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КАФЕДРА ИНОСТРАННЫХ ЯЗЫКОВ

ENGLISH FOR VETERINARIANS

Учебное пособие
для аудиторной и самостоятельной работы студентов
по специальности 36.05.01 «Ветеринария»,
квалификация выпускника «Ветеринарный врач»

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Данное пособие предназначено для студентов института ветеринарной медицины и биотехнологии по специальности 36.05.01 «Ветеринария», квалификация «Ветеринарный врач» и имеет целью подготовить их к чтению и переводу специальной литературы на английском языке. Пособие содержит большое количество текстов по специальности и разнообразные лексико-грамматические упражнения для проработки на занятиях под руководством преподавателя и самостоятельной работы.

Учебное пособие составлено в соответствии с требованиями Федерального государственного образовательного стандарта высшего образования (ФГОС ВО) по по специальности 36.05.01 «Ветеринария», утвержденный приказом Министерства образования и науки Российской Федерации от 04. 12. 2015 г. № 1431

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Рекомендовано учебно-методической комиссией института экономики и агробизнеса Брянского ГАУ протокол № 1 от 12 октября 2018 г.

Предисловие

Дисциплина «Иностранный язык» входит в цикл базовых (обязательных) дисциплин гуманитарного цикла и признана способствовать общему интеллектуальному развитию студентов, их способностей к социальному и профессиональному взаимодействию, стимулирует к самообучению, академической мобильности и непрерывному образованию, что обеспечивает формирование и развитие иноязычных информационно-коммуникативных компетенций.

Учебное пособие составлено в соответствии с требованиями ФГОСов ВО и Примерной программой «Иностранный язык» для неязыковых вузов и факультетов (Москва, 2009), имеет целью формирование общекультурных компетенций и предназначено для студентов по специальности 36.05.01 «Ветеринария», квалификация «Ветеринарный врач».

Учебное пособие направлено на реализацию ОК-6: обладать способностью к коммуникации в устной и письменной формах на русском и иностранных языках для решение задач межличностного и межкультурного взаимодействия; ОПК-2: обладать готовностью к коммуникации в устной и письменной формах на русском и иностранном языках для решения задач профессиональной деятельности.

Основными целями данного учебного пособия является повышение исходного уровня владения иностранным языком, обучение студентов лексике ветеринарной направленности, развитие навыков чтения специализированных текстов и общения на профессионально ориентированные темы. При этом пособие должно подготовить студентов к дальнейшему обучению реферированию и аннотированию более сложных, в том числе аутентичных, текстов по ветеринарии.

Пособие включает 14 модулей с текстами, коммуникативными упражнениями и словарным минимумом, направленных на развитие у студентов навыков чтения и перевода специальной литературы, активизацию профессиональной терминологии на русском и английском языках. Необходимо отметить, что тексты носят учебный характер и рассматривают вопросы ветеринарии. В зависимости от уровня языковой подготовки группы возможно привлечение дополнительного материала по данным темам.

Contents

Module 1

Mammals

When man, the dominant species on earth, looks around him, he must realize at once that he shares his home, our planet, with a vast number of other living things.

Man himself is a mammal and also are many of the animals with whom he is most closely associated: the dogs and cats which often share his life: the cows and sheep and pigs upon which he feeds: the oxen, donkeys and horses which, until very recently, pulled his ploughs, carried his burdens and gave him his most effective means of transport; and the rats and mice which, even in an age when hygiene has become a fetish, still manage to appear as unwelcome guests in his home.

Quite apart from such familiar creatures, a richly varied cast of wild mammals is still spread in astonishing diversity over the face of the earth.

In the first place, all mammals belong to the important division of the animal kingdom as the Vertebrata, or "backboned animals". But reptiles, birds, amphibians and fishes are vertebrates too. All animals have lungs and breathe atmospheric air. But so do birds and reptiles, as well as most adult amphibians. Practically every mammal gives birth to living young, but many reptiles and fish also do this. Mammals are warm-blooded, but we can say the same of birds. How then do mammals differ from their vertebrate cousins? What are the typical mammalian qualities that they share among themselves?

A most important distinction between mammals and other vertebrates is that all mammals—and only mammals—produce milk with which they feed their young.

Another important distinction between mammals and all other vertebrates, indeed, all other living things—is that only mammals possess true hair. A hairy covering is particularly important to mammals as a protection against rain and cold.

Besides possessing hair and producing milk, mammals also have a number of other internal characteristics which are especially typical, though perhaps less obvious. The number of their skull bones is reduced, as compared with other vertebrates, and each hat of the

lower jaw consists of but a single bone. The teeth are typically differentiated and specialized. In the circulatory system, the left aortic arch forms the connection with the heart, as compared to the right aortic arch in birds. A muscular wall, or diaphragm, separates the chest cavity from the abdominal cavity.

Certainly the most important single factor which gives, mammals their superiority over other animals is the development of their brain. The mammalian brain is a complex and highly organized structure, much more advanced than that of any other animal. This development also has been made possible by the capacity for heat regulation, which has been such an advantage to mammals in other ways. The ability to maintain the complex activities of the cerebral cortex in the higher mammals, and to store memories, is very largely dependent on the ability to maintain a constant body temperature.

Vocabulary

1. species	виды
2. living thing	живое существо
3. mammal	млекопитающее
4. to share	разделять
5. plough	плуг
6. burden	ноша
7 fetish	фетиш, амулет, идол, кумир
8. wild mammals	дикие млекопитающие
9. to spread	распространяться
10. diversity	разнообразие
11. vertebrata (лат.) backboned	позвоночные животные
12. lungs	легкие
13. adult	взрослый
14. to give birth	рождать живое потомство
15. warm-blooded	теплокровный
16. hair	волосяной покров
17. obvious	явный, очевидный
18. scull bones	кости черепа
19. lower jaw	нижняя челюсть
20.differentiated	дифференцированный
21. circulatory system	кровеносная система
22. aortic arch	дуга аорты

23. muscular wall	грудно-брюшная перегородка
24. brain	мозг
25. to advance	продвигаться
26. heat regulation	теплорегуляция
27. cerebral cortex	кора головного мозга
28. to store memories	сохранять в памяти
29. constant body temperature	постоянная температура тела

Text work

1. Give the Russian for:

1. Man himself is a mammal.
2. All mammals belong to the important division of the animal kingdom. .
3. All mammals have lungs and breathe atmospheric air.
4. Mammals are warm-blooded.
5. Important distinctions between mammals and other vertebrates are to produce milk and possess true hair.
6. The skull bone of mammals is reduced.
7. The left aortic arch forms the connection with the heart.
8. The mammalian brain is a complex and highly organized structure.
9. Mammals have the ability to maintain a constant body temperature.

2. Give the English for:

1. Человек - доминирующий вид на Земле.
2. Млекопитающие, рептилии, птицы, амфибии, рыбы - позвоночные.
3. Млекопитающие производят потомство путем деторождения.
4. Волосяной покров млекопитающих - защита от дождя и холода.
5. Нижняя челюсть состоит из единственной кости.
6. Диафрагма разделяет грудную и брюшную полости
7. Важный фактор, который дает преимущество млекопитающим - развитие их мозга.

3. Insert the words given below and translate the sentences into Russian:

1. Man himself is a ...

2. Only mammals produce ..., with which they feed their young.
3. Only mammals process true ...
4. In the circulatory system the left ..,forms the connection with the heart,
5. A diaphragm separates the ... from the abdominal cavity.
6. The most important factor which gives superiority is the development of (heirs'...
7. The ability to maintain the complex activities of the cerebral cortex is very largely dependent on the ability to maintain a...
(mammal, constant body temperature, milk, hair, brain, chest cavity, aortic arch).

4. Answer the following questions:

1. Is man the dominant species on the earth?
2. What animals are associated with man?
3. What division of the animal kingdom do all mammals belong to?
4. What qualities do mammals possess?
5. What are the important distinctions between mammals and other vertebrates?
6. What makes mammals superior to other animals?

Module *2*

Variety of mammals

The living members of the class mammalia are today divided into three main sub-classes, according to differences in their anatomy and the manner in which they bear their young. First the monotremes, or egg-laying mammals., of which there are only two families. Second are the marsupials, or mammals with pouches for carrying their young, which are comparatively undeveloped, even embryonic in appearance at birth. Third, and by far the largest group are the placentals, mammals whose young grow and develop within the mother's body, nourished by means of an organ known as the placenta, which forms a connecting link with her own blood stream. These three major divisions developed very early in mammalian history and each of them evolved thereafter quite independently of

the others. But these three main divisions are just the beginning. Living mammals are further divided into 18 smaller groups or orders. Subdivisions of each order are also made - families, genera, species - according to the degree of evolutionary kinship. In addition to any popular name or names, it may have, each species of animal known to zoologists is given a scientific name. The system by which individual kinds of mammals are scientifically named within the large categories can be seen by taking a familiar example, the wolf. First of all, the wolf belongs to the class mammalian. Then it fells in a group made up of the placental mammals, and is further separated into the order Carnivora, or meat-eating mammals. To distinguish it from such other meat eaters as cats, weasels and the like, it is placed in the family Canidae, that of the doglike carnivores. Together with various other closely related species, it is included in the genus Canis, which separates it from such closely allied groups as the foxes and the bush dogs. The specific name of the wolf is Canis lupus, distinguishing it from all near relatives, such as the coyote (Canis Latrans) and the domestic dog (Canis familiaris).

Vocabulary

1. monotremes	первозвери (биолог.)
2. egg-laying	яйцекладущие
3. marsupials	сумчатые
4. youngs	детеныши
5. placentals	плацентарные
6. blood stream	поток крови
7. order	отряд
8. evolutionary kinship	эволюционное развитие
9. popular name	название в обиходе
10. scientific name	научное название
11. order Carnivora (лат.)	отряд Carnivora
12. meat-eating	хищные (отряд)
13. family Canidae (лат.)	семейство Собачьи
14. genus Canis (лат.)	род Волк
15. specific name	видовое имя
16. domestic dog	домашняя собака

Text work

1. Give the Russian for:

1. The class mammalia are divided into three main sub-classes.
2. There are egg-laying, marsupial and placental mammals.
3. These divisions are just the beginning.
4. Mammals are further divided into 18 smaller groups.
5. The wolf belongs to the class mammalian.
6. The specific name of the wolf is Canis lupus.

2. Give the English for:

1. Яйцекладущих млекопитающих только два семейства.
2. Детеныши плацентарных млекопитающих растут и развиваются в материнском теле.
3. Каждое млекопитающее;, известное зоологам, имеет научное название.
4. Волк относится к группе плацентарных млекопитающих.
5. Далее волк относится к отряду Хищные,
6. Вместе с другими близко родственными видами волк включен в род Волк.

3. Insert the words given below and translate the sentences into Russian:

1. Three main sub-classes of the class Mammalia are the monotremes, the mar-supials and the...
2. Living mammals are further divided into ...
3. Wolf is a...
4. Wolf belongs to the class ...
5. Further the wolf is separated into the order ...
6. The ... is included in the genus Canis
7. The placental mammals nourished their young by means of an organ known as the ...

(wolf, Carnivora, mammal, 18 smaller groups, placenta, mammalian, placentals).

4. Answer the following questions:

1. What sub-classes are the living members of class Mammalia divided into?

2. What animals belong to the monotremes?
3. What is the second sub-class?
4. Are the placentals the largest group of mammals?
5. What are the placentals?
6. What is the further division of living mammals?

Module 3

How mammals eat

Food is the fuel which makes the body machine work, and without it living things quickly lose their energy and eventually die. Plants do not "eat" in the sense that we usually understand that terra, but they do synthesize organic food, using chemicals in the soil and the air as ingredients, and the rays of the sun as the source of energy. The lowest animals, on the other hand, absorb their nourishment directly through their body coverings. Thus the amoeba, although lacking a mouth, sur-rounds food particles and absorbs them through the flexible membrane in which it is enclosed.

With the higher animals this process of taking in food has become much more complex. To get their essential nourishing fuel and to break it down, for energy, mammals, like other vertebrates, have to perform a whole series of complicated operations. First, of course, each animal has to find an actual supply of the kind of food suited to its particular bodily needs.

Second, the animal must actually get the food into its mouth. But finding food and getting it to the mouth are still only the beginning of the problem. A further complex sequence of events mu3t occur before the food can perform its function of nourishing the animal and keeping it alive. First the mouth itself must be equipped with suitable machinery for dealing with the particular food which it receives. In most mammals this machinery is provided by the teeth, and these vary enormously from species to species in arrangement and structure. When a mammal swallows food, usually after chewing it, the food passes into the esophagus, a simple passage which conveys it quickly to the much wider envelope known as the stomach. Here the proteins are broken down by the action of the gastric juices, and the food goes on to the small intestine. Now

reduced to a sort of mash, it continues to break down into simpler components, some of which are immediately absorbed into the blood stream. These processes continue in the caecum and large intestine. Nourishing matter is absorbed in different proportions into the blood stream as the journey proceeds. Finally, the unused residue is passed out through the rectum and returns to the soil as manure to enrich the food supply on which future generations may feed.

Vocabulary

1. on the other hand	с другой стороны
2. to absorb	абсорбировать (всасывать)
3. nourishment	питательные вещества
4. body coverings	покровы тела
5. although	зд. несмотря на
6. to surround	окружать
7. food particles	частицы пищи
8. flexible membrane	эластичная: мембрана
9. to actually get	по-настоящему доставлять
10. machinery for dealing	аппарат для переработки
11. these vary enormously	Эти очень различаются
12. to swallow	глотать
13. to chew	пережевывать
14. esophagus	пищевод
15. passage	проход
16. envelope	расширение
17. stomach	желудок
18. gastric juice	желудочный сок
19. small intestine	тонкий кишечник
20. mash	химус (содержимое желудка)
21. to break down	разрушать, расщеплять
22. blood stream	кровеносная система
23, caecum	слепая кишка
24. large intestine	толстый кишечник
25. nourishing matter	питательное вещество
26. rectum	прямая кишка
27. manure	навоз

Text work

1. Give the Russian for:

1. Plants do not "eat" in the sense that we usually understand that term.
2. The lowest animals absorb nourishment through their body coverings.
3. In the higher animals this process of taking in food has become much more complex.
4. When a mammal swallows food, usually after chewing it, the food passes into the esophagus.
5. After this, food passes into the stomach.
6. Here the proteins are broken down.
7. Nourishing matter is absorbed into the blood stream.
8. The unused residue is passed out through the rectum.
9. Manure enriches the food supply.

2. Give the English for:

1. Пища - топливо, без которого живущие организмы погибают.
2. Растения синтезируют органическую пищу.
3. Амеба окружает частицы пищи и всасывает их.
4. Высшие млекопитающие, чтобы получить их основную пищу и преобразовать ее в энергию, должны выполнить ряд операций.
5. Животные должны действительно доставить пищу в рот.
6. Рот животных должен быть снабжен подходящим аппаратом для переработки пищи.
7. Этот механический аппарат представлен зубами.
8. Пищевод - простая трубка, которая соединяется с желудком.
9. Там белки разрушаются под действием желудочного сока.
10. Пища попадает в тонкий кишечник.
11. Пища редуцируется до химуса.

3. Insert the words given below and translate the sentences into Russian:

1. Food is the fuel which makes the body machine ...
2. Plants using ... in the soil and the air as ingredients.
3. They use also the ... as the source of energy.
4. Each animal has to ... an actual supply of the kind of food.
5. The mouth must be equipped with the ...

6. In the ... the proteins are broken down.
7. After that the food goes on to the ...
8. Now reduced to a ..., it continues to break down into simpler components.
9. Nourishing matter is ... into the blood stream.
(Small intestine, find, absorbed, work, stomach, chemicals, teeth, rays of the sun, sort of mash)

4. Answer the following questions:
1. What is food for living things?
2. How do plants "eat"?
3. Do the lowest animals eat? Give the example.
4. Is the process of taking in food in the higher animals the same as in the lowest ones?
5. What stages does the process of eating in the vertebrates consist of?
6. Describe the sequence of this process?

Module 4

Blood

Blood fulfills a number of functions, most of which are included in the following summary: 1) It carries nutrient substances from the alimentary canal to the tissues 2) It transports oxygen from the lungs to the tissues 3) It removes the waste products of metabolism from the tissues to the organs of excretion. 4) It transport!; the secretions of the endocrine glands. 5) It aids in the equalization of the water content of the body. 6) Because of its high specific heat it is an important aid in equalizing body temperature. 7) It is concerned in. the regulation of the hydrogen ion concentration in the organism. 8) It: assists in the body defenses against microorganisms.

For proper functioning the cells of the body, particularly the highly specialized ones require a remarkably constant environment. This is spoken of as the internal environment, or fluid matrix, of the organism. It is the same as the extracellular fluid of the body and is comprised of the interstitial, fluid and the blood plasma. Evidently

many of the functions of the blood are directed toward the maintenance of the constancy of the internal environment, of which the blood plasma is a part. This maintenance is spoken of as homeostasis.

Vocabulary

1. blood	кровь
2. nutrient substances	питательные вещества
3. tissues	ткани
4. alimentary canal	пищеварительный тракт
5. the waste products of metabolism	конечные продукты обмена веществ
6. secretions	Секреты (гормоны)
7. the hydrogen ion concentrations	РН (концентрация ионов водорода)
8. constant environment	постоянство внутренней среды(гомеостаз)
9. extracellular fluid	внеклеточная жидкость

Text work

1. Give the Russian for:

1. Blood fulfills a number of functions.
2. Blood transports the secretions of the endocrine glands.
3. Blood aids in the equalization of the water content of the body.
4. Blood aids in equalizing body temperature.
5. For proper functioning the cells of the body require a remarkably constant environment.
6. The maintenance of the constancy of environment is homeostasis.

2. Give the English for:

1. Кровь несет питательные вещества к тканям.
2. Кровь выводит конечные продукты из тканей.
3. Кровь участвует в регуляции РН
4. Она защищает от микроорганизмов.
5. Высоко-специализированные клетки.
6. Плазма крови.

3. Insert the words given below and translate the sentences into Russian:

1. Blood ... a number of functions
2. Blood carries nutrient substances from the ...
3. Blood removes the waste products to the ...
4. Blood ... in the body defends against microorganism
5. The internal environment is ...

(Alimentary canal, fluid matrix, fulfills, organs of excretion, assists)

4. Answer the following questions:

1. What functions does blood fulfill?
2. What do the cells require for proper functioning?
3. What is blood comprised of?
4. What are many functions of blood directed toward?
5. What is homeostasis?

Module 5

Cell Structure

Much has been learned about the visible structure of the cell since the days of Schleiden and Schwann. At the same time, the cell physiologist, the biochemist, the geneticist, and many others have helped the cytologist to understand how the various components of the cell function and how they are related to each other and to the total cell.

As stated earlier a cell is a mass of protoplasm enclosed within a limiting membrane, whose activities are controlled and directed by a nucleus. The two basic and essential components of the cell are the nucleus and the cytoplasm including its organelles. The nucleus, although it is not distinct in some forms (bacteria and blue-green algae), is suspended in the cytoplasm and is usually located near the center of the cell. The mass of protoplasm that constitutes a cell is enclosed within a plasma membrane, and in plants within an additional cell wall.

The plasma membrane, sometimes referred to as the cell membrane, is located at the surface of the cytoplasmic portico of the

cell. The plasma membrane is composed of both proteins and lipids. The plasma membrane is elastic and can spontaneously repair itself from minor tearing, but more severe injury usually results in disintegration of the cell.

The plasma membrane holds the contents of the cell together, of course, and separates the cell as a distinct functional unit of protoplasm. Perhaps the most important function of the plasma membrane is to allow through its selective ability or semi-permeability, the passage of materials into and out of the cell by means of diffusion, osmosis, and active transport .Waste materials of metabolism, as well as any secretory products, must pass to the outside of the cell. The plasma membrane provides for these interchanges between the cell and its environment and thus has a very significant role in maintaining the "life' of the cell.

Vocabulary

1. as stated earlier	как излагали ранее
2. to enclose	за. находиться
3. within	в пределах
4. essential	существенный
3. organelles	органеллы (органоиды)
6. blue-green algae	сине-зеленая водоросль (цианобактерия)
7. to be suspended	быть подвешенным
8. an additional cell all v.	гликокаликс (доп. мембрана у растении
9. to refer	ссылаться
10. both proteins lipids and	как белки, так и липиды
11. minor tearing;	незначительные повреждения
12. severe injury	серьезная травма
13.disintegration	распад
14. a distinct Junctional unit of eoplasm pro	четкое функц. объединение протоплазмы
15. semipermeability	полупроницааемость
16. diffusion	диффузия
1.7. osmosis	осмос

18. significant	важный
19. maintaining	поддержание

Text work

1. Give the Russian for:

1. Much has been learned about the visible structure of the cell.
2. A cell is a mass of protoplasm.
3. The two basic and essential components of the cell are the nucleus and the cytoplasm.
4. The plasma membrane is located at the surface of the cytoplasmic portion of the cell.
5. The plasma membrane holds the contents of the cell together.
6. Waste materials of metabolism must pass to the outside of the cell.
7. The plasma membrane maintains the "life" of the cell.

2. Give the English for:

1. Как различные компоненты клетки функционируют?
2. Как они: относятся друг к другу и ко всей клетке?
3. Деятельность клетки контролируется ядром.
4. У некоторых видов (бактерия и цианобактерия) ядро нечеткое.
5. Масса протоплазмы находится в пределах плазматической мембраны.
6. Плазматическая мембрана эластична.
7. Плазматическая мембрана разделяет клетку как четкое, функциональное объединение протоплазмы.

3. Insert the words given below and translate the sentences into Russian:

1. A cell is a mass of protoplasm enclosed within a ... membrane.
2. Cytoplasm includes its ...
3. In some forms ... is suspended in the cytoplasm.
4. In plants the mass of protoplasm that constitutes a cell is enclosed within an...
5. The plasma membrane is composed of both ... and lipids.
6. The plasma membrane can spontaneously ... itself from minor tearing.

7. The plasma membrane holds the contents of the .,. together.
8. The most important ... of the plasma membrane is to allow through its selective ability or semi-permeability the . passage of materials into and out of the cell.
(Nucleus, cell, limiting, function, protons, organelles, additional cell wall, repair)

4 Answer the following questions:
1. What is a cell?
2. What are the basic components of the cell?
3. Where is the nucleus located?
4. What is: the plasma membrane?
5. What is the plasma membrane composed of?
6. What is the function of the plasma membrane?

Module 6

Nucleus

The nucleus of the cell was first observed and recognized as a universal phenomenon by Robert Brown in 1831. In living material it is barely visible, but in fixed (preserved) and stained preparations, it appears ass a distinct, spherical body usually located near the center of the cell. In the non-dividing cell, the nucleus seems to be filled with a mass of material which, except for the presence of small spherical bodies known as nucleoli, seems to lack organization. The contents of the nucleus are enclosed by a. double porous membrane, the nuclear membrane. This membrane permits the interchange of material between the nucleus and the surrounding cytoplasm. On the inside, the nucleus contains a clear viscous fluid called nuclear sap or nucleoplasm in which is suspended the chromatin network. This network is composed of a definite number of chromosome threads or chromosome-mata, the number being constant for each species. These threads become transformed into chromosomes as the cell begins to divide. The chromosome threads contain the DMA molecules upon which is coded the genetic information needed by the cell to carry out all its activities (reproduction, growth,

differentiation, and metabolism) as expressed through the synthesis of proteins (including enzymes). The genetic information contained on the DNA molecules is transmitted by RNA from the nucleus; to the cytoplasm of the cell, where it is utilized. The nucleoli appear to be storage places for RNA. Since the nucleus contains all the DNA, hence all the genetic information within most cells it has ultimate control over all the activities of the cell.

Vocabulary

1. stained preparation	влажный препарат
2. non-dividing	неделящийся
3. nucleoli	ядрышко
4. double porous membrane	двойная пористая мембрана
5. nucleoplasm	ядерная жидкость
6. nuclear sap	кариоплазма
7. chromatin network	хроматиновая сеть
8. chromosome thread	нить хромое омы
9. DNA molecule	молекула ДНК
10. enzyme	фермент
11. RNA	РНК

Text work

1.Give the Russian for:

1. The nucleus was first observed by Robert Brown in 1831.
2. The contents of the nucleus are enclosed by a double porous membrane. 3. The nucleus contains a clear viscous fluid called nucleoplasm.
4. The chromosome threads become transformed into chromosomes as the cell begins to divide.
5. The genetic information contained on the DNA molecules, is transmitted by RNA from the nucleus to the cytoplasm of the cell.

2. Give the English for:

1. Ядро было признано всеобщим феноменом в 1831 году.
2. Ядерная мембрана обеспечивает обмен веществами между ядром и цитоплазмой.
3 В кариоплазме подвешена хроматиновая сеть.

4. Нити хромосом состоят из молекул ДНК.
5. Генетическая информация переносится РНК из ядра в цитоплазму клетки.
6. Ядрышки являются местами возникновения РНК.

3. Insert the words given below and translate the sentences into Russian:

1. Nucleus is a distinct, spherical body usually located, near the ... of the cell.
2. In the non-dividing cell, nucleus has the small spherical bodies known as ...
3. The chromatin network is composed of a ... number of chromosome threads.
4. The number of. … is constant for each species.
5. The... is coded upon the DMA molecules.
6. The cell needs this information to carry out all its activities as expressed through the...
7. Hence the ... controls all the activities of the cell.

(Synthesis of proteins, nucleoli, chromosome threads, definite, nucleus, center, genetic information)

4. Answer the following quaestions:

1. Who first observed and recognized the nucleus of the cell?
2. What is the nucleus?
3. What does the nucleus seem to be filled with?
4. What does the nuclear membrane permit?
5. What is the chromatin network?
6. What do chromosome threads contain?

Module 7

Tissues (Part I)

In all triploblastic animals (that is, animals that possess three germ layers), five tissue types differentiate: epithelial tissues, connective tissues, muscle tissues, nerve tissues, and blood. In organisms that lack mesoderm, many of these tissues do not develop,

making the body of these diploblasttc forms relatively simple. The five types of tissues found in the triploblastie animal body are described below.

An epithelium is a group of cells that covers a body surface or lines hollow organs and cavities within the body. The outer layers of the skin, the lining of the respiratory tract, and the entire lining of the digestive tract plus its derivatives are epithelial tissues. Epithelial tissues are the most cellular of all tissues in the body, and the cells are always arranged compactly.

Blood is a cell-containing fluid which transports oxygen, food materials, carbon dioxide, nitrogen-containing waste materials, and hormones. Blood, as it circulates through the body, helps to maintain a constant internal environment for the organism. It also facilitates the mobilization of a hurried defense against disease.

The fluid portion of blood is an intercellular material called plasma. The formed elements, or cells, are suspended in the plasma and are of three basic types: red blood cell (erythrocyte), the white blood cell (leucocyte), and the platelet (thrombocyte).

Vocabulary

1. triploblasiic	трехслойный
2. germ layers	зародышевые листки
3. lack	недостаток, нехватка
4. diploblasttc	двухслойный
5. epithelium	эпителий
6. line	зд. выстилка
7. outer	наружный, внешний
8. entire	внутренний
9. derivative	производное
l0. hurried defence	ускоренная защита
11. intercellular material	межклеточное вещество
12. formed elements	форменные элементы
13. platelets	кровяные пластинки (тромбоциты)

Text work

1. .Give the Russian for:

1. In all triploblastic animals five tissue types are differentiated.
2. An epithelium is a group of cells that covers a body surface.
3. Epithelial tissues are the most cellular of all tissues in the body.
4. Blood is a cell containing fluid which transports oxygen.
5. Blood helps to maintain a constant internal environment for the organism.
6. The fluid portion of blood is plasma.
7. Erythrocytes are the formed elements.

2. Give the English for:

1. Виды ткани: эпителиальная, соединительная, мышечная, нервная и кровь.
2. Эпителий выстилает полые органы и полости тела.
3. Клетки эпителия всегда расположены компактно.
4. Кровь переноса! питательные вещества, углекислый газ, азотосодержащие отходы.
5. Кровь облегчает мобилизацию ускоренной защиты.
6. Лейкоциты и тромбоциты - форменные элементы крови.

3. lnsert the words given below and translate the sentences into Russian:

1. ... is the animal tissue too.
2. In organisms that lack ... many of the tissues do not develop.
3. This makes the body ...
4. The outer layers of the skin, the lining of the respiratory tract are ... tissues.
5. Blood trans ports ...
6. The plasma is an ...
7. The formed, elements are of three basic types…

(Diploblastic, erythrocyte, epithelial, blood, thrombocyte, hormones, mesoderm, leucocyte, intercellular material)

4. Answer the following questions:

1. What five tissue types are differentiated in triploblastic animals?
2. What animals are called triploblastic?

3. What is an epithelium?
4. What is the function of the epithelium?
5. How is a cell containing fluid called?
6. What types of cells does the blood consist of?

Module 8

Tissues (Part 2)

Erythrocytes are non-nucleated cells whose sole function is that of transporting oxygen. They are the most numerous of the formed elements of blood, the number in man being 4,500,000 to 1000,000 per cubic millimeter of whole blood under normal conditions, White blood cells or leucocytes are nucleated cells. They are of two types: granulocytes, which have lobed nuclei and distinctly staining: granules in the cytoplasm, the agranulocytes (lymphocytes and monocytes) which have non-lobed nuclei and lack grannies in their cytoplasm. All leucocytes aid in the body's defense against disease, either by engulfing foreign particles such as bacteria, or by participating in the immune mechanism. They are less numerous than erythrocytes, their number being approximately 8,000 per cubic millimeter of whole blood. Thrombocytes are important in the clotting of blood. The normal number of thrombocytes in man is 250,000 per cubic millimeter of whole blood.

Lymph is a fluid closely related to blood, It is formed in tissue fluids (that is, the fluids which diffuse from the blood stream through capillary walls into the tissue spaces) are: collected into lymph capillaries. This fluid has a milky appearance, and its composition varies according to the organ from which it is collected. Lymph from the liver is usually rich in proteins, whereas that collected from the small intestine contains much fat.

The connective tissues are unlike either blood or the epithelial tissues in their relatively small number of cells per tissue volume. Although they are characterized by the presence of certain intercellular fluids and fibers, they are more variable in appearance: than any of the other tissues. All connective tissues are derived from mesenchyme, migrating mesodermal cells.

Vocabulary

1. non-nucleated	безъядерный
2. per cubic millimeter	на кубический миллиметр
3. granulocytes	гранулоциты
4. staining granule	зернистая гранула
5. engulfing	обезвреживание
6. clotting	свертывание
7. tissue space	тканевое пространство
8. milky appearance	консистенция молока
9. tissue volume	объём ткани
10. fiber	волокно
11. mesenchyme	мезенхима

Text work

1. Give the Russian for:

1. Erythrocytes sole function is that of transporting oxygen.
2. Their number in man being 4,500.000 to 5,000,000 per cubic millimeter of whole blood, under normal conditions.
3. Leucocytes are of two types: granulocytes and agranulocytes.
4. They are less numerous than erythrocytes.
3. Thrombocytes are important in the slotting of blood.
6. Lymph is a fluid closely related to blood.
7. This fluid has a milky appearance.
8. The connective tissues are unlike either blood or the epithelial tissues.
9. They are more variable in appearance than any of the other tissues.

2. Give the English for:

1. Эритроциты - безъядерные клетки.
2. Она самые многочисленные форменные элементы крови.
3. Гранулоциты имеют округлое ядро и четкие зернистые гранулы в цитоплазме.
4. Все лейкоциты помогают в защите организма против болезней.
5. Нормальное количество тромбоцитов у человека 250000 куб. мм. цельной крови.

6. Лимфа тонкого кишечника, содержит много жира.
7. Состав лимфы зависит or органа, от которого она оттекает.
8. Лимфа формируется в тканевой жидкости.
9. Соединительная ткань имеет маленькое количество клеток в межклеточной жидкости.

3. Insert the words given below and translated the sentences into Russian:

1. Erythrocytes or ... are the: most numerous of the formed elements of blood.
2. Leucocytes are ... cells.
3. Agranulocytes have … nuclei.
4. The number of ... are approximately 8000 per cubic millimeter of the whole blood.
5. … are important in the clotting of blood.
6. The tissue fluids diffuse from the blood stream through ... into the tissue spaces.
7. Lymph from the ... is usually rich in proteins.
8. All connective tissues are derived from ...

(Thrombocytes, liver, mesenchyme, nucleated, white blood cells, capillary walls, capillaries, red blood cells, erythrocytes, non-lobed)

4. Answer the following .questions:

1. What are erythrocytes'?
2. How many erythrocytes are there in man being under normal condition?
3. What are leucocytes?
4. What types of leucocytes are there?
5. What is the function of leucocytes?
6. What is lymph?
7. What differs the connective tissues from blood or the epithelial tissues?

Module 9

Tissues (Part 3)

There are two categories of connective tissues: the connective tissues proper (fibrous tissues, concerned primarily with connecting one part of the body to another) and the supporting connective tissues (cartilage and bone). Both are composed of cells, fibers, and intercellular matrix, but they differ functionally according to the rigidity of the intercellular substances.

Muscle tissue is differentiated into three types: smooth (or visceral), skeletal (or striated), and cardiac. All types function to cause movement through a contraction of the myofibrils embedded in the cytoplasm of the cells or fibers.

Smooth muscle cells are spindle-shaped, and each contains a single cigar-shaped nucleus located near the center of the cell. These cells ate normally found as compact layers in the walls of such hollow organ as the stomach and intestine, the blood vessels, the urinary bladder, the uterus, the spleen, and various ducts. Smooth muscle tissues are termed “involuntary”, because they cannot be consciously controlled.

Skeletal muscle tissue forms the “flesh” of the body. Each fiber is a long, straight, unbanked cylinder, which contains a large number of myofibrils embedded in its cytoplasm. Since, this type of muscle tissue can be consciously controlled by the organism, it is termed “voluntary”.

Cardiac muscle tissue composes the wall of the heart and resembles skeletal muscle in structure. Its action, however, is involuntary.

Nerve tissue functions to conduct nerve impulses. Each nerve cell or neuron consists of an enlarged portion, the cell body, from which two or more fibers extend. These fibers are of two types: dendrites, which conduct impulses toward the cell body, and exons, which conduct impulses away from the cell body. Neurons occur in many sizes and shapes and, when, grouped together in large numbers, form the brain, spinal cord, and nerves.

Vocabulary

1. smooth	гладкий
2. striated	поперечно-полосатый
3. cardiac	сердечный
4. myofibril	миофибрилла
5. spindle-shaped	веретеновидный
6. cigar-shaped	сигароподобный
7. stomach	желудок
8. intestine	кишечник
9. urinary bladder	мочевой пузырь
10. uterus	матка
11. spleen	селезенка
12. flesh	мякоть
13. neuron	нейрон
14. dendrite	дендрит
15. exon	аксон
16. brain	головной мозг
17. spinal cord	спинной мозг

Text work

1. Give the Russian for:

1. There are two categories of connective tissues: the connective tissues proper and the supporting connective tissues.
2. Muscle tissue is differentiated into three types.
3. Smooth muscle cells are spindle-shaped.
4. Smooth muscle tissues are termed “involuntary”.
5. Skeletal muscle tissue is termed “voluntary”.
6. The action of the cardiac muscle tissue is involuntary.
7. Each nerve cell consists of the body and fibers.
8. Nerve cells are called neurons.
9. Neurons occur in many sizes and shapes.

2. Give the English for:

l. Хрящи и кости: относятся к опорной соединительной ткани.

2. Все виды мышечной ткани различаются миофибриллами, расположенными в цитоплазме.

3. Каждая клетка гладкой: мышечной ткани состоит из одного сигаровидного ядра, расположенного около центра клетки.
4. Гладкая мышечная ткань не может сознательно контролироваться.
5. Каждое волокно скелетной мускулатуры длинное и сильное.
6. Сердечная мышечная ткань по структуре похожа на скелетную.
7. Нервная ткань проводит импульсы.

3. Insert the words given below and translate the sentences into Russian:

1. The connective tissue are composed of cells, fibers, and ... .
2. Muscle tissue is differentiated into three types: ..., ..., and … .
3. The cells of the first type of muscle tissue are normally found as compact layers in the walls of such hollow organs.
4. The second type of muscle tissue forms the … of' the body.
5. This type of muscle tissue can be consciously controlled by the ... .
6. The third type of muscle tissue composes the wall of the ... .
7. From the body of neurons extend two or more ... .
8. These fibres are of two types: ... and ... .
9. Neurons grouped together in large numbers, form the ... .

(Fibers, intercellular matrix, walls, smooth, organism, flesh, cardiac, brain, extras, skeletal, dendrites, hart)

4. Answer the following questions:

1. What two categories of connective tissues are there?
2. What are both types of connective tissues composed of?
3. What types of muscle tissues are there?
4. Where are smooth muscle tissues found?
5. What do skeletal muscle tissues form?
6. Does cardiac muscle tissue compose the wall of the heart?
7. What does nerve tissue consist of?

Module 10

Organ systems (Part I)

As the various tissues in the plant and animal body differentiate, they become associated with each other to form organs that carry out particular functions. Organs which are related by function are grouped into organ systems. It is the coordinated functioning of all organ systems that enables an individual organism to maintain itself in its environment and to reproduce.

Although organs and organ systems exist in all multicellular forms, this level of differentiation is probably better illustrated in animals than in plants.

The association of organs with each other to carry out particular functions results in organ systems. Ten such systems are commonly recognized in animals.

The digestive system is composed of such organs as the esophagus, stomach, small intestine, large intestine, pancreas, and liver. All of these organs function together, primarily through the action of digestive enzymes, to break down food particles into molecules that are small enough to be absorbed into the blood stream.

The circulatory system is composed of the heart, the blood vessels, blood, the lymphatic vessels, and lymph. This system transports materials from one part of the body to another. The circulatory system also transports hormones and has a role in the regulation of body temperature and in protecting the body against disease.

The respiratory system is composed of the lungs and the related air passages (the nasal cavity, the pharynx, the trachea, and the bronchial tubes). The function of this system is twofold: 1) to supply all of the cells within the body with the oxygen they need to carry on respiration, and 2) to remove the carbon dioxide and some of the water that is a waste product of respiration. In some animals, other organs of respiration have evolved. For example, fish possess gills, insects have a series of tubules through which air flows, and a number of organisms, particularly the more primitive ones, carry on oxygen, carbon dioxide exchange through the body surface.

The excretory system provides the body with a means of ridding itself of metabolic waste materials. The primary excretory organs are the kidneys, lungs, skin, and liver.

Vocabulary

1. digestive system	пищеварительная система
2. esophagus	пищевод
3. pancreas	поджелудочная железа
4. liver	печень
5. circulatory system	сердечно - сосудистая систем а
6. air passages	воздухоносные пути
7. nasal cavity	носовая полость
8. pharynx	глотка
9. bronchial tubes	бронхиальные трубки
10. gills	жабры
11. tubule	сосуд
12. kidneys	почки

Text work

1. Give the Russian for:

1. Organs which are related by function are grouped into organ systems.
2. Ten such systems are commonly recognized in animals.
3. All organs of the digestive system function together, primarily through the action of digestive enzymes.
4. The circulatory system transports materials from one part of the body to another.
5. The circulatory system also transports hormones.
6. The function of the respiratory system is twofold.
7. Animals have the lungs.
8. Fish possess gills, insects have a series of tubules, through winch air flows.
9. The primary excretory organs are the kidneys, lungs, skin, and liver.

2. Give the English for:

1. Различные ткани в теле животных соединяются друг с другом

и формируют органы, которые выполняют особенные функции.
2. Хотя органы и системы органов присутствуют у всех многоклеточных, этот уровень развития лучше показан у животных.
3. Пищеварительные ферменты расщепляют пищевые частицы на молекулы, которые всасываются в кровеносную систему.
4. Лимфа и лимфатические сосуды входят в сердечно-сосудистую систему.
5. Сердечно-сосудистая система играет важную роль в регуляции температуры тела.
6. Дыхательная система снабжает все клетки тела кислородом.
7. У примитивных организмов газообмен происходит через поверхность тела.
8. Почки относятся к выделительной системе.

3. Insert the words given below and translate the sentences into Russian:

1. The coordinated functioning of all organ systems enables an individual organism to ... itself in its environment and to … .
2. The digestive system is composed of such organs as the esophagus, ..., small intestine, large intestine, pancreas, and ... .
3. The circulatory system is composed of the ..., the blood vessels, ..., the lymphatic vessels, and ... .
4. This system transports ... from one part of the body to another.
5. The respiratory system removes the carbon dioxide and supplies the ... .
6. The ... provides the body with a means of ridding itself of metabolic waste materials.

(Heart, stomach, maintain, lymph, excretory system, materials, liver, blood, oxygen, reproduce)

4. Answer the following questions:

1. What organs form organ systems?
2. What enables an individual organism to maintain itself and to reproduce?
3. What organ systems are recognized in animals?
4. What is the digestive system composed of?
5. What is the function of the circulatory system?

6. What is the respiratory system?
7. What does the excretory system provide the body with?

Module 11

Organ Systems (Part II)

The skeletal system is composed of varying amounts of bones and cartilages, depending upon the group of animals in question. The skeletal system provides a supporting framework for the body, a system of joints and places of attachment for skeletal muscles. In the vertebrates this system also serves to protect such organs as the brain, the spinal cord, and the organs contained within the rib cage. The marrow tissue within the cavities of long bones and ribs is the source of red blood cells and certain kinds of white blood cells.

The muscular system involves all of the muscle tissues within the body. The contraction of these tissues, whether voluntary or involuntary, is a response to a nerve impulse.

The nervous system is composed of the brain, the spinal cord, all the peripheral nerves, and the sensory parts of those organs concerned with receiving stimuli from the external or internal environment. Not only does the nervous system receive the stimuli and conduct the nerve impulses that cause an organism to respond, but it also integrates and coordinates the various body parts in accordance with the information received in the form of stimuli. In higher animals this system permits the processes which we term intelligence - thought, reasoning, and memory.

The reproductive system has as its sole function the perpetuation of the species through the production of new organisms. The organs involved include the gonads (the testes and ovaries) with their various associated ducts and glands. The asexual methods of reproduction characteristic of primitive forms do not involve reproductive organs.

The endocrine system consists, of the ductless glands, the gland, which produce chemical regulators called hormones. Hormones are highly specific in their effects. The thyroid, pituitary,

and adrenal glands are examples of organs which compose this system.

The integumentary system is composed of the skin and the specialized structures, such as hair, scales, feathers, and nails, which develop from it. Although the primary purpose of this system is protection, such functions as respiration, excretion, the reception of stimuli, and the production of secretions are also sometimes carried out by the integument.

Vocabulary

1. skeletal system	опорная система
2. bone	кость
3. cartilage	хрящ
4. joint	сустав
5. rib cage	грудная клетка
6. marrow tissue	костный мозг
7. rib	ребро
S. external	внешний
9. internal	внутренний
10. gonad	половая железа
11. testes	семенник
12. wary	яичник
13. ductless	беспротоковый
14. thyroid gland	щитовидная железа
15. pituitary gland	гипофиз
16. adrenal gland	надпочечник
17. integumentary system	наружный покров

Text work

l. Give the Russian for:

1. The skeletal system is; composed of varying amounts of bones and cartilages.
2. In the vertebrates this system also serves to protect such organs as the brain, the spinal cord and the organs contained within the rib cage.
3. The muscular system involves all of the muscle tissues within the body.

4. The nervous system is composed of the brain, the spinal cord, all the peripheral nerves.
5. In higher animals this system permits the processes which we term intelligence.
6. The reproductive system has as its sole function the perpetuation of the species.
7. The asexual methods of reproduction are characteristic of primitive forms.
8. The endocrine system consists of the ductless glands, the glands which produce chemical regulators called hormones.
9. The integumentary system is composed of the skin and the specialized structures.

2. Give the English for:

1. Опорная система обеспечивает поддержание остова тела, системы суставов и места крепления скелетных мышц.
2. Мозговая ткань в длинных костях и ребрах – это источник красных и некоторых белых кровяных клеток.
3. Сокращение мышечных: тканей - ответ на нервный импульс.
4. Нервная система интегрирует и координирует различные части тела.
5. Половая система включает половые железы.
6. Эндокринные железы: продуцируют химические регуляторы - гормоны.
7. Щитовидная железа - пример эндокринного органа.
8. Производные кожи - волосы, чешуя, перья, ногти.

3. Insert the words given below and translate the sentences into Russian:

1. The ... system has a very important role in a supporting framework for the body.
2. The marrow tissue within the cavities of long bones and ...is the source of ... .
3. The ... of these tissues is voluntary or involuntary.
4. The ... system receives the stimuli and conducts the nerve impulses.
5. In higher animals this system permits the processes which we term intelligence -..., reasoning, and ... .

6. The gonads are the ... and ... .
7. The endocrine glands are the ..., pituitary, and adrenal glands.
(Nervous, red blood cells, thyroid, thought, skeletal, memory, testes, contraction, ribs, ovaries)

4. Answer the following questions:
1. What is the skeletal system?
2. Does the skeletal system serve as a supporting framework for the body? (give examples)
3. What functions does the nervous system perform?
4. What organs does the reproductive system include?
5. What does the endocrine system consist of?
6. What is the primary purpose of the integumentary system?

Module 12

The Liver (Part I)

The liver plays an indispensable part in the metabolism of the body and elaborates bile. It is the largest gland of the organism. It occupies the upper right quadrant of the abdominal cavity, a part of its surface being attached to the diaphragm. It arises in the embryo as an evagination of the intestine and develops into a compound gland whose secretory portions are branching and anastomosing tubules. In the lower vertebrates this condition remains throughout life, but in the mammals the original architecture undergoes a complete remodeling.

Lobule of the Mammalian Liver.—The mammalian liver is made up of polygonal prisms each representing an architectural unit or lobule, 0.7 to 2 mm in diameter. The periphery of each lobule is translucent and grey, while its center is brown. In man the outlines of the lobules are usually indistinct, because the connective tissue partitions between them are poorly developed. In the pig on the contrary, each lobule is completely surrounded by a layer of connective tissue, and the lobulation is obvious. When a freshly sectioned surface of such a liver is scraped with a knife, the soft tissue is squeezed out of the lobules and the remaining partitions give the

impression of a honeycombed structure. In cirrhosis of the liver in man, the connective tissue is greatly increased and the lobulation completely distorted.

In the salivary and pancreatic glands each lobule represents a mass of glandular tissue drained by a duct of a certain order and size. The liver lobule, however, is best conceived as depending not on the duet: system, but as centering on the hepatic vein. This is clearly seen in microscopic sections of a liver whose blood vessels have been injected with colored masses.

The liver lobule has also been described as the amount of liver tissue which surrounds and is drained by the smallest interlobular bile ducts. According to this idea, the center of the liver lobule would be the structures in the periportal areas, and the lobule would extend into the parenchyma of the several surrounding anatomical lobules.

Vocabulary

1. to elaborate:	вырабатывать
2. bile	желчь
3. gland	железа
4. abdominal cavity	брюшная полость прилегать
5. be attached.	
6. evagination.	выпячивание
7. portions	выделения
8. condition	состояние
9. architecture	строение
10. remodeling	перестройка
11. lobule	доля
12. translucent	прозрачная
13. indistinct	нечёткий
14. connective tissue	соединительная ткань.
15. partition	частица
16. on the contrary	напротив
17. lobulation	разделение на доли
18. sectioned	отделенная
19. to give the impression	создавать впечатление
20. honeycombed structure	структура пчелиных сот
21. cirrhosis	цирроз

22.to increase	увеличиваться
23. salivary glands	слюнные железы
24. pancreatic	поджелудочный
25. duct	проток
26. hepatic vein	печеночная вена
27. interlobular bile duct	междолъковый желчный проток

Text work

l. Give the Russian for:

1. The liver elaborates bile.
2. It occupies the upper right quadrant of the abdominal cavity.
3. The mammalian liver is made up of polygonal prisms or lobules.
4. The periphery of each lobule is translucent and grey.
5. Its center is brown.
6. When a surface of the liver is scraped with a knife, the soft tissue is squeezed out.
7. In cirrhosis of the liver in man, the connective tissue is greatly increased and the lobulation completely distorted.
8. In the salivary glands each lobule represents a mass of glandular tissue.
9. The center of the liver lobule would be the structures in the periportal areas.

2. Give the English for:

1. Печень играет незаменимую роль в обмене веществ.
2. Печень возникает у эмбриона как выпячивание кишечника.
3. Печень млекопитающих состоит из многочисленных долей.
4. У свиней каждая доля окружена слоем соединительной ткани.
5. При циррозе соединительная ткань сильно атрофируется,
6. Доля печени зависит от печеночных вен.
7. Доля печени описывается как количество печеночной ткани.
8. Печень выполняет желчевыводящую функцию.
9. Через центр доли проходит центральная вена.

3. Insert the words given below and translate the sentences into Russian:

1. ... is the largest gland of the organism.

2. Liver develops into a. compound gland whose secretory ... are branching and anastomosing tubules.
3. Each lobule of the liver is 0.7 to 2 mm in ... .
4. In man the connective tissue ... between them are poorly developed.
5. In the pig, each ... is completely surrounded by a layer of connective tissue.
6. In the pancreatic glands each ... .represents a mass of glandular tissues drained by a
7. The liver lobule is best conceived as depending not on the duct system, but as centering on the...
(Liver, portions, diameter, partitions, lobule, tissue, duct, of center, hepatic vein)

4. Answer the following questions:
1. What part does the liver play is the body?
2. Where does the liver located?
3. How does it arise in the embryo?
4. What is the mammalian liver made up of?
5. What do the man's lobules look like?
6. What can you see in a freshly sectioned surface of a liver?

Module 13

The Liver (Part II)

This theory considers only the bile excretory function of the liver and overlooks entirely the fact that the liver is predominantly an endocrine gland. It also disregards the structure of this organ as seen in such species as the pig, in which the liver lobule is demarcated by a continuous connective tissue layer.

The lobule of the liver in cross section has five six or seven sides. The diameter of the cross - section is decidedly smaller than the height of the lobule. Running through the center of the lobule in its long axis is the central vein, while at the periphery are the branches of the portal vein (intralobular vein). The interlobular bile ducts, branches of the hepatic artery, and the lymphatics form a

network about the portal vein and its branches.

Blood Vessels - The principal afferent blood vessel of the liver is the portal vein. It collects the blood from the viscera of the digestive tract and from the spleen and enters the liver at the port a together with the hepatic artery. The liver of mammals receives a smaller part of its blood supply from the hepatic artery. This relatively small vessel supplies the interlobular connective tissue and its contained structures and helps to nourish the parenchyma of the gland. In the living frog liver, numerous anastomoses have been seen between the terminals of the hepatic artery and those of the portal vein. The blood is drained from the liver by the two or more hepatic veins; these enter the inferior vena cava as it passes through the fossa for this vessel. Throughout the liver the terminal branches of the portal vein and the radicles of the hepatic vein are about equal distances apart. Each radicle of the hepatic vein is surrounded by a layer of liver tissue of uniform thickness, and this mass constitutes the hepatic lobule. Because of their central position in the long axis of the lobules, the intralobular branches of the hepatic vein are called central veins. Several central veins join to form an intercalated vein - the sub lobular vein of the older literature. Several of these veins unite to form a collecting vein: these in turn join to form the hepatic veins, which pursue a course through the liver independent of the portal venous system.

Vocabulary

I.	afferent	афферентный
2.	portal vein	поротная вена
3.	viscera	внутренности
4.	digestive tract	пищеварительный тракт
5.	spleen	селезенка
6.	porta	воротная вена
7.	hepatic artery	печеночная вена
8.	relatively	относительно
9.	vessel	сосуд
10.	interlobular connective tissue	междольковая соединительная ткань
11.	to nourish	питать, кормить
12.	parenchyma	паренхима

13.	anastomos	анастомоз
14.	terminal	окончание
15.	inferior vena cava	нижняя полевая вена
16.	fossa	канал
17.	branch	ответвление
18.	radicle	корень
19.	uniform thickness	одинаковая толщина
20.	axis	ось
21.	intralobular	внутридольковый
22.	central vein	центральная вена
23.	intercalated vein	вставочная вена
24.	to pursue	преследовать
25.	portal venous system	система воротной вены

Text work

1. Give the Russian for:

1. to consider only the bile excretory function
2. The liver is predominantly an endocrine gland.
3. to demarcate by a contiguous connective tissue layer
4. height of the lobule
5. to form a network about the portal vein and its branches
6. to collect the blood from the viscera of the digestive tract
7. relatively small vessel
8. to nourish the parenchyma of the gland
9. inferior vena cava
10. radicle of the hepatic vein
11. long axis of the lobules
12. to pursue a course though the liver.

2. Give the English for:

1. Печень является преимущественно эндокринной железой.
2. диаметр разреза
3. проходящий через центр дольки
4. воротная вена и ее ответвления
5. собирать кровь от селезенки.
6. помогать питать паренхиму железы
7. окончания печеночной артерии

8. канал кровеносного сосуда
9. быть окруженным слоем ткани одинаковой толщины
10. центральное положение в длинной оси
11. объединяться для формирования печеночной вены

3. Insert the words given below and translate the sentences into Russian:

1. This theory considers only the bile ... function of the liver.
2. The liver lobule is demarcated by a continuous ... tissue layer.
3. The ... of cross - section is decidedly... than the height of the lobule.
4. The principal... blood vessel of the ... is the ...vein.
5. The liver of ... receives a smaller part of its ... supply from the hepatic … .
6. In the living frog liver, numerous ...have been seen between the :.. of the .... artery and those of the portal ... .
7. Each radicles of the ... vein is surrounded by a … of liver ... of... thickness and this mass constitutes the hepatic .... .
8. Several ... veins join to form an ... vein - the ... vein of the older literature, (Mammals, liver, smaller, portal, diameter, vein, connective, sub lobular, central, tissue, hepatic, anastomoses, blood, intercalated, uniform, excretory, terminals, artery, afferent).

4. Answer the following questions:

1. What fact does the theory overlook entirely*?*
2. How many sides has the lobule of the liver in cross section?
3. What is the name of the principal blood vessel of the liver?
4. What does the hepatic artery supply?
5. Why are the intralobular branches of the hepatic vein called central vein?

Module 14

Spleen

The spleen is the largest lymphoid organ in the body. However, its histology is more complex than that of lymphoid tissue generally. It has been compared histologically to a large hemolymph node. Many kinds of cells are found in the splenic pulp: reticulo-endothelial cells, splenocytes or pulp cells, and practically all kinds of blood cells. The spleen is abundantly supplied with blood, the course of which through the organ is peculiar. Capillaries are lacking in the ordinary sense, and blood passes right into the splenic pulp. It is then collected by the venous sinuses, which are drained by veins whose union leads to the formation of the splenic vein.

Functions —The functions of the spleen are not fully understood, although many facts of importance are known. That the organ is not necessary for life, is well-established. Splenectomy has been successfully performed not only on the small animals but also on horses, cattle, sheep, goats, and pigs. When the spleen is extirpated, other organs soon take over its functions or other adjustments are made, so that little or no disturbance of health ordinary results. Erythrocyte count, erythrocyte percentage volume, and hemoglobin content of the blood all show a decrease. The summary of splenic function is the following:

1. The spleen is an important reservoir for blood which may be called upon under certain conditions, as during exercise following hemorrhage, in carbon monoxide poisoning, during the administration of certain anaesthetics (chloroform, ether), and in emotional states. The spleen undergoes at least two kinds of rhythmic changes in sizes. One of these is a slow expansion and contraction; the other, a frequently recurring systole and diastole. These movements are probably related to its function as a blood reservoir. In giving up blood in the conditions just mentioned, the spleen undergoes strong contraction accompanied by vasoconstriction. In some species (horse, dog. cat) the blood coming from the spleen during this contraction is richer in corpuscles than the blood of the general circulation, whereas in others splenic contraction augments only the blood volume. In animals of the first

class the spleen must be able to concentrate blood coming to it by squeezing out plasma.

2. In the fetus the spleen is concerned in blood cell formation. In the adult it continues to form lymphocytes, monocytes, and possibly other cells, and its fetal activity of erythropoiesis can be resumed under certain pathological conditions.

3. It is concerned in the destruction of erythrocytes. This is by virtue of its high content of reticulo-endothelial cells and its power of making red cell more susceptible to hemolysis, that is more fragile. It has very high iron content.

4. By reason of its reticulo-endothelial cells it is believed to be concerned in antibody formation, and because of the presence of numerous lymphocytes it plays a part in the resistance of the body to certain infections.

5. The spleen is of importance in the formation of bile pigment, the storage of iron, and possibly other phases of metabolism.

Vocabulary

1. histology	гистология
2. hemolymph node	лимфоузел
3. splenic pulp	пульпа селезенки
4. splenocyte	клетка селезенки
5. venous sinuse	венозный синус
6. splenic vein	селезеночная вена
7. splenectomy	удаление селезенки
8. hemorrhage	кровоизлияние
9. administration	назначение лекарств
10. vasoconstriction	сужение сосудов
11. contraction	сокращение
12. fetus	эмбрион, плод
13. adult	зрелость
14. bile	желчь

Text work

1. Give the Russian for:

1. The spleen has been compared histologically to a large hemolymph node.
2. The spleen is abundantly supplied with blood.
3. The functions of the spleen are not fully understood.
4. When the spleen is extirpated, other organs soon take over its functions.
5. The spleen is an important reservoir for blood.
6. The spleen undergoes at least two kinds of rhythmic changes in sizes.
7. In some species (horse, dog, cat) the blood coming from the spleen during this contraction.
8. In the fetus the spleen is concerned in blood cell formation.
9. The spleen is concerned in the destruction of erythrocytes.
10. The spleen is of importance in the formation of bile pigment.

2. Give the English for:

1. Гистология селезенки более сложная, чем главная лимфатическая ткань.
2. В пульпе селезенки расположены многие виды клеток.
3. Кровь собирается венозным синусом.
4. Резервуар крови в селезенке может быть использован при некоторых обстоятельствах.
5. Движение селезенки, вероятно, описывает ее функции как резервуара крови.
6. Сильные сокращения селезенки сопровождаются движением сосудов.
7. Разрушение эритроцитов происходит благодаря тому, что они делаются более хрупкими.
8. Лимфоциты играют роль в устойчивости организма к некоторым инфекциям.

3. Put in the right words:

1. The ... the largest lymphoid organ in the body.
2. Practically all kinds of blood cells are found in the ... .
3. Blood is collected into ... .

4. Erythrocyte count, erythrocyte percentage volume, and ... content of the blood all show a decrease.
5. Reservoir for blood may be called upon under hemorrhage, in carbon monoxide ... in emotional states.
6. The blood coming from the spleen during this contraction is richer in ... than the blood of the general circulation.
7. In the ... it continues to form lymphocytes, monocytes.
8. Fetal activity of... can be resumed under certain pathological conditions.

(Poisoning, splenic vein, adult, spleen, hemoglobin, corpuscles, splenic pulp, erythropoiesis)

4. **Answer the following questions:**
1. What is the spleen?
2. What cells are found in the splenic pulp?
3. What functions does the spleen- perform?
4. How is the spleen related to blood?
5. Is the spleen concerned in the destruction of erythrocytes.
6. What is the spleen important for?

ADDITIONAL READING

Text 1. Virus

Much progress was made to eliminate or diminish the occurrence of many in fectious diseases, such as malaria, poliomyelitis, tetanus, diphtheria, pertussis and tuberculosis. Much effort is devoted to infectious disease of viral nature.

Influenza, for example, is still considered an important health and economic problem. Despite the reported reduction in incidence by 2—3 times through the use of preventive vaccines and sera, effective preventive measures and therapeutic agents are still needed. An explosion of knowledge was recently noted in the molecular biology and mode of replication .of influenza virus. From 1934 when the influenza virus, was first isolated it is the object of intensive research. The treatment of the influenza virus diseases is followed by the constant development of new drugs. Detailed reviews and

explanations of clinical techniques were provided by the authorities in the special field.

How does the human body stop the viruses in their massive multiplication? Two ways are mentioned.

An infected cell releases an unknown substance. It affects other cells. They produce a protein, interferon. Interferon is not specifically produced to fight flue, Any vims infection is influenced by it.

The second way is through the body's immune defense system.

Large quantities of vaccine are prepared to inoculate high risk groups in the population. New preventive methods and drugs are, devised and improved.

Text 2. Immunity

All animal species are equipped to defend themselves against aggressors. The study of the defense mechanisms of the body against such attack by foreign microorganisms or macromolecules is the science of immunology.

Man's first real insight into the nature of infectious diseases is known to have come only a hundred years ago. Luis Pasteur realized that bacteria caused diseases to develop. Among his many contributions to immunology, Pasteur showed protection against a particular disease to be conferred, either by past exposure to the disease or by immunization with cultures of the causative organism which had first been rendered harmless. In thus producing immunity by active immunization, Pasteur was, in fact, using the same principle as had been used nearly я -century before by an English physician, Edward Jenner, who induced protection against, smallpox by vaccination of human subjects with material from the lesions of cowpox. These observations led many workers to search for further ways to induce immunity against bacterial disease. It became obvious that certain factors in the serum of convalescent patients, known as antibodies, could, when injected, induce protection against bacterial disease. They could also make the causative bacteria active in the test tube.

At the same time as Pasteur, Elie Metchnikoff studied the interesting capacity of phagocytic cells to ingest and destroy all sorts

of foreign material including bacteria.

Thus, well before the end of the nineteenth century the humoral i.e. antibodies, and cellular factors were realized to play a part in immunity to infection. During the next few decades, numerous methods were developed for the detection and measurement of antibody in serum.

Text 3. Veterinary Service

Agriculture plays an important role in the development of our country. Agriculture remains the main source of pro viding the population with food. It supplies the necessary raw materials for the food and light industries which produce large quantities of consumer goods.

Intensification of animal husbandry is better feeding and selection, introduction of the achievements of science and advanced method, great mechanization. It ensures an increase in the output of animal products.

Specialization and concentration are increasing in animal husbandry. Farms for fattening of cattle, pig and poultry are set up. Large industrialized farms for the production of pork, beef, eggs and milk have been established.

The tasks set for the veterinary science today are to increase animal productivity, to reduce death rate in animals, to make prophylaxes of animal diseases.

Veterinary service should pay particular attention to the organization of veterinary work on industrial livestock and poultry farms to prevent the spreading of infectious diseases.

The foremost attention is paid to the veterinary sanitation and hygiene. They are the foundation of human health, wellbeing of animals, good quality of animal production and high culture of cattle-breeding.

The duty of the veterinary doctor is to prevent infectious and noncontagious diseases, to treat sick animals, to control the quality of meat, milk and eggs delivered by farms. Animal diseases cause great damage to the herds of cattle.

The success of the struggle and preventive treatment against these diseases depend upon the arrangement of the veterinary service. Vaccination of animals against infectious dis eases is a

specialized type of work in which veterinarians may be engaged.

Biological industry has produced various drugs and preparations promoting resistance of animal body to harmful environmental conditions.

Text 4. Veterinary Medicine and Veterinary Science

A **veterinarian** (American English) or a **veterinary surgeon** (British English), often shortened to **vet**, is a physician for animals and a practitioner of veterinary medicine. Veterinarians are usually ranked as the most intelligent and trustworthy among medical practitioners. They diagnose and treat disease in a variety of different species without verbal communication with their patients.

Many careers are open to specialists with veterinary degrees. They work in clinical institutions and often practice in a limited field such as "companion animal" or pet medicine (small animals such as dog, cat, and pocket pets), production medicine or livestock medicine. Production medicine includes dairy cattle, beef cattle, swine, sheep, and poultry, equine medicine (e. g., sport, race track, show, and rodeo), laboratory animal medicine, or reptile medicine. Veterinarians may specialize in medical disciplines such as surgery, dermatology or internal medicine after postgraduate training and certification.

Some veterinarians pursue postgraduate training and enter research careers, and have contributed to advances in many human and veterinary medical fields, including pharmacology and epidemiology. Research veterinarians were the first to isolate oncoviruses, *Salmonella* species, *Brucella* species, and various other pathogenic agents. Veterinarians were in the forefront in the effort to suppress malaria and yellow fever in the United States. Veterinarians determined the identity of the botulism disease causing agent; produced an anticoagulant used to treat human heart disease; and developed surgical techniques for human beings, such as limb and organ transplants.

Text 5. Classification of Animal Diseases (1)

Disease is the general term for any deviation from the normal or healthy condition of the body. Diseases of animals are disorders which influence an animal's health and ability to function. Animal

diseases are of great concern to human beings for several reasons. Diseases can reduce the productivity of animals used to produce food, such as hens and dairy cows. Animals that are raised as food, such as pigs and beef cattle that become ill may affect the economic wellbeing of many industries. Some animal diseases can be transmitted to human beings, and control of these types of diseases, known as zoonosis, is vital to public health. In the wild animal populations reduced by disease can upset the ecological balance of an area. And, in the case of pets, prevention and treatment of animal diseases help pets live long and healthy lives, enhancing the companionship shared by a pet and its human owner.

Animal diseases are characterized as infectious and noninfectious. Infectious diseases are caused by an agent, such as bacteria or a virus that penetrates the body's natural defense mechanisms, while noninfectious diseases are caused by factors such as diet, environment, injury, and heredity. Sometimes the cause of a disease is unknown. An animal may also experience one disease or a combination of diseases simultaneously.

To identify a disease, a veterinarian (a doctor who treats animals) first determines the animal's signals — species, breed, age, and sex. This information helps to identify a disease because some diseases are more prevalent in certain species, or a disease may preferentially affect one sex or age group. Then the veterinarian gathers a complete history of the animal and its problem. This history includes the first symptoms which appeared in the animal. The veterinarian gives the animal a thorough physical examination, which may include measuring its body temperature, listening to its heart, checking its pulse, and feeling its abdomen and lymph nodes. Then the veterinarian creates a list of possible dis eases that may make the animal sick. The list may be narrowed by running diagnostic tests such as X rays, electro cardiograms, blood analyses, and bacterial or fungal cultures. Once the disease is identified, the doctor develops a treatment plan for the animal.

Text 6. Infectious Diseases (1)

Infectious diseases are those caused by an infecting agent or organism. A disease can be infectious but not readily transmitted to others. There are several categories of organism capable of infecting

domestic animals. They include parasites, bacteria and viruses. Some of these diseases are transmissible from animals to human beings — these are known as zoonosis. Examples of zoonosis are rabies and tuberculosis.

Some examples of important bacterial diseases of domestic animals are shown below.

Anthrax. Anthrax is caused by *Bacillus anthracis* and can affect all warm-blooded animals. It is highly contagious to human beings handling an infected animal but it is not normally transmitted readily to other animals on the farm. Anthrax is usually rapidly fatal.

Brucellosis. Brucellosis is caused by several species including *Brucella abortus*. It commonly affects cattle, sheep, goats, pigs, human beings and causes abortion and fever. There is no effective treatment for affected animals. Human beings are normally treated with large doses of antibiotics for a very long period. Brucellosis can be effectively controlled by vaccination, combined with testing and eradication. It is fairly well controlled in livestock in the USA. There is concern about it spreading into cattle from other sources, e. g. buffalo.

Tuberculosis. Tuberculosis is caused by several species including *Mycobacterium tuberculosis*. It affects mammals, birds and reptiles. An effective treatment is available although drug resistance is becoming a serious problem for human beings. Tuberculosis requires a long course of therapy. Herds are tested regularly by veterinarians and if affected animals are found they should be slaughtered. Meat and milk of infected animals can transmit the disease.

Swine dysentery. Swine dysentery is caused by *Treponema hyodysenteriae*. The disease causes diarrhea and weight loss in young pigs. It is controlled by antibiotics in feed. Some vaccines are being developed.

Salmonellosis. Salmonellosis is caused by various species of *Salmonella*. There are typically two forms: an enteric form in which diarrhea and vomiting is present and young animals are mainly at risk of dehydration and an invasive form in which the bacteria of the *Salmonella genus* invade the bloodstream and cause septicaemia. The latter is often fatal. There are some vaccines against salmonellosis but they are of limited efficiency. Antibiotics and

fluids are the usual treatments.

Mastitis. Mastitis is an infection of the mammary gland by various species of bacteria. It affects all mammals, reducing milk yield and quality. The disease is spread through contaminated equipment or hands of the milkier and dirty barns and yards. The symptoms are clotted and watery milk, fever, pain, swelling and change in the shape of the udder. Preventive measures are hygiene and therapy. A vaccine is available to reduce incidence of coliform mastitis.

Text 7. Infectious Diseases (2)

Many microscopic organisms naturally and peacefully exist in enormous quantities within animal bodies. For ex ample, the multi-chambered stomach of a cow contains bacteria that help the animal digest its food. But many other microscopic organisms known as pathogens cause diseases in animals. Pathogens include bacteria, viruses, fungi, prions — newly identified mutated proteins — and parasites. Pathogens are easily spread: an animal may consume food or drink something that has been contaminated with infected fecal material. If the ground is contaminated by *Salmonella* bacteria, for instance, infection can travel from barn to barn on the soles of a farmer's boots. Or an animal may be exposed while walking across contaminated ground. Some diseases are transmitted by biting insects.

Infectious bovine keratoconjunctivitis, or **IBK**, is a veterinary infection of cattle caused by *Moraxella bovis*, a species of bacteria. It is spread by direct contact or by the common flies serving as a vector. It is the most common ocular disease of cattle (mostly beef). This disease is highly contagious and occurs worldwide. Younger animals are more susceptible but the recovery with minimal damage is usual, if they are treated early. The disease is better known as pinkeye.

Johne's disease is a contagious, chronic and sometimes fatal infection that affects primarily the small intestine of ruminants. All ruminants are susceptible to Johne's disease, which is sometimes called paratuberculosis. Paratuberculosis is found worldwide, with Norway, Sweden and some states in Australia the only areas proven to be free of the disease. In cattle, the main symptoms of

paratuberculosis are diarrhea and wasting. Most cases are seen in 2 to 6 year old animals. The initial symptoms can be subtle and may be limited to weight loss, decreased milk production, or roughening of the hair coat.

Text 8. Noninfectious Diseases (1)

Many animal diseases are caused by noninfectious factors such as an animal's environment, genetics, and nutrition.

Heatstroke, for example, occurs when an animal is forced to endure high temperatures without access to water, ad equate ventilation, or suitable shade. A common scenario involves an animal that has been locked inside a car without air-conditioning during hot weather.

Conversely, extreme cold can lead to **hypothermia** or **frostbite**. Other environmental hazards include the vast array of products people use to eliminate pests and weeds from homes, farms, and gardens. For example, poison used to kill rats and mice can cause fatal internal hemorrhaging in any animal that ingests this toxic substance. Improper use of sprays, dips, and collars can also cause illness. Automobile antifreeze is another well-known poison. Its sweet taste ap peals to some animals, such as cats and dogs, but consuming only a small amount can result in death. Many plant species are also toxic to animals. Some, such as yew, commonly grow in pastures and yards.

Poor feeding can lead to diseases such as **nutritional secondary hyperparathyroidism**. It involves the muscles and bones of dogs and is associated with an all meat diet. Large, rapidly growing puppies that consume too many calories and too much calcium can develop hypertrophic osteodystrophy, a disease resulting in lameness. Cats need sufficient amounts of an essential amino acid called taurine in their diets. Without it, they may develop eye problems. Not enough iodine intake can cause enlargement of the thyroid gland in cows, horses, and other animals.

Trauma is a leading cause of an injury and premature death of animals, especially pets that are allowed to roam free outdoors. Many animals are hit by cars or bitten by other animals. Farm animals may be attacked by predators, or they may harm themselves on sharp fencing or discarded nails. Untreated wounds can become

infected and cause permanent damage.

Text 9. What is a Zoonotic Disease?

Some infectious diseases are dangerous to human beings. Zoonosis is a disease of animals that may be transmitted to men under natural conditions. Approximately 150 zoonotic diseases are known to exist. In most cases they are transmitted from animals, such as pets, farm animals, or rats that have close contact with human beings. As doctors who work with both animals and their human owners, veterinarians are an important source of information about zoonotic diseases. When a veterinarian sees or suspects a zoonotic disease, it is the responsibility of the veterinarian to alert the owner of the potential for disease spread to human beings. Veterinarians can NOT offer a diagnosis or treatment for human owners, but must urge the owner to contact their human physician for consultation.

What are the examples of zoonotic diseases?

Zoonotic disease has a long history. Ancient Greece and the Bible mention **the plague**. Nowadays the number of potential zoonotic diseases is impressive. Examples of zoonosis include **rabies**, **ringworm**, and others.

Classical swine fever (CSF) or hog cholera is a highly contagious disease of pigs transmitted by fleas, aerosols, handling infected animals. Swine fever causes fever, skin lesions, convulsions and usually (particularly in young animals) death within 15 days. The incubation period of CSFV ranges from 2 to 14 days but symptoms may not be apparent until after 2 to 4 weeks.

Tuberculosis (TB) is a chronic contagious disease of animals and human beings, caused by bacteria of the genus *Mycobacterium*. It is transmitted by inhalation of droplets from an infected animal's cough or sneeze, or by wound infection. TB infection causes lesions called tubercles that develop in certain tissues, such as the lung or liver. The symptoms of tuber culosis in animals vary greatly, depending upon the infected organ or organs. If the disease is in the lungs there may be a cough; in the intestines — chronic diarrhea; in the brain — nervous symptoms; in the udder — swelling. Symptoms include fever, emaciation, and progressive loss

of strength.

Ringworm is a fungal infection of the skin in domestic animals such as sheep and cattle. The signs of this disease are round, hairless patches that are usually found on the shoulder, rump, back or head and neck.

This is just to name a few! Disease incidence varies greatly with region.

Who is at risk for zoonotic disease?

Any human being in contact with an infected animal or a disease vector is at risk for a zoonotic disease. A vector is a disease carrier that spreads the disease from an infected animal to an uninfected human or animal.

Text 10. Liver Transplants

Liver transplantation has not aroused the sensational publicity focused on heart grafting. Yet since Dr. Thomas Starzl, now at the University of Pittsburgh, pioneered the operation 18 years ago (1963), over 200 livers have been transplanted in the United States. One of the Starzl's patients has lived over 12 years after transplantation, and two of his female ones have given birth to normal children. In a British programme of liver transplants doctors at Addenbrook's Hospital, Cambridge, and King's College Hospital, London, report that the one-year survival rate during the past 21 months exceeded 50 per cent.

In both programmes, use of an experimental drag, cyclosporine A, has apparently helped to improve recent survival rates and has allowed lower doses of steroid hormones, which are given to prevent rejection of the new organ. One must know that high doses of steroids are particularly harmful to children because they inhibit growth. The treatment of children with bile-duct malformations has been an important part of Dr. Starzl's programme.

Although the operation remains very difficult, liver transplantation gives a chance of excellent rehabilitation for patients who have no treatment alternatives.

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