться
8. pulmonary circulation-малый круг кровообращения (легочный)
9. systemic circulation – большой круг кровообращения
10. cone-shaped cavity – коническая полость
11. apex cordis – верхняя часть сердца
12. basis cordis – основная часть сердца
13. auricles – предсердие
14. ventricles – желудочек
15. orifices – зазор, отверстие
16. longitudinal sulcuses – продольные перегородки
17. trunk – ствол, (туловище)
18. mitral valve – митральный клапан
19. aortic valve – аортальный клапан
20. oxygenated – обогащенный кислородом
21. supply – снабжать
22. attach – прикрепляться
23. back to – назад
24. round trip – круговорот
25. partition – перегородка (расчленение)

**Ex. 4. Translate the words, what parts of speech do they belong?**

Exchange, functionally, returning, supply, breast, vertebral, dorsally, influence, constriction, round, systemic, only, communicate, transversal, destroyed, useful, cavities, separate, pump, inside, ana­tomically, toward, cardiovascular.

**Ex. 5. Read the text find English equivalents for the Russian ones:**

Обогащенная кислородом кровь, малый круг кровообращения, большой круг кровообращения, размешаться между легкими, присоединяться к грудной клетке, действовать как насос; полости, которых соединяются; в основании сердца, клапан закрывается, под воздействием сокращений.

**Ex. 6. Translate the text:**

**CARDIOVASCULAR SYSTEM.**

The cardiovascular system consists of the heart and a system of vessels for distribu­tion of the blood to the tissues of the body and to the lungs for exchange of gases. Whether or not the blood is oxygenated, vessels that carry blood away from the heart are called arteries, and vessels that carry blood toward the heart are called veins. Circulation to the lungs (pul­monary circulation) is functionally and ana­tomically separate from circulation to the rest of the body (systemic circulation). Conceptu­ally, it is therefore useful to regard the heart as two separate pumps housed within the same organ; one is a low-pressure pump that directs blood returning from the body to the lungs (i.e., the pulmonary circulation), and the other is a high-pressure pump that distributes blood to the systemic circulation.

The heart (Greek cardia) is the central and main organ supplying the flow of blood and lymph in vessels. The heart pumps blood to the lungs, back to the heart, out to every part of the body, and back to the heart again.

The blood makes each round trip in about a minute. The heart is evolved into pericardium which is placed between lungs and attached to the breast bone by joints. The heart is attached to the vertebral column by vessels which are coming in and out of it.

The heart present cone-shaped cavity muscle organ. The basis cordis is directed dorsally and apex cordis is directed ventrally. The heart is divided inside into right and left halves by partition. Each half in its turn is divided into auricle and ventricle. The cavities of which are communicated with each other by the vast auricle-ventricle orifices.

Auricles are situated in the basic of the heart. Outside they are separated from ventricles by transversal sulcus. Each auricle forms saclike evagination (heart ear).

Heart ears are situated to the right and to the left from the pulmonary artery and aorta. Ventricles is closed and blood runs into aorta Outside they are

separated from each other by the left and right longitudinal sulcuses. The apex of the heart belong to the left ventricle which is situated behind and somewhat to the left, the right ventricle lies in front and somewhat to the right. Accordingly are situated longitudinal sulcuses.

The blood vessels run in the sulcuses. Behind the trunks of the pulmonary arteries there is aorta. The aortic valve is closed and blood runs into aorta under influence of the constriction of left ventricle. The mitral valve is between the auricle and ventricle. It consists of the two folds. Blood comes from the auricle to the ventricle. The mitral valve is open only in one direction. If the function of the mitral valve is destroyed blood comes backwards. It is the courses the heart disease. The mitral valve is closed and blood runs into arteries. The heart is evolved into pericardium which is placed between the lungs and attached to the breast bone by joints.

**Ex. 7. Finish the sentences and translate them:**

1. …system consists of the heart and a system of vessels for distribu­tion of the blood to the tissues…
2. Pul­monary circulation is functionally and ana­tomically separate from circulation to the rest…
3. The heart pumps blood to the lungs, … and back to the heart again.
4. … is directed dorsally and apex cordis is directed ventrally.
5. … are situated to the right and to the left from the pulmonary artery and aorta.
6. … to the left ventricle which is situated behind and somewhat to the left, the right ventricle lies in front and somewhat to the right.
7. The mitral valve is closed and blood runs…

**Ex. 8. Mark the sentences with true (T), false (F):**

1. The cardiovascular system consists of the heart and a system of blood vessels.
2. The heart is the central and main organ supplying the organism with air and the oxygen.
3. The blood makes each round trip in about an hour.
4. The heart is attached to the vertebral column by tissues which are coming in and out of it.
5. The cavities of the heart are communicated with each other by the vast auricle-ventricle orifices.
6. The aortic valve is opened and blood runs into aorta under influence of the constriction of left ventricle.
7. The heart is evolved into pericardium which is placed above the lungs and attached to the breast bone by joints.

**Ex. 9. Answer the questions.**

1. What does the cardiovascular system consists of?
2. What is artery?
3. What is vein?
4. Describe the pul­monarycirculation.
5. Describe thesystemic circulation.
6. How much time does it take one round blood trip?
7. What are the auricles and where is it situated?
8. What are the ventricles and where is it situated?
9. What are the functions of the aortic valve and the mitral valve?
10. What may happen if the function of the mitral valve is destroyed?

**Ex. 10. Find in the text the verbs in passive voice write them out and translate.**

**Ex. 11. Translate from Russian into English:**

1. Сердечнососудистая система включает в себя сердце и сосуды, переносящие кровь.
2. Сосуды, переносящие кровь от сердца к органам называются артерии.
3. Сосуды, переносящие кровь от органов к сердцу называются вены.
4. Малый круг кровообращения идет от сердца к легким, здесь кровь обогащается кислородом.
5. Большой круг кровообращения переносит кровь от сердца ко всем органам и тканям организма.
6. Один круг кровообращения завершается примерно за одну минуту.
7. Сердце – это главный орган, перекачивающий кровь, оно расположено за грудиной между легкими.
8. Сердце – это полый конический мышечный орган, разделенный на левую и правую доли.
9. Предсердия отделяются от желудочков поперечной перегородкой, которая называется митральный клапан.
10. Дисфункция митрального клапана приводит к серьезным заболеваниям сердца.

**Ex. 12. Retell the text using the sentences from the ex. 10.**

# UNIT 7

**THE URINARU SYSTEM**

**Ex. 1. Without a dictionary give the Russian equivalents of the international words and scientific terms:**

The urethra, products, regulate, composition, hormonal functions, reservoir, constituents, filter, plasma, peritoneum, retroperitoneal, location, reflecting, position, abdominal organs, projecting,collected, peripherally.

**Ex. 2. Translate the next word combinations pay attention to the preposition and unions:**

Remove waste products from the blood, a distensible reservoir for the storage of urine, push the left kidney to the right as far as the median plane or beyond, collecting space within the renal hilus, artery gives off a number of interlobular arteries, the capillaries of the glomerulus coalesce into an efferent arteriole.

**Ex. 3. Vocabulary to the text. Learn new words:**

1. urinary system – мочевыделительная система
2. kidney – почка
3. ureter – уретра
4. urinary bladder – мочевой пузырь
5. tubule – трубочка
6. coalesce – сливаться
7. to empty into – впадать в
8. distensible reservoir – эластичный резервуар
9. discharge – разгружать ,выпускать
10. reabsorb – поглощать повторно
11. roughly bean-shaped – грубо бобовидные
12. equine – жеребец
13. dorsal part – спинная часть
14. ventral – брюшная часть
15. cranial – череп
16. pendulous – качающийся, висячий, отвислый
17. pelvis – таз
18. snugly – плотно
19. fascia – соединительная оболочка
20. renal medulla – мозговое вещество почки
21. descending and ascending loops – нисходящие и восходящие петли
22. cortex – кора
23. renal crest – почечный гребень
24. proximal – проксимальный
25. distal – дистальный
26. calyces – чашечка
27. glomerulus coalesce – клубочки сливаются

**Ex. 4. Translate the words, what parts of speech do they belong?**

Distensible, storage, discharges, through, reddish-brown, constituent, selectively, filtrate, ultimately, excreting, excesses, roughly, bean-shaped, exceptions, equine, distinctively, dorsal, cavity, each, vertebrae, most slightly, more, complementary, tend.

**Ex. 5. Read the text find English equivalents for the Russian ones:**

Удалять отходы, определенные гормональные функции, опустошать мочевой пузырь, полезные вещества, задняя часть полости живота, близко прикреплены, в дополнение к, делиться на, проходить вдоль, в регулировании состава жидкости, брать свое название, образовывать сеть капилляров.

**Ex. 6. Translate the text:**

**THE URINARY SYSTEM**

The urinary system consists of two kidneys, two ureters, the urinary bladder, and the urethra. The paired kidneys remove waste products from the blood, help regulate the composition of plasma, and perform certain hormonal functions. The system of tubules in each kidney coalesces into a single muco-muscular tube, the ureter, which extends caudal to empty into the urinary bladder, a distensible reservoir for the storage of urine. When full, the urinary bladder discharges the urine through the urethra to the outside of the body.

The kidneys are paired reddish-brown organs that filter plasma and plasma constituents from the blood and then selectively reabsorb water and useful constituents from the filtrate, ultimately excreting excesses and plasma waste products. The kidneys of most animals are roughly bean-shaped, with the exceptions among domestic animals of the heart-shaped right equine kidney and the distinctively lobated kidneys of the ox.

The kidneys are in the dorsal part of the abdominal cavity on each side of the aorta and caudal vena cava, just ventral to the first few lumbar vertebrae. In most domestic animals, the right kidney is slightly more cranial than the left, with the cranial pole of the right kidney lying snugly in a complementary fossa of the liver. The left kidney tends to be more pendulous, and in ruminants, the forestomach may push the left kidney to the right as far as the median plane or beyond, particularly when the rumen is full. The kidneys are described as being retroperitoneal in location, reflecting their position outside the peritoneal cavity where they are more closely attached to the abdominal wall by fascia, vessels, and peritoneum than are most other abdominal organs. A tough connective tissue capsule surrounds the entire kidney.

The medial aspect of each kidney features a concavity, the hilus, where arteries and nerves enter the kidney, and the ureter, veins, and lymphatic vessels leave. The wide origin on the ureter in the kidney is the renal pelvis. The renal pelvis receives urine from the collecting tubules of the kidney. The cavity in the kidney that contains the pelvis is the renal sinus. The bovine kidney does not have a renal pelvis, the ureter instead arising directly from the coalescence of individual calyces.

The portion of the kidney immediately surrounding the renal pelvis is the renal medulla, which appears striated because of the radially arranged collecting tubules. In addition to collecting tubules, the medulla also contains some loops of Henle (descending and ascending loops). The medulla is surrounded peripherally by the renal cortex, in which reside the renal corpuscles, the histological units of filtration. The cortex has a granular appearance because of the large number of these renal corpuscles, also found in the cortex are proximal and distal convoluted tubules and other segments of loops of Henle.

The medulla and cortex are arranged in units called lobes, cone-shaped aggregates of renal tissue. The medullar portion of each lobe constitutes a renal pyramid, whose apex, the renal papilla, is directed toward the renal pelvis. In the bovine kidney, each pyramid is associated with one of the grossly obvious lobes of the bovine kidney. In the pig and small ruminants, the adjacent cortices of individual lobes are fused, so that the surface of the kidney appears smooth. The individual nature of the porcine lobes is revealed, however, through the persistence of discrete papillae projecting into the renal pelvis. In the horse and small ruminants, the individual papillae, like the cortex, are fused. Consequently, they present as a single longitudinal ridge, the renal crest, projecting into the renal pelvis. Urine discharged from the collecting tubules of the renal crest is collected in the renal pelvis and from there is delivered to the ureter.

In the kidney of the ox and pig, individual pyramids project into minor calyces, cuplike diverticula of the common collecting space within the renal hilus. These in turn empty into major calyces. These major calyces in the porcine kidney empty into the renal pelvis, hut the bovine kidney has no pelvis, and so the major calyces in this species empty directly into the ureter.

Because of its important role in adjusting the composition of extracellular fluid (including plasma), the blood supply to the kidney is much more extensive than the size of the organ would suggest. The two renal arteries may receive as much as one-fourth of the total cardiac output. Each renal artery enters the hilus of the kidney and divides into a number of relatively large branches, the interlobar arteries. These pass peripherally between pyramids almost to the cortex, where they bend abruptly and become arcuate arteries, which derive their name from the arched manner by which they pass along the junction between cortex and medulla.

Each arcuate artery gives off a number of interlobular arteries that extend into the cortex and in turn give rise to the afferent arterioles. Each afferent arteriole branches repeatedly to form a tufted capillary network called the glomerulus, which is associated with the renal corpuscle. The capillaries of the glomerulus coalesce into an efferent arteriole, which leaves each glomerulus.

**Ex. 7. Match the beginnings of the sentences with their endings:**

1. The paired kidneys remove waste products from the blood, help regulate the composition of plasma,…
2. When full, the urinary bladder discharges…
3. The kidneys are in the dorsal part of the abdominal cavity on each side…
4. The renal pelvis receives urine from …
5. In the bovine kidney, each pyramid is associated with …
6. Each renal artery enters the hilus of the kidney and…
7. The capillaries of the glomerulus coalesce into…
8. …the urine through the urethra to the outside of the body.
9. …an efferent arteriole, which leaves each glomerulus.
10. …and perform certain hormonal functions.
11. …divides into a number of relatively large branches, the interlobar arteries.
12. …of the aorta and caudal vena cava, just ventral to the first few lumbar vertebrae.
13. …the collecting tubules of the kidney.
14. …one of the grossly obvious lobes of the bovine kidney.

**Ex. 8. Mark the sentences with true (T), false (F):**

1. The urinary system consists of the kidneys, the ureters, the urinary bladder, and the urethra.
2. The kidneys are in the ventral part of the abdominal cavity on each side of the aorta and caudal vena cava, just dorsal to the first few lumbar vertebrae.
3. The right kidney in most domestic animals, is slightly more cranial than the left, with the cranial pole of the right kidney lying snugly in a complementary fossa of the liver.
4. A thin connective tissue capsule surrounds the entire kidney.
5. The bovine kidney has a renal pelvis, the ureter instead arising directly from the coalescence of individual calyces.
6. Urine discharged from the collecting tubules of the renal crest is gathered in the renal pelvis and from there is delivered to the ureter.
7. Each renal artery enters the hilus of the kidney and divides into a number of small branches, the interlobar arteries.

**Ex. 9. Answer the questions.**

1. What does the urinary system consist of?
2. What is the function of the kidneys?
3. What forms do kidneys of animals have?
4. Where do the kidneys locate?
5. What surrounds the entire kidney?
6. What is the renal pelvis? Describe it function.
7. What is the renal medulla and it function?
8. What are the lobes of the bovine, the pig and small ruminants kidney?
9. Describe the blood supply to the kidney.
10. What is the glomerulus?

**Ex. 10. Translate next sentences match Gerund:**

1. Growing corn is important for some cattle farms.
2. Growing condition for corn should be favorable.
3. The system of growing calves on pasture is very economical.
4. The way of keeping calves on pasture is more comfortable in this region.
5. The recording of individual performance in breeding populations of farm animals developed rapidly.

**Ex. 11. Translate from Russian into English:**

1. Почки – это парный орган, который фильтрует кровь, регулируя состав плазмы.
2. Почки расположены в задней части полости живота.
3. Каждая почка имеет вогнутый хилус, где артерии и нервы входят в почку и мочеточник, а вены и лимфатические сосуды – покидают.
4. Часть почки, непосредственно примыкающей к почечной лоханке является мозговое вещество почки, которое является поперечно – полосатой из-за радикально расположенных собирающих канальцев.
5. Мозговая часть почки также содержит петли Генля – нисходящие и восходящие петли.
6. Сердцевина и кора расположены в долях почки, состоящих из почечной ткани.
7. Моча выделяется из собирательных канальцев и поступает в уретру.

**Ex. 12. Retell the text using the sentences from the ex. 9.**

# CONTROL TEST

1. Physiology is a study of…
   1. is the study of the functions animal organ systems
   2. problems of sterility and nutritional disorders
   3. is a study of the origination of various species
2. What sciences are based on physiology research
3. physics
4. mechanics
5. biochemistry
6. What does term anatomy mean?
7. principles of body movement
8. a constitution of a body and organs
9. functions of the parts of the body

1. What is embryology?
2. is a study of the structures of various species of animals
3. is the study of anatomy, from the period of fertilization of the egg to birth
4. is the study of the form and relations of the structures of the body that can be seen

with the unaided eye.

1. What is comparative anatomy?
2. is a study of the structures of various species of animals, with particular emphasis on those characteristics that aid in classification
3. is the study of developmental anatomy, covering the period from conception (fertilization of the egg) to birth
4. is the study of tissues and cells that can be seen only with the aid of a microscope
5. What is the histology?
6. is the study of tissues and cells that can be seen only with the aid of a microscope.
7. is the study of developmental anatomy, covering the period from conception (fertilization of the egg) to birth
8. is the study of the form and relations of the structures of the body that can be seen with the unaided eye.
9. What is the osteology?
10. the study of the articulations (unions) between bones
11. the study of the bones that make up the skeleton
12. the study of the functions of bones
13. What is the function of skeleton?
14. skeleton forms the tissues and cells, which help the body to move
15. sskeleton gives a basis for the external structure and appearance of most vertebrate animals.
16. form the relations of the structures of the body
17. What is arthrology?
18. is the study of the articulations (unions) between bones, which are commonly called joints
19. is a study of the structures of various species of animals
20. is the study of developmental anatomy
21. What is cardiac muscle?
22. is a major component of the wall of organs of the digestive and urogenital systems and most blood vessels
23. the bulk of the muscle in the body attached to the bones of the skeleton
24. is characterized by fibers with visible striations, so it is considered a type of striated muscle
25. What are the main functions of digestive system?
26. are digestion, and absorption of food and mastication
27. are mastication, digestion, and absorption of food, and elimination of solid wastes
28. are elimination of solid wastes and absorption of food
29. What are the main elements of digestive system
30. are the mouth, pharynx, esophagus, forestomach (ruminants) rectum, and the accessory glands (salivary glands, liver, and pancreas).
31. glandular stomach, small intestine, large intestine, rectum, and the accessory glands (salivary glands, liver, and pancreas).
32. all of the above
33. How many compartments does ruminant stomach have?
34. One
35. Two
36. Three
37. Four
38. What are the intestine functions?
39. elimination of solid wastes and absorption for vitamins
40. digestion, and absorption of food and water
41. absorption for vitamins, minerals, water and elimination of solid wastes
42. What is the main function of gallbladder?
43. is to concentrate gall and then release it when food is passing through the small intestine.
44. is to provide bile salts, which facilitate the enzymatic digestion of lipids
45. is the primary site of chemi­cal digestion and absorption of nutrients
46. What is a pharynx?
47. is a common soft tissue conduit for food and air, lying caudal to the oral and nasal cavities
48. is the gatekeeper to the entrance of the trachea
49. is the organ of phonation (vocalization), hence its common name, voice box
50. What are the functions of the larynx?
51. is the gatekeeper to the entrance of the trachea
52. is the organ of phonation (vocalization), hence its common name, voice box
53. is a common soft tissue conduit for food and air
54. What is the shape of thorax?
55. is a cone with the apex at the thoracic inlet.
56. is roughly conical, with the base resting against the cranial side of the diaphragm
57. is the base of the cone is covered by the dome-shaped diaphragm.
58. What is the gas exchange?
59. is the exchange between the blood and alveolar air in the lungs occurs across the walls of alveoli
60. is the exchange between epithelial cell lining the alveoli, and a fused basement membrane contributed by both cells
61. is the exchange between the alveolar air in the lungs
62. What may be happen if one lung is collapsed so that air movement is impossible?
63. the collapsed lung receives the same amount of blood flow as the inflated normal lung
64. plasma entering pulmonary capillaries from the pulmonary arteries contains the highest concentration of carbon dioxide and the lowest of oxygen
65. lack of airflow in the collapsed lung means that oxygen and carbon dioxide in alveolar air are the same in a pulmonary capillary
66. What does the cardiovascular system consists of?
67. the heart and vessels that carry blood away from the heart are called arteries
68. the heart and vessels that carry blood toward the heart are called veins
69. the heart and a system of vessels for distribu­tion of the blood to the tissues of the body and to the lungs for exchange of gases.
70. What is artery?
71. vessels that carry blood away from the heart
72. vessels that carry blood toward the heart
73. vessels that carry blood away from the lung
74. What is vein?
    1. vessels that carry blood away from the lung
    2. vessels that carry blood away from the heart
    3. vessels that carry blood toward the heart
75. .How much time does it take one round blood trip?
76. about a half of a minute
77. about a minute
78. about two minutes
79. What are the auricles and where is it situated?
80. auricles are situated in the basic of the heart forming a saclike heart ear
81. auricles form the greater part of the heart, outside they are separated from each other by the left and right longitudinal sulcuses
82. auricles are situated to the right and to the left from the pulmonary artery and aorta
83. What are the ventricles and where is it situated?
84. ventricles form the greater part of the heart outside they are separated from each other by the left and right longitudinal sulcuses
85. ventricles are situated to the right and to the left from the pulmonary artery and aorta
86. ventricles are situated in the basic of the heart forming a saclike heart ear
87. What are the functions of the aortic valve?
88. the aortic valve is closed and blood runs into aorta under influence of the constriction of left ventricle
89. the aortic valve is open only in one direction and blood comes from the auricle to the ventricle
90. the aortic valve is between the auricle and ventricle. It consists of the two folds
91. What are the functions of the mitral valve?
92. the mitral valve is open only in one direction
93. the mitral valve is closed and blood runs into aorta
94. the mitral valve is closed and blood runs out from the aorta
95. What may happen if the function of the mitral valve is destroyed?
96. blood comes backwards
97. blood doesn’t come backwards
98. blood overcomes the heart
99. What does the urinary system consist of?
100. the urinary bladder, and the urethra
101. two ureters, the urinary bladder
102. two kidneys, two ureters, the urinary bladder, and the urethra
103. What is the function of the kidneys?
104. remove waste products from the blood, help regulate the composition of plasma, and perform certain hormonal function
105. help regulate the composition of plasma, and perform certain hormonal function
106. remove waste products from the blood, help regulate the composition of plasma
107. What forms do kidneys of animals have?
108. roughly bean-shaped, heart-shaped right kidney, lobulated kidneys
109. lobulated kidneys, heart-shaped right kidney
110. roughly bean-shaped, heart-shaped right kidney
111. Where do the kidneys locate?
112. are in the right part of the abdominal cavity on each side of the vein and caudal vena cava, just ventral to the first few lumbar vertebrae
113. are in the dorsal part of the abdominal cavity on each side of the aorta and caudal vena cava, just ventral to the first few lumbar vertebrae
114. are in the frontal part of the dorsal cavity on each side of the aorta and caudal vena cava, just ventral to the first few lumbar vertebrae
115. What is the renal medulla and it function?
116. the portion of the kidney immediately surrounding the renal pelvis is the renal medulla, which appears striated because of the radially arranged collecting tubules
117. the portion of the kidney immediately receives urine from the collecting tubules of the kidney.
118. the portion of the cavity in the kidney that contains the pelvis is the renal sinus
119. What is the glomerulus?
120. Each afferent arteriole branches repeatedly to form a tufted capillary network
121. Each arcuate artery gives off a number of interlobular arteries that extend into the cortex and in turn give rise to the afferent arterioles
122. Each renal artery enters the hilus of the kidney and divides into a number of relatively large branches

# SUPPLEMENTARY READING

Tasks:

1. Read and translate the text

2. Give the annotation to the text

TEXT 1

**THE ANATOMY OF THE PIG**

Circulatory system. Pigs, like all mammals, have a four chambered heart. Blood enters the right atrium via the superior and inferior vena cava. The blood is then pumped into the right ventricle from where it is pumped to the lungs to be oxygenated via the pulmonary arteries. Oxygen-rich blood is then pumped through the left atrium and into the left ventricle. Location of the fetal heart will show that the walls of the left ventricle are thicker than those of the other chambers. This is due to fact that the muscle of the left ventricle must be strong enough to pump oxygen-rich blood throughout the body. The aortic arch of a fetal pig has two arteries attached to it, the brachiocephalic artery and the subclavian artery. As the aorta descends, it splits into two large iliac arteries. An umbilical artery branches near the base of each iliac artery. The umbilical arteries run through the umbilical cord, carrying blood 45 to the maternal placenta where it becomes oxygenated, nutrient-rich, and free of waste. This oxygenated, nutrient-rich blood is then returned to the liver of the fetus via the umbilical vein. There are only a few differences between the circulatory system of an adult pig and a fetal pig, besides from the umbilical arteries and vein. There is a shunt between the wall of the right and left atrium called the foramen ovale. This allows blood to pass directly from the right to left atrium.

There is also the ductus arterius which allows blood from the right atrium to be diverted to the aortic arch. Both of these shunts close a few minutes after birth. Digestive system. The monogastric digestive system of the fetal pig harbors many similarities with many other mammals. The fetal pig's digestive organs are well developed before birth, although it does not ingest food. These organs include the esophagus, stomach, small and large intestines. Mesenteries serve to connect the organs of the fetal pig together. In order for digestion to occur, the fetal pig would have to ingest food. Instead, it gains much needed nutrition from the mother pig via the umbilical cord. In the adult pig, food will follow the general flow through the esophagus, which can be located behind the tracheae. From the oral cavity, the esophagus leads to the stomach, small intestine, and large intestine.

Other organs developing during fetal pig development such as the gallbladder, pancreas and spleen are all critical in contributing to the overall flow of the digestive system. After being digested and absorbed, the food follows through the large intestine and is excreted through the rectum and anus. In the fetal pig however, the metabolic wastes are sent back to the mother through the umbilical cord where the mother excretes the wastes. Other remaining wastes remain in the fetal pig until birth. The oral cavity of the fetal pig begins developing before birth. The tongue's taste buds, located in the enlarged papillae, facilitate food handling after birth. These taste buds develop during fetal development. Adult pigs have up to 15,000 taste buds, a much larger number than the average human tongue, which has 9,000. The dental anatomy of the fetal pig shows differences from adult pigs. The fetal pig develops primary teeth (which are later replaced with permanent teeth). Some may erupt during fetal stage, which is why some of the pigs that are/will be dissected show evidence of teeth. Depending on the age of the fetal pig, it is natural to see eruptions of third incisor and canine in the fetal pig. Because the fetal pigs were still in the mother’s uterus, teeth will still form which supports reasons for hollow unerupted teeth that may be seen during the dissection. Similar to human dental anatomy, the overall dental anatomy of the pig consists of incisors, canines, pre-molars, and molars. Exploring the dental anatomy even further, piglets can have 28th teeth total and adult pigs can have 44 teeth total. If you would like to compare this to the dental anatomy of a human, there are 20 primary teeth and 28–30 permanent teeth.

Urogenital system of a female pig. The fetal pig urogenital system is similar to the adult pig's system with the exception of the reproductive organs. The fetal pig urinary track is relatively developed and easy to locate during dissection. The kidneys are located behind the abdominal organs and are partially embedded into the dorsal body wall by the spine. The ureters carry the urine to the urinary bladder, the large sack-like organ by the umbilical artery and vein, to the urethra. From there, the urine can be excreted. To externally determine if the fetal pig is a female, there will be a fleshy protrusion ventral near the anus called the genital papilla.

Reproductive system. The female's internal reproductive system is located below the kidneys. The two sac-like organs attached to the coil-like fallopian tubes are the ovaries. The uterus, which becomes the vagina, is located where the fallopian tubes meet. This system can be difficult to find as it is small as well as extremely dorsal and posterior to the other systems. Male: to externally determine if the fetal pig is male, look for the urogenital opening located behind the umbilical cord. Also note the swelling behind the hind legs of the fetal pig. This will be the scrotum. The male's internal reproductive system has two scrotal sacs, which depending on the age of the fetal pig may or may not have developed testes. The epididymis coil on the testes connects to the vas deferens. The vas deferens crosses over the ureter and enters the urethra, which then connects to the penis located just posterior to the skin. Similar to the female system, the male system may also be difficult to identify all parts. If the fetal pig is indeed male, take caution to not cut very deep into the scrotum when dissecting. (from Wikipedia, the free encyclopedia)

Tasks:

1. Read and translate the text

2. Give the annotation to the text

TEXT 2

**THE ANATOMY OF THE SHEEP**

Sheep are raised for fleece, meat (lamb, hogget or mutton) and milk. Ewes typically weigh between 45 and 100 kilograms, and the rams between 45 and 160 kilograms. Teeth. Mature sheep have 32 teeth. As with other ruminants, the eight incisors are in the lower jaw and bite against a hard, toothless pad in the upper jaw; picking off vegetation. There are no canines; instead there is a large gap between the incisors and the premolars. Until the age of four (when all the adult teeth have erupted), it is possible to see the age of sheep from their front teeth, as a pair of incisors erupts each year. The front teeth are gradually lost as sheep age, making it harder for them to feed and hindering the health. The average life expectancy of a sheep is 10 to 12 years, though some sheep may live as long as 20 years. Hearing. Vision.

Sheep have good hearing, and are sensitive to noise when being handled. Sheep have horizontal slit-shaped pupils, possessing excellent peripheral vision; with visual fields of approximately 270° to 320°, sheep can see behind themselves without turning their heads. However, sheep have poor depth perception; shadows and dips in the ground may cause sheep to 48 balk. In general, sheep have a tendency to move out of the dark and into well-lit areas, and prefer to move uphill when disturbed.

Sense of smell. Sheep also have an excellent sense of smell, and, like all species of their genus, have scent glands just in front of the eyes, and interdigitally on the feet. The foot glands might also be related to reproduction, but alternative reasons, such as secretion of a waste product or a scent marker to help lost sheep find their flock, have also been proposed.

Digestive system. Like all ruminants, sheep have a complex digestive system composed of four chambers, allowing them to break down cellulose from stems, leaves, and seed hulls into simpler carbohydrates. When sheep graze, vegetation is chewed into a mass called a bolus, which is then passed into the first chamber: the rumen. The rumen is a 19 to 38-liter organ in which feed is fermented via a symbiotic relationship with the bacteria, protozoa, and yeasts of the gut flora. The bolus is periodically regurgitated back to the mouth as cud for additional chewing and salivation. Cud chewing is an adaptation allowing ruminants to graze more quickly in the morning, and then fully chew and digest feed later in the day. This is beneficial as grazing, which requires lowering the head, leaves sheep vulnerable to predators, while cud chewing does not. After fermentation in the rumen, feed passes in to the reticulum and the omasum; special feeds such as grains may bypass the rumen altogether. After the first three chambers, food moves in to the abomasum for final digestion before processing by the intestines. The abomasum is the only one of the four chambers analogous to the human stomach (being the only one that absorbs nutrients for use as energy), and is sometimes called the “true stomach”.

Reproduction. Most sheep are seasonal breeders, although some are able to breed year-round. Ewes generally reach sexual maturity at six to eight months of age, and rams generally at four to six months. Ewes have estrus cycles about every 17 days, during which they emit a scent and indicate readiness through physical displays towards rams. A minority of sheep displays: a preference for homosexuality (8 % on average) or freemartins (female animals that are behaviorally masculine and lack functioning ovaries). After mating, sheep have a gestation period of about five months, and normal labor may take one to three hours. Although some breeds may regularly throw larger litters of lambs, most produce single or twin lambs. During or soon after labor, ewes and lambs may be confined to small lambing jugs, small pens designed to aid both careful observation of ewes and to cement the bond between them and their lambs. After the birth, ewes ideally break the amniotic sac (if it is not broken during labor), and begin licking clean the lamb. Most lambs will begin standing within an hour of birth. In normal situations, lambs nurse after standing, receiving vital colostrums milk. Lambs that either fail to nurse or that is rejected by the ewe require aid to live, such as bottle-feeding or fostering by another ewe. 49 Castration is performed on ram lambs not intended for breeding, although some shepherds choose to avoid the procedure for ethical, economic or practical reasons. Ram lambs that will either be slaughtered or separated from ewes before sexual maturity are not usually castrated. (from Wikipedia, the free encyclopedia)

Tasks:

1. Read and translate the text

2. Give the annotation to the text

TEXT 3

**THE ANATOMY OF THE CATTLE**

Cattle are raised as livestock for meat (beef and veal), as dairy animals for milk and other dairy products, and as draft animals (pulling carts, plows and the like). Other products include leather and dung for manure or fuel. In some countries such, as India, cattle are sacred.

Cattle have one stomach with four compartments. They are rumen, reticulum, omasum, and abomasum, with the rumen being the largest compartment.The reticulum, the smallest compartment, is known as the “honey comb”. Cattle sometimes consume metal objects which are deposited in the reticulum and irrigation from the metal objects causing hardware disease. The omasum’s main function is to absorb water and nutrients from the digestible feed. The omasum is known as the “many plies”. The abomasums is like the human stomach; this is why it is known as the “true stomach”. Cattle are ruminants. They have a digestive system that allows use of otherwise indigestible foods by repeatedly regurgitating and rechewing them as “cud”.These microbes are primarily responsible for decomposing cellulose and other carbohydrates into volatile fatty acids that cattle use as their primary metabolic fuel.

The microbes inside the rumen are also able to synthesize amino acids from nonprotein nitrogenous sources, such as urea and ammonia. As these microbes reproduce in the rumen, older generations die and their carcasses continue on through the digestive tract. These carcasses are then partially digested by the cattle, allowing them to gain a high quality protein source. These features allow cattle to thrive on grasses and other vegetation. The gestation period for a cow is nine months. A newborn calf weighs 25–45 kg (55 to 99 lb). Breeding stock usually lives to about 15 years (occasionally as much as 25 years). (from Wikipedia, the free encyclopedia)

Tasks:

1. Read and translate the text

2. Give the annotation to the text

# GLOSSARY

|  |  |
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| **Word** | **Meaning** |
| **A** |  |
| Abdomen | The part of the body below the diaphragm |
| Abomasum | The final compartment of the stomach of ruminants.  This the ‘true’ stomach where muscular walls churn  the food and gastric juice is secreted |
| Accessory gland | A gland that produces secretions that make up the liquid portion of semen |
| Adrenal cortex | Outer portion of adrenal gland |
| Adrenal medulla | Inner portion of adrenal gland |
| Alimentary | Concerning nutrition |
| Alveolus | An air sac in the lung, where gas exchange takes place |
| Antagonistic muscles | A pair of muscles that work together such that as one contracts the other relaxes and vice versa. |
| Anterior pituitary gland | Anterior portion of pituitary gland |
| Antigens | A substance that stimulates the body to produce an antibody |
| Anus | The opening at the lower end of the rectum through which solid waste is eliminated. |
| Aorta | The main artery to body and head from heart |
| Apex | The pointed end of a cone shaped structure e.g. heart |
| Arteriole | A small, almost microscopic, artery |
| Artery | A blood vessel that carries blood away from the heart |
| Articulation | The point of contact between bones. Where they move against each other |
| Atlas | First cervical vertebra |
| Atom | A unit of matter that comprises a chemical element |
| Atrioventricular valve | A valve that prevents blood flow backwards from ventricle to atrium |
| Atrium (pl. atria) | One of two cranial chambers of heart |
| Autonomic nervous system | The part of the vertebrate nervous system that innervates smooth and cardiac muscle and  glandular tissues and governs involuntary actions. Consists of the sympathetic nervous  system and the parasympathetic nervous system. |
| Axis | The second cervical vertebra |
| **B** |  |
| Ball and socket joint | A synovial joint where rounded end of one bone fits into cup-shaped depression of another |
| Barb | The part of the feather that sticks out of the shaft |
| Basement membrane | The thin membrane between epidermis and dermis |
| Bile | An alkaline secretion from liver that helps break down fats into small droplets |
| Binocular vision | The placement of the eyes such that both see the same wide area but from slightly different angles |
| Binomial | The two-part Latinized name of a species, consisting of genus and species names |
| Blind spot | The area of retina at end of optic nerve where there are no receptor cells |
| Blood | The fluid that circulates in the blood vessels |
| Blood pressure | The pressure of blood on the walls of the blood vessels |
| Body cavity | A space within the body that contains various organs |
| Bowman’s capsule | The double walled globe at proximal end of nephron. Encloses glomerulus |
| Breed | A race or variety |
| Bronchiole | A branch of the bronchi in the respiratory system |
| Bronchus | One of the large branches of the trachea |

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| **C** |  |
| Callus | A thickening of the skin or growth of new bone tissue in and around a fracture |
| Carbohydrate | An organic compound containing carbon, hydrogen and oxygen. Made up of sugar subunits |
| Cardiac cycle | A complete heartbeat consisting of systole and diastole |
| Cardiac muscle | The muscle that makes up the wall of the heart. Striated branched fibres |
| Cardiovascular system | The body system comprising the heart, blood vessels and blood |
| Carotid artery | The artery from aorta that supplies the head and brain |
| Carpal | A bone of the “wrist” |
| Cartilage | Dense connective tissue found at ends of long bones, in trachea, ear pinna. Also forms the skeleton of the foetus |
| Caudal | Nearer to the tail than |
| Cellular respiration | The chemical pathway that produces energy in the cell  It consumes a fuel, generally glucose, in the presence of oxygen |
| Central nervous system | The part of the nervous system consisting of the brain and spinal cord |
| Cerebellum | The part of the vertebrate hindbrain located dorsally; functions in unconscious coordination of movement and balance |
| Cerebral cortex | The surface of the cerebrum; the largest and most complex part of the mammalian brain, containing sensory and motor nerve cell bodies of the cerebrum |
| Cerebrospinal fluid | The fluid that circulates around and within brain and spinal cord |
| Cerebrum | The dorsal portion of the brain composed of right and left hemispheres;  the integrating center for memory, learning, emotions |
| Cervical vertebrae | The neck vertebrae |
| Cervix | The neck of the uterus |
| Choroid | The middle coat of the eyeball |
| Chyle | The milky fluid found in the lacteals of the small intestine |
| Chyme | The semi fluid mixture of partly digested food and digestive secretions in the stomach and small intestine |
| Class | The taxonomic grouping of related, similar orders; category above order and below phylum |
| Clavicle | The collar bone |
| Clot | The process that changes liquid blood to a gelatinous mass |
| Coagulation | The process by which blood clots |
| Coccyx | The tail bones |
| Coccygeal vertebrae | The vertebrae of the tail |
| Cochlea | The coiled tube forming the portion of the inner ear that converts sound waves to nerve impulses |
| Collagen | A protein that is the main organic constituent of connective tissue |
| Colon | Part of the large intestine. |
| Colostrum | The first milk, it contains antibodies. |
| Common bile duct | The duct that carries both bile and pancreatic juice into the small intestine |
| Compact bone | Dense bone made up of Haversian systems |
| Conditioned Reflex | The response that is elicited by a stimulus after training has taken place |
| Condyle | A rounded protuberance at the ends of some bones where it forms an articulation with another bone |
| Cone | A light sensitive receptor in the retina that responds to colour |
| Congenital | Present at the time of birth |
| Conjunctiva | The delicate membrane covering the cornea of the eye |
| Connective tissue | One of the 4 basic tissue types of the body. Binds and supports. Consists of cells and fibres in a matrixs |
| Constipation | Decreased defecation due to decreased mobility of the intestines |
| Cornea | The transparent anterior layer of the eye through which the iris can be seen |
| Coronary artery | The artery that supplies the heart muscle |
| Corpus luteum | A yellow endocrine gland formed in the empty ovarian follicle after ovulation |
| Cortex | The outer layer of an organ |
| Costal | To do with a rib |
| Cranial | Towards the head |
| Cranial nerve | One of the 12 nerves that leave the brain |
| Cranium | The brain case that surrounds and protects the brain |
| Crop | The bag-like structure at the base of the oesophagus in birds.In many birds it stores food before it enters the stomachA |
| Crop-milk | Secretion produced by glands in the wall of the crop of in pigeons and doves Parents regurgitate it to feed their young |
| Cytology | The study of cells |

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| **D** |  |
| Dental formula | The formula that describes the numbers of the different kinds of teeth |
| Dentine | The tissue below the enamel in teeth |
| Dermis | The layer of dense connective tissue lying under the epidermis |
| Diabetes mellitus | The condition caused by under secretion of insulin. Symptoms: raised blood glucose levels, glucose in urine |
| Diaphragm | The dome shaped skeletal muscle separating the thoracic from the abdominal cavities |
| Diaphysis | The shaft of a long bone |
| Diastole | The phase of the heartbeat involving the relaxation of the ventricles |
| Diastolic blood pressure | Blood pressure in the arteries between the passage of the pulses |
| Diffusion | A passive process of movement of molecules from a region of high concentration to one of low concentration |
| Digestion | The mechanical and physical breakdown of food |
| Digitigrade locomotion | Locomotion on the “fingers” as in cats and dogs |
| Directional terms | Terms that describe the locations of structures in relation to other structures or locations in the body |
| Distal | Farther away from the trunk of the body or point of origin |
| Dorsal | Nearer the back of the animal than |
| Duodenum | First part of the small intestine |

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| **E** |  |
| Effector | A muscle or gland that responds to a motor neuron impulse |
| Egestion | The elimination of indigestible waste products from the body |
| Emulsification | The breakdown of large fat particles to smaller ones in the presence of bile |
| Endometrium | The inner lining of the uterus |
| Endoplasmic reticulum | The network of membranous channels running through the cytoplasm of cells |
| Endothelium | The layer of squamous epithelium that lines blood vessels |
| Epidermis | The thin outer layer of the skin |
| Epididymis | The organ composed of convoluted tubules that lies on the border of the testis Where sperm mature |
| Epiglottis | The cartilage on the top of the larynx that closes the windpipe during swallowing |
| Epiphysis | The end of a long bone |
| Epithelial tissue | Tissue that forms outer part of skin, lines blood vessels, hollow organs and passages in the body |
| Essential amino acids | The 10 amino acids that can not be made by animals and must be acquired in the diet |
| Exocrine gland | A gland that secretes substances into a duct |
| Expiration | Breathing out |
| Extension | Bending of a joint so that the angle between the bones increases |
| **F** |  |
| Fats | Biological compounds consisting of three fatty acids linked to one  glycerol molecule |
| Femur | The long bone between the pelvis and the knee |
| Fetlock | The joint between the metacarpals or metatarsals and the phalanges in horse |
| Fibrin | The insoluble protein formed from fibrinogen |
| Fibrinogen | The protein in blood plasma essential for blood clotting |
| Fibula | The lateral bone of the lower hind limb |
| Filtrate | The fluid produced by filtration of blood in the nephron |
| Flexion | The movement involving decreasing the angle between two bones |
| Foetus | Later stage of development of a young animal |
| Foramen | A hole in a bone for passage of vessels or nerves |
| Foramen magnum | The hole at the base of the skull for passage of the spinal cord |
| Fossa | A furrow or shallow depression in a bone |
| Functional caecum | The enlarged large intestine and caecum occupied by cellulose digesting micro-organisms |

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| **G** |  |
| Gall bladder | The small pouch that stores bile |
| Gas exchange | The process in which oxygen from inhaled air is transferred into the blood and  carbon dioxide from the blood is transferred into the alveoli |
| Gastric juice | The digestive secretion produced by glands in the wall of the stomach |
| Gestation | The period of foetal development inside the uterus |
| Girdle | An encircling or arching arrangement of bones |
| Gizzard | The second part of the stomach of birds. In seed eating birds it contains pebbles and its muscular walls help grind the food |
| Gland | A collection of cells that secrete substances |
| Gliding joint | A synovial joint with flat articulating surfaces that permits limited movements e.g. between carpals and tarsals |
| Glomerulus | Tuft of capillaries surrounded by the Bowman’s capsule in nephron |
| Glottis | Vocal cords |
| Goitre | A condition involving enlargement of thyroid gland |
| Growth hormone | A hormone secreted by the anterior pituitary gland. Stimulates growth, particularly of the skeleton |
| **H** |  |
| Haematuria | Urine that contains red blood cells |
| Haemoglobin | Pigment containing iron in red blood cells that allows them to carry oxygen |
| Haversian canal | The canal down centre of a Haversian system |
| Haversian system | The columns of boney tissue that make up compact bone |
| Heparin | A naturally occurring anticoagulant. Also used in laboratory tests for heavy metals |
| Hepatic | To do with the liver |
| Hepatic portal vessel | The blood vessel that carries blood from the intestines to the liver |
| Hinge joint | A synovial joint that allows movement in only one plane e.g. elbow |
| Histamine | A substance secreted from white cells and platelets that is involved in the inflammatory response |
| Hock | The joint (between the tarsals and metatarsals |
| Humerus | The bone of the upper forearm between the scapula and the radius and ulna |
| Hypertension | High blood pressure |
| Hyperthermia | High body temperature |
| Hypertonic | Having an osmotic pressure higher than a solution with which it is compared |
| Hypotension | Low blood pressure |
| Hypotonic | Having an osmotic pressure lower than a solution with which it is compared |

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| **I**  Ileum | The terminal part of the small intestine |
| Incisors | The chisel-shaped ‘biting off’ teeth at the front of the mouth |
| Induced ovulation | When ovulation is stimulated by mating as in cat and rabbit |
| Inferior | Towards the lower part of the body. Not used in animals except, perhaps, higher apes |
| Infertility | The inability to conceive or cause conception |
| Inflammation | A localised protective response to tissue injury |
| Ingestion | The taking in of food, liquids etc. |
| Inguinal | To do with the groin |
| Inorganic | Compounds that lack carbon |
| Insertion | The attachment of a muscle tendon to a bone that moves |
| Inspiration | Breathing in |
| Insulin | A hormone produced by the pancreas. Decreases blood glucose levels |
| Internal | Away from the surface of the body |
| Interstitial fluid | Extracellular fluid surrounding the cells |
| Intervertebral disc | A pad of cartilage between the vertebrae |
| Intestinal juice | Digestive secretion produced by glands in the lining of the small intestine |
| Intracellular fluid | Fluid within the cells |
| Invertebrates | Animals that do not posses a backbone or vertebral column |
| **J** |  |
| Jejunum | The middle portion of the small intestine |

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| **K** |  |
| Keel | The breast bone in birds |
| Keratin | A protein found in epidermis, hair, feathers, hoofs etc. |
| Kidney | The organ that produces urine |
| **L** |  |
| Lachrymal gland | The tear gland of the eye |
| Lactation | The secretion and ejection of milk by mammary glands| |
| Large intestine | Part of the gut consisting of the colon, caecum, rectum and anal canal |
| Larynx | The voice box |
| Lateral | Away from the midline |
| Liver | The large organ caudal to the diaphragm |
| Longitudinal | Lengthwise slice of an animal or organ |
| Lordosis response | Standing firm to pressure on the loin region |
| Lumbar | Loin region of the back |
| Lumen | A space within an artery, vein, intestine or tube |
| Lung | The organs of respiration |
| Luteinising hormone | The hormone from the anterior pituitary gland that stimulates ovulation and development of corpus luteum |

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| **M** |  |
| Mammary gland | The milk producing gland |
| Mandible | The bone of the lower jaw |
| Marrow | The soft sponge like material in the cavities of bone |
| Matrix | The substance of a tissue in which the more specialised structures are embedded |
| Maxilla | The bone of the upper jaw |
| Medial | Towards the midline |
| Medulla | Inner part of an organ |
| Medulla oblongata | The part of the brain stem or hind brain |
| Meninges | The membranes covering the brain and spinal cord |
| Mesentery | The membrane attaching the small intestine to the abdominal wall |
| Metacarpals | The bones of the “hand” |
| Microfilaments | A solid contracting strand in the cytoplasm of cells that brings about cell contraction. |
| Microvilli | The microscopic fingerlike projections from the membrane of the cells covering the villi of the small intestine |
| Mucus | A thick fluid secretion |
| **N** |  |
| Nasal cavity | The space just inside the nostril |
| Neurotransmitter | Molecules released at a synapse to transmit the nerve impulse from one neuron to the next |
| Neutral fat | A fat or triglyceride. Biological compound consisting of three fatty acids linked to one glycerol molecule |
| Neutrophil | White blood cell with granules in the cytoplasm involved in phagocytosis |
| Nictitating membrane | The third eyelid in the cat, tuatara and crocodiles |
| Normal saline | A 0.9% solution of sodium chloride |
| Nuclear membrane | The double layered membrane that surrounds the nucleus |
| Nucleolus | The spherical body within the nucleus, containing RNA |
| Nucleus | The spherical or oval body in the cell that contains the DNA |
| Nutrient | A chemical substance in food that provides energy or assists various body processes |

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| **O** |  |
| Oesophagus | The hollow muscular tube connecting the pharynx with stomach |
| Omasum | Part of the modified stomach of ruminants with a folded inner surface |
| Organ | A structure with a specific function |
| Origin | The attachment of a muscle to a bone that does not move |
| Ossicle | A small bone |
| Ossification | The formation of bone |
| Otolith | A particle of calcium carbonate embedded in the membrane of the otolith organ of the inner ear |
| Ovary | The female gonad that produces ova |
| Ovulation | The release of the ovum from the mature follicle of the ovary |
| Ovum | The egg cell (plural: ova) |
| **P** |  |
| Pancreas | The organ lying along the caudal margin of the stomach. Has endocrine and exocrine functions |
| Pancreatic juice | The digestive secretion produced by the pancreas |
| Parasympathetic division | One of the two parts of the autonomic nervous system. Concerned with normal “at rest” activities |
| Parathyroid gland | One of four small endocrine glands on the dorsal surface of the thyroid gland |
| Parotid gland | One of the paired salivary glands ventral to the ear |
| Patella | The kneecap |
| Pathogen | A disease-producing organism |
| Pectoral | To do with the chest or breast |
| Pelvic cavity | The caudal portion of the abdominal cavity. Contains the bladder, colon and reproductive structures |
| Pelvic girdle | The bony structure formed by the hip bones, sacrum and coccygeal bones |
| Pelvis | The structure formed by the two hip bones, sacrum and coccyx |
| Pericardial cavity | The small cavity between the two layers of the pericardial membranes |
| Pericardium | The membrane that encloses the heart |
| Periosteum | The tough connective tissue covering of a bone |
| Peripheral | Located on the outer part of the body |
| Peripheral nervous system | The part of the nervous system composed of the cranial and spinal nerves |
| Peristalsis | The successive muscular contractions along the wall of the gut |
| Peritoneum | The membrane that lines the abdominal cavity and covers the abdominal organ |
| Physiology | The science that deals with the functions of an organism and its parts |
| Pivot joint | A synovial joint where a peg of bone articulates with a ring of bone as in the joint between the atlas and axis |
| Pleura | Membranes that cover the lungs and line the walls of the chest and diaphragm |
| Pleural cavity | The space between the two layers of the pleura |
| Prolactin | A hormone produced by the anterior pituitary gland |
| Prostate gland | The gland caudal to bladder in males |
| Proteases | Enzymes that split proteins into amino acids |
| Protein | An organic compound consisting of carbon, hydrogen, oxygen and nitrogen. Made up of amino acids |
| Proximal | Nearer to the body or to the point of origin |
| Pulmonary | To do with the lungs |
| Pulp cavity | The cavity within the crown and neck of a toot |
| Pulse | The series of waves of high pressure blood passing along an artery |

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| **R** |  |
| Radius | The shorter bone of the forelimb between the humerus and the “wrist” |
| Refraction | Bending of light as it passes from one medium to another |
| Relaxin | The hormone secreted by the placenta and ovaries that eases the joint between the right and left pelvis and dilates the cervix for birth |
| Renal | To do with the kidney |
| Renal pelvis | The cavity in the centre of the kidney |
| Renal pyramid | A cone shaped structure in kidney medulla |
| Renal system | The body system involving the kidneys |
| Reticulum | The part of the modified stomach of ruminants with honeycomb of raised folds on its inner surface |
| Rickets | A bone disorder caused by inadequate vitamin D |
| Rod | The photoreceptor in the retina, specialized for vision in dim light |
| Rostral | Towards the muzzle |
| Rumen | The first and largest compartment of the modified stomach of ruminants.It houses the microorganisms |
| Ruminant | An animal with a rumen: sheep, cow, camel |
| Rumination | Chewing the “cud” |
| **S** |  |
| Sacrum | The triangular bone formed from fused sacral vertebrae.Located between the two hipbones |
| Sagittal plane | Plane that divides the body into left and right portions |
| Sagittal section | Lengthwise slice of an animal or organ |
| Saliva | The secretion from the salivary glands |
| Salivary amylase | The starch digesting enzyme in saliva |
| Scapula | The shoulder blade |
| Sebum | The waxy secretion from a sebaceous gland |
| Secondary sex characteristic | A characteristic that develops at sexual maturity. e.g. large body size of males, manes in lions |
| Secretion | The production or release of a fluid from a gland |
| Semicircular canals | The membranous fluid filled canals containing receptors for equilibrium |
| Semilunar valve | The valve guarding the entrance to the aorta or the pulmonary artery |
| Seminiferous tubule | The tightly coiled duct in the testis where sperm are produced |
| Sensory neuron | A neuron that carries a nerve impulse towards the central nervous system |
| Serum | Plasma minus its clotting proteins |
| Sesamoid bones | Small bones usually found in tendons |
| Shock | Reduced cardiac output resulting in failure to deliver adequate oxygen and nutrients to the body |
| Shoulder | The synovial joint where the humerus joins the scapula |
| Sinus | An air cavity in a bone especially in the bones of the face or skull |
| Skeletal muscle | Tissue specialized for contraction with striated fibres. Attached to the bones of the skeleton |
| Skull | The skeleton of the head |
| Small intestine | The long tube of the gut that begins at the stomach and ends at the large intestine |
| Smooth muscle | Tissue specialized for contraction with spindle shaped non striated fibres |
| Spinal cord | The mass of nerve tissue in the vertebral column |
| Spinal nerve | One of the nerves that originate in the spinal cord |
| Spleen | The large lymphatic organ near the stomach that stores blood and produces lymphocytes |
| Spongy bone | The inner layer of bone; found at the ends of long bones less dense than compact bone |
| Squamous | Scale like |
| Stifle | The joint between the femur and the tibia on the hind leg |
| Stomach | The large baglike part of the gut between the oesophagus and the small intestine |
| Striated muscle | Striped or skeletal muscle |
| Subcutaneous | Beneath the skin |
| Submandibular gland | The salivary gland beneath the tongue |
| Substrate | A substance on which an enzyme acts |
| Sulcus | A groove or depression between the convolutions of the brain |
| Superficial | Nearer to the surface of |
| Suture | An immoveable joint in the skull |
| Sympathetic division | One of the two subdivisions of the autonomic nervous system concerned with reacting to emergency situations |
| Synovial joint | A fully moveable joint |
| Systemic circulation | The blood circulation from the left ventricl through the aorta to all the organs of the body and back to the heart |
| Systole | The phase of the heartbeat involving contraction of the ventricles |
| Systolic blood pressure | The blood pressure during passage of the pulse |
| Synovial joint | A fully moveable joint |

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| **T** |  |
| Target cell | A cell whose activity is affected by a particular hormone |
| Tarsals | The bones of the “ankle” |
| Tendons | A tough cord of fibrous connective tissue that connects muscles to bones |
| Testis | The male gonad that produces sperm |
| Thoracic cavity | The chest cavity that contains the heart and lungs |
| Thorax | The part of the body between the neck and the diaphragm |
| Tissue | A group of similar cells |
| Tissue fluid | Plasma that has left the capillaries and flowed into the spaces between the cells of the tissues; also known as intercellular fluid or interstitial fluid |
| Total lung capacity | The sum of the tidal volume, inspiratory reserve, expiratory reserve and residual volume of the lungs |
| Trachea | The windpipe |
| Transverse | A crosswise slice of an animal or organ |
| Triceps | The muscle that extends from the shoulder to the elbow responsible for extending the forearm |
| Trunk | The part of the body to which the fore and hind limbs are attached |
| Tympanic membrane | The thin transparent membrane of connective tissue between the external ear, canal and the middle ear. Also called the eardrum |
| **U** |  |
| Ulna | The longer bone of the forelimb between the humerus and the “wrist” |
| Umbilical cord | The cord containing arteries and vein that attaches the foetus to the placenta |
| Unguligrade locomotion | Locomotion on the “fingernails” as in horses and pigs |
| Urea | The soluble excretory product produced when excess amino acids (from proteins) are broken down by the body |
| Ureter | One of two tubes that connect the kidney with the bladder |
| Urine | The fluid produced by the kidneys |
| Uterus | The hollow muscular organ in females where the foetus develops |
| **V** |  |
| Vane | The flat part of a feather emerging from the shaft; there are two vanes per feather |
| Vascular | To do with blood |
| Vasoconstriction | The decrease in size of the channel down a blood vessel |
| Vaso dilation | The increase in size of the channel down a blood vessel |
| Vein | A blood vessel that carries blood towards the heart |
| Velvet | The tissue layer that covers antlers |
| Vena cava | One of two large blood vessels that return blood to the heart |
| Ventral | Nearer the belly of the animal than |
| Ventricles | The caudal chambers of the heart |
| Venule | A small vein |
| Vertebral canal | The channel that encloses and protects the spinal cord |
| Vertebrates | Animals that have a backbone or vertebral column |
| Vesicles | Small, intracellular membrane-bound sac |
| Vestibular organ | The organ of balance – semicircular canals and otolith organ |
| Villus (pl. villi) | A projection from the lining of the small intestine to help absorb digested food molecules |
| Viscera | The organs in the abdominal and pelvic cavities |
| Visceral skeleton | Bones formed in the organs of the body |
| Viscosity | The thickness or stickiness of a liquid |
| Vital capacity | The sum of the inspiratory and expiratory reserve volumes and the tidal volume |
| Vital capacity | The volume of the air expired when a maximum expiration follows a maximum inspiration |
| Vitamin | An organic molecule necessary in minute quantities for the proper functioning of the chemical processes in the body |
| Vitreous Humor | The fluid in the posterior chamber of the eye |
| **W** |  |
| White matter | Masses of myelinated axons located in the brain and spinal cord |
| **Y** |  |
| Yellow marrow | Bone marrow that is yellow with fat; found at the ends of long bones |
| **Z** |  |
| Zona pellucida | The tough layer surrounding the ovum |
| Zygote | Single cell resulting from the union of the sperm and egg |

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| HANDBOOK GRAMMAR |
| |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **Инфинитив**  Инфинитив (**the Infinitive**) – это неличная форма глагола, которая называет действие. Инфинитив является основной (или I) формой глагола и представляет глагол в словаре. Признаком инфинитива является частица **to**:**to help** – помогать, **to read** – читать. Инфинитив употребляется без частицы **to** в следующих случаях:  You had better go now. Лучше уйди / иди сейчас. I must see you at once. Мне надо сейчас же встретиться с тобой. В современном английском языке инфинитив имеет следующие формы.   |  |  |  | | --- | --- | --- | |  | **Active** | **Passive** | | Indefinite | to write | to be written | | Continuous | to be writing | — | | Perfect | to have written | to have been written | | Perfect Continuous | to have been writing | — |   Инфинитив в форме действительного залога обозначает действие, произведённое лицом, выраженным в предложении подлежащим, а в страдательном залоге - действие, направленное на это лицо.  **I like to help.** Я люблю помогать. **I like *to be helped*.** Я люблю, когда мне помогают.  Инфинитив в Indefinite Active обозначает действие, не уточняя характер его протекания. Инфинитив в**Continuous Active** подчёркивает длительность действия.  **She likes *to write* letters.** Она могла писать письмо. **She must *be* still *writing*.** Она, должно быть, всё ещё пишет.  Неперфектный инфинитив выражает действие, одновременное с действием глагола-сказуемого (или следующее за ним). Перфектный инфинитив выражает действие, предшествующее действию, выраженному глаголом-сказуемым.  **I am glad *to study* at the University.** Я рад, что учусь в университете. **I am glad *to have studied* at the University.** Я рад, что учился в университете. | |
| **Герундий. The Gerund** |
| Герундий имеет свойства как глагола, так и существительного. Подобной неличной формы в русском языке нет. Как существительное он может выполнять в предложении функции подлежащего, дополнения, определения и обстоятельства с предлогом. Как глагол может иметь после себя прямое дополнение и определяться наречием, иметь перфектную форму, категорию залога, а также выражать действие как процесс.  Герундий образуется от основы глагола с помощью суффикса **-ing**. **To translate – translating**, **to read – reading**.   |  |  |  | | --- | --- | --- | |  | active | passive | | Indefinite | writing | being written | | Perfect | having written | having been written | |  |  |  |   Формы герундия совпадают с формами **Participle I** и **Perfect Participle**. Однако, это разные формы глагола, отличающиеся и по значению и по синтаксическим функциям.  Формы **Indefinite Gerund** обозначают действия, одновременные с действием, выраженным глаголом-сказуемым.  **He likes *inviting* friends to his place.** Он любит *приглашать* друзей к себе. **He likes *being invited* to his friends.** Он любит, *когда его приглашают* к себе его друзья.  Перфектные формы герундия (Perfect Gerund) обозначают действия, предшествующие действию, выраженному глаголом-сказуемым.  **He is proud *of having invited* this man to his place.** Он гордится тем, что*пригласил* этого человека к себе. **He was proud *of having been invited* to the party.** Он гордился тем, что *его пригласили* на вечер. |

**Условные придаточные предложения**

Условные предложения могут выражать реальные, маловероятные (условные предложения I типа) и нереальные условия (условные предложения II типа).

**Условные предложения I типа**

Условие, содержащееся в условном придаточном предложении, рассматривается говорящим как реально предполагаемый факт, относящийся к настоящему, прошедшему или будущему временам. Сказуемые главного и придаточного предложений выражаются глаголами в формах изъявительного наклонения.

**If the weather *is nice*, we go for a walk.** Если погода хорошая, мы ходим на прогулку.  
**If the weather *was nice*, we *went* for a walk.** Если погода была хорошая, мы ходили на прогулку.  
**If the weather *is nice*, we'*ll go* for a walk.** Если погода будет хорошая, мы пойдём на прогулку.

**Условные предложения II типа**

Условие, содержащееся в условном придаточном предложении, рассматривается говорящим как маловероятное. Для выражения малой вероятности осуществления действия в настоящем или будущем временах сказуемое главного предложения употребляется в форме сослагательного наклонения **should / would + Indefinite Infinitive без to**, а сказуемое придаточного предложения - в форме сослагательного наклонения, аналогичной **Past Indefinite** или were для всех лиц от глагола **to be**.

**If he *were* free, he *would do* it.** Если *бы* он *был свободен*, он *бы* это *сделал*.  
**If we *paid more attention* to grammar, we *should know* the language better.**Если *бы* мы *уделяли* грамматике больше внимания, мы *бы знали* язык лучше.

**Условные предложения III типа.**

Условие, содержащееся в условном придаточном предложении, рассматривается говорящим как неосуществимое, так как относится к *прошлому* времени. Сказуемое главного предложения употребляется в форме сослагательного наклонения **should / would + Perfect Infinitive**, а сказуемое придаточного предложения в форме сослагательного наклонения, аналогичной **Past Perfect**.

**I *should not have been late* yesterday, if my watch *had been write*.** Я *бы не опоздал* вчера, если *бы* мои часы *шли* правильно.

**Союзы условных придаточных предложений.**

**if** – если; **in case** – в случае, если; **suppose (that)** – предположим, что; **on condition (that)** – при условии, что; **provided (that)** – при условии, что; **unless** – если … не; **but for** – если бы не

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1. Комарова Е. А. Английский для специальностей зоотехния и ветеринария / Е. А. Комарова. ­– М. : Академия, 2008.

2. Michael Vince Advanced Language Practice / Vince Michael.

М. : Mucmillan Publishers Limited, 2008.

3. Practical English Usage.– Oxford University Press, 2011.

4. Oxford Advanced Learner's Dictionary. – 7-th edition – Oxford University Press, 2005.

5. Larry Tilley, Francis W. K. Smith Jr. // Veterinary Consult: Canine and Feline medicin. Mucmillan Publishers Limited; September, 2015.

6. Anatomy and Physiology of Animals [Электронный ресурс]. ­– Режим доступа: https://en.wikibooks.org/wiki/Anatomy\_and\_Physiology\_of\_Animals.

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