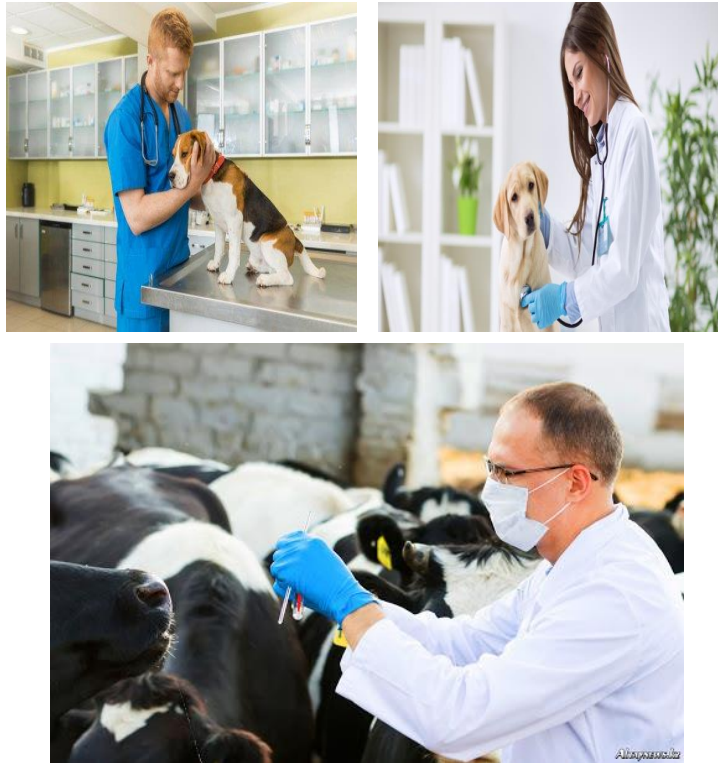


***DAVRONOVA F.P.***



***ENGLISH FOR STUDENTS OF  
VETERINARY AND ZOOENGINEERING  
SPECIALITIES  
(1-2 COURSES)***

**O‘ZBEKISTON RESPUBLIKASI  
VETERINARIYA VA CHORVACHILIKNI  
RIVOJLANTIRISH DAVLAT QO‘MITASI  
SAMARQAND VETERINARIYA MEDITSINASI  
INSTITUTI**

**Davronova Fotima Pirnazarovna  
Buriyeva Sora Saloxitdinovna**

**ENGLISH FOR STUDENTS OF  
VETERINARY AND ZOOENGINEERING  
SPECIALITIES**

**(1-2 COURSES)**

**O‘quv-uslubiy qo‘llanma**

(1-2 bosqich veterinariya va zootsiyeniya ta’lim yo’nalishi talabalari uchun)

**Samarqand - 2021**

Mazkur o'quv-uslubiy qo'llanma ingliz tili fanining o'quv dasturiga asosan tayyorlandi.

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O'zbekiston Respublikasining Ta'lim to'risidagi qonuni, "Kadrlar tayyorlash milliy dasturi" va Vazirlar Mahkamasining "Davlat ta'lim standartlarini tasdiqlash to'g'risida"gi qarorida barcha o'quv fanlari, shu jumladan, chet tillarni o'qitishni mazmunini tubdan yaxshilash dolbzarb vazifalardan biri ekanligi ta'kidlangan. Shu nuqtai nazardan bugungi kunda chet tillarni o'qitishga katta e'tibor qaratilmoqda.

Ushbu ingliz tili fanidan tayyorlangan o'quv-uslubiy qo'llanma ingliz tilini o'rganayotgan veterinariya va zootexnika ta'lim yo'nalishi 1-2 bosqich talabalari uchun mo'ljallangan bo'lib, talabalarda o'qish va gapirish ko'nikmalarini rivojlantirish bilan birga veterinariya va zootexnika yo'nalishiga oid terminologiya bilan yaqindan tanishib borishadi. Bundan tashqari talabalarda matnga oid topshiriqlar va mashqlar bajarish malaka va ko'nikmalarini rivojlantirishga ham xizmat qiladi.

Ushbu o'quv-uslubiy qo'llanma Samarqand Veterinariya Meditsinasi Institutining Ilmiy-uslubiy Kengashida muhokama qilingan va nashrga tavsiya etilgan.

“ \_\_\_\_\_ ” \_\_\_\_\_ 2021 yil \_\_\_\_\_ -son majlis bayoni

## SO'Z BOSHI

O'zbekiston Respublikasi Prezidenti Sh.M. Mirziyoyevning 2017 yil 20 apreldagi "Oliy ta'lim tizimini yanada takomillashtirish chora-tadbirlari to'g'risida" PQ-2909-sonli Qarorida "Oliy ma'lumotli mutaxassislar tayyorlashning maqsadli parametrlarini shakllantirish, oliy ta'lim muassasalarida o'qitish yo'nalishlari va mutaxassislarini istiqbolda mintaqalar va iqtisodiyot tarmoqlarini kompleks rivojlantirish, amalga oshirilayotgan xududiy va tarmoq dasturlarining talablarini inobatga olgan holda optimallashtirish" zarurligini alohida ta'kidlagan edi. Bu kabi fikrlarning barchasi mamlakatimiz ravnaqida, ayniqsa, Kadrlar tayyorlash Milliy dasturi orqali belgilangan vazifalarni amalga oshirishda boshqa fanlar bilan bir qatorda chet tillarni o'rganishning ham o'z o'rnini bor.

Hozirgi zamon global taraqqiyoti jamiyatning har bir a'zosidan jahon afkor ommasi tomonidan yaratilgan ilmlardan, atrofida yuz berayotgan o'zgarishlardan xabardor bo'lishni, buning uchun avvalo ta'lim jarayonida beriladigan bilimlarni yetarli darajada o'zlashtirishni, DTS va o'quv dasturi talablarini bajarishini va ularni amaliy faoliyatga tatbiq etish ko'nikma va malakalarni egallashni, insonning boshqa faoliyatlari bilan uyg'unlashtirishini talab etadi. Chunki dunyoning bugungi taraqqiyot manzarasiga nazar tashlasak, mamlakatning er maydoni kengligi, moddiy resurslari asosiy rol o'ynamay qo'ydi. Mamlakatning taraqqiyoti darajasi uning intellektual salohiyatiga bog'liq bo'lib qoldi. Bunga Yaponiya va Koreya davlatlari yaqqol misol bo'ladi. Ularning er maydoni katta emas, unumdor erlari ham kam, qazilma boyliklari deyarli yo'q, biroq ilm, axborot texnologiyalaridan foydalanishlari tufayli jahonda yetakchi o'rinlarni egallab turibdi.

Mavjud ta'lim tizimini tubdan isloh qilish va kadrlar tayyorlash milliy dasturini zamonaviy ilmiy tafakkur yutuqlariga, ijtimoiy tajribaga asoslangan holda, uzluksiz ta'lim tizimini barcha shakldagi ta'lim muassasalarida ta'lim jarayonini ta'minlovchi ilg'or ilmiy-metodik texnologiya sifatida amalga oshirish bugunning dolzarb vazifalaridan biri hisoblanadi. Zero, "Ma'naviyatni shakllantirishga bevosita ta'sir qiladigan yana bir muhim hayotiy omil – bu ta'lim-tarbiya tizimi bilan chambarchas bog'liqdir".

Ushbu o'quv-uslubiy qo'llanma veterinariya va zootexnika yo'nalishida tahsil olayotgan I-II kurs talabalari uchun mo'ljallangan. U ikki qismdan iborat bo'lib, birinchi qismi 1-2 semestrda, ikkinchi qismi 2-3 semestrda egallanishi lozim bo'lgan ma'lumotlarni qamrab olgan. Veterinariya va zootexnika yo'nalishiga oid matnlar,

har bir mavzu uchun alohida lug'atlar va matnlar asosida tuzilgan mashqlardan iborat. Talabalar matnlarni oqish, tarjima qilish va mashqlar ustida ishlash jarayonida veterinariyaga, zootexnika va chorvachilikka oid terminologiya bilan tanishib chiqishadi. Veterinariya va zootexnika soha mutaxassislarini tayyotlashga mo'ljallangan matnlarning turli xorijiy ilmiy jurnallardan, monografiyalardan, mutaxassislikka oid adabiyotlardan olingan ma'lumotlar bilan boyitilganligi talabalarning bilimlarini oshirish bilan bir qatorda, ularning ingliz tili leksikologiyasini terminlar bilan boyitish imkoniyatini yaratadi. Har bir matndan so'ng berib borilgan savollar matnni o'zaro guruhlarda muhokama qilishda alohida ahamiyat kasb etadi.

O'quv-uslubiy qo'llanmaning maqsadi talabalarda matnni o'qib tushunish (reading), so'zlashish (speaking), yozish(writing) ko'nikma va malakalarini shakllantirishdan iboratdir. Bu esa o'z navbatida talabalarda ingliz tilidagi badiiy adabiyotlarni o'qishga bo'lgan qiziqishlarini oshiradi va mutaxassislikka oid mavzuda so'zlashish, yozish qobiliyatlarini rivojlantirishga xizmat qiladi. Bundan tashqari talabalar har bir mavzudan so'ng veterinariya va zootexnika mutaxassisligiga oid terminlarning ingliz tilida ifodalanishi bilan tanishib chiqishlari mumkin. Bu esa o'z navbatida kadrlarni davr talabiga munosib bo'lishlarini ta'minlaydi.

## PART I

### LESSON 1

**Exercise 1.** *Translate the following text using the dictionary.*

#### 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 half 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.

### **New words and phrases**

mammal –sut emizuvchi

plough- plug (dehqonchilik quroli)

burden-yuk, og'irlik

hygiene- gigiyena, tozalik

diversity-farq, tafovut

vertebrate (backboned animals)-umurtqali hayvonlar

warm-blooded-issiq qon

important distinction-muhim farq

protection-himoya

familiar creatures-yaqin, o'xshash mavjudotlar

besides-bundan tashqari

internal characteristics-ichki hususiyatlari

aortic arch-shotomirga oid ravoq

circulatory system-aylanish systemasi

abdominal cavity-qorin bushlig'i

regulation-tartibga solish

body temperature-tana harorati

capacity-sig'im, qobiliyat

advantage-avfzallik

### **Exercise 2. Answer the questions**

1. What kind of animals are mammals?
2. Count some of the mammals.
3. What does "backboned animal" means?
4. What is the most important distinction between mammals and other vertebrates?
5. What is the most important single factor which gives mammals their superiority over other animals?
6. What are the typical mammalian qualities that they share among themselves?

**Exercise 3. *Translate the following sentences and underline the terms***

1. 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. 2. In the first place, all mammals belong to the important division of the animal kingdom as the Vertebrata, or “backboned animals”. 3. Mammals are warm-blooded, but we can say the same of birds. 4. How then do mammals differ from their vertebrate cousins? 5. What are the typical mammalian qualities that they share among themselves? 6. Besides possessing hair and producing milk, mammals also have a number of other internal characteristics which are especially typical, though perhaps less obvious. 7. The teeth are typically differentiated and specialized. 8. This development also has been made possible by the capacity for heat regulation, which has been such an advantage to mammals in other ways. 9. This development also has been made possible by the capacity for heat regulation, which has been such an advantage to mammals in other ways.

**Exercise 4. Fill in the blank**

1. In the first place, all mammals belong to the important division of the animal kingdom as the Vertebrata, or ... 2. The number of their... is reduced, as compared with other vertebrates, and each half of the lower jaw consists of but a single bone. 3. All animals have ... and breathe ... air. 4. Practically... gives birth to living young, but many reptiles and fish also do this. 5. Mammals are..., but we can say the same of birds. 6. In the ... system, the left ... arch forms the connection with the heart, as compared to the right ... arch in birds. 7. A muscular .., or diaphragm, ... the chest cavity from the... 8. The teeth are ... differentiated and specialized. In the ... system, the left ... arch forms the ... with the heart, as compared to the right aortic ... in birds.

**LESSON 2**

**Exercise 1. *Translate the following text using the dictionary***

**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 are 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 falls 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).

### **New words and phrases**

divided into-...ga bo'linmoq

according to- ...ga binoan

monotremes (egg-laying) mammals - tuxum quyuvchi sut emizuvchilar

mammals with pouches( marsupials) -xaltali sut emizuvchilar

embryonic-embryon holatidagi, yetilmagan

placental-placentga oid

nourished-boqmoq, ovqatlantirmoq

main division-asosiy qism

subdivision-qismlarga bo'linish

genera-tur, xil, nav

species-tur(hayvonlar filosofiyasida)

kinship-qarindoshchilik,qardoshlik

meat-eating mammals (carnivora)-go'shtxo'r sut emizuvchilar

weasel-ariq sichqoni (suvsarga mansub kichkina yirtqich hayvon)

lupus-teri tuberkulyozi( teridagi pufakli toshma)

domestic dog (Canis familiaris)-xonaki it

coyote - koyot(Amerika bo'risi)

**Exercise 2. Answer the questions**

1. What kind of animals are monotremes?
2. What kind of animals are marsupials?
3. How many groups Living mammals are divided into?
4. Which class the wolf belongs to?
5. What kind of animals are Carnivora ?

**Exercise 3. Translate the following sentences and underline the terms**

1. 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. 2. These three major divisions developed very early in mammalian history and each of them evolved thereafter quite independently of the others. 3. Subdivisions of each order are also made-families, genera, species according to the degree of evolutionary kinship. 4. 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. 5. Then it falls in a group made up of the placental mammals, and is further separated into the order Carnivora, or meat-eating mammals. 6. 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. 7. 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.

**Exercise 4. Fill in the blanks**

1. The living members of the class mammalia are today divided into ..., according to differences in their anatomy and the manner in which they bear their young. 2. ... to any popular name or names it may have, each species of animal known to..... is given a scientific name. 3. Then it falls in a group made up of the ....., and is further ... into the order....., or meat-eating mammals. 4. To distinguish it from such other meat eaters as ..., weasels and the like, it is placed in the family....., that of the doglike..... 5. Together with ... other closely related species, it is included in the genus....., which separates it from such closely allied groups as the...6. The specific name of the wolf is ... lupus, distinguishing it from all near relatives, such as the... and the...7. Subdivisions of each order ... also made-families, ..., species according to the degree of ... kinship. 8. Subdivisions of each order are also ..., genera, ... according to the degree of ... kinship.

## LESSON 3

### Exercise 1. *Translate the following text using the dictionary*

#### 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 term, 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, surrounds food particles and absorbs them through the flexible membrane in which it is enclosed.

In 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 must 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 oesophagus, 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.

## New words and phrases

fuel-yoqilg'i  
eventually-oxir oqibat, nihoyat  
synthesize-sintezlanmoq  
chemical-kimyoviy  
soil-yer, tuproq  
ingredient-tarkibiy qism, ingridiyent  
rays of the sun-quyosh nurlari  
on the other hand-boshqa taraflama  
absorb-singdirmoq  
the source of energy-energiya manbai  
the amoeba-amyoba  
flexible-egiluvchan, elastic  
membrane-membrana  
enclosed-yopiq, chegaralangan  
vertebrates-umurtqalilar  
lowest animals-eng mayda hayvonlar  
enormously-o'ta bahaybat  
occur-sodir bo'lmoq  
arrangement-tartibga solmoq, klassifikasiyalash  
to swallow-yutmoq(og'iz bushligida)  
oesophagus-qizilo'ngach  
gastric juices-oshqozon shirasi  
intestine-ichak  
reduced-qisqartirmoq  
provide-ta'minlamoq  
stomach-oshqozon  
immediately-zudlik bilan, tezkorlik bilan  
caecum-ko'r ichak  
proportion-proporsiya, mutanosiblik  
generation-avlod, turkum, ko'payish  
rectum-to'g'ri ichak

### **Exercise 2. Answer the questions**

1. What is role of food in our life?
2. Explain the nourishment of the lowest animals?

3. What is the difference between the nourishment of the lowest animals and the higher animals?
4. How mammals eat?
5. Explain the process after the food passes into the oesophagus.

**Exercise 3. Translate the following sentences and underline the terms**

1. Food is the fuel which makes the body machine work, and without it living things quickly lose their energy and eventually die. 2. Plants do not “eat” in the sense that we usually understand that term, 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. 3. Thus the amoeba, although lacking a mouth, surrounds food particles and absorbs them through the flexible membrane in which it is enclosed. 4. 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. 5. In most mammals this machinery is provided by the teeth, and these vary enormously from species to species in arrangement and structure. 6. When a mammal swallows food, usually after chewing it, the food passes into the oesophagus, a simple passage which conveys it quickly to the much wider envelope known as the stomach.

**Exercise 4. Fill in the blanks**

1. Plants do not “eat” in the sense that we usually understand that term, but they do synthesize organic food, using chemicals in the soil and the air as ingredients, and..... as the source of.....2. The....., on the other hand, absorb their nourishment directly through their.....3. First, of course, each animal has to find..... the kind of food suited to its particular.....4. But..... and getting it to the ..... are still only the beginning of the problem. 5. In most mammals this machinery is provided by the....., and these vary enormously from species to species in..... 6. When a mammal....., usually after chewing it, the food passes into....., a simple passage which conveys it quickly to the much wider envelope known as.....7. .... is absorbed in different proportions into the..... as the journey proceeds.

**LESSON 4**

**Exercise 1. Translate the following text using the dictionary**

**MAMMALS AS VECTORS OF HUMAN DISEASES**

There are many carriers of infectious zoonotic diseases, both protozoan and helminthic, among mammals. Many of these vectors belong to the order of ungulates;

brucellosis and tuberculosis are transmitted through the milk of cows, goats, and sheep; goat's milk is also a vehicle of the virus of spring-summer encephalitis; horned cattle are a source of human infestation with anthrax and foot-and-mouth disease; horses transmit glanders. Beef that has not been sufficiently cooked presents a threat of infestation with the beef tapeworm, while pork can be the source of infestation with the pork tapeworm and of trichinosis.

Representatives of the order of carnivores, particularly stray dogs, are potential vectors of visceral leishmaniasis (kalaazar). Domestic dogs and cats are a source of rabies and toxoplasmosis in man. In certain areas 40 per cent of the local dogs are vectors of toxoplasmosis. Dogs and wild carnivores as well as cats, are responsible for the spread of some helminthic diseases.

The order of rodents is very important medically, it is the most numerous order, of the mammals (as regards species). The incisors of these animals are shaped like chisels; having no roots they grow throughout the life of the animal. Since the food of rodents consists of hard bark, grain, etc.; their incisors are constantly worn down, and therefore never become over-long. Many rodents are crops pests, and many are vectors and reservoirs of grave infections. Among the vectors are mice, rats, hamsters, gophers, voles, etc.

Plague, tularaemia, and other infections can be transmitted through rodents. Tularaemia, for instance, penetrates the mucous membranes and skin if persons who drink water drawn from source contaminated by infested animals; it is also transmitted by ticks and bloodsucking insects, carrying the infection from rodents to man.

### **New words and phrases**

vector-infeksiya tashuvchi

infectious-yuqumli, infeksiya

zoonotic diseases- insonlarga hayvonlardan yuqadigan kasallik

protozoan- sodda hayvonlar

helminthic-parazit qurtga qarshi vosita

ungulates-tuyoqlilar

brucellosis-brutsiliyoz

tuberculosis- tuberkulyoz

transmit- yuqmoq

encephalitis- ensefalit ( bosh miyaning yallig'lanishi )

human infestation-insoniyatni parazitlar bilan zararlanishi

glanders- manqa (otlarning yuqumli kasalligi)  
anthrax-kuydirgi  
foot-and-mouth disease-oyoq va og'izdagi kasalliklar  
beef- mol go'shti  
pork tapeworm- cho'chqa go'shtidagi gijja  
beef tapeworm- mol go'shtidagi gijja  
trichinosis-trixines  
leishmaniasis-leyishmanioz  
representatives- vakil kishi  
helminthic diseases-gelmentik kasalliklar  
order of rodents- yovvoyi kemiruvchi  
incisors- old tishlar  
toxoplasmosis-toksoplazmoz  
rodents-kemiruvchi  
reservoirs-suv ombori  
constantly-doimiy  
hamsters-og'maxon  
gophers- sug'ur  
voles-bo'shliqlar  
penetrates – ichiga kirmoq  
bloodsucking-qon so'radigan

**Exercise 2. Answer the questions**

1. What kind of infectious zoonotic diseases transmitted through the milk of domestic animals?
2. What is a source of human infestation with anthrax and foot-and-mouth disease?
3. What is a source of rabies and toxoplasmosis in man?
4. What kind of animals are responsible for the spread of some helminthic diseases?

**Exercise 3. Translate the following sentences and underline the terms**

1. There are many carriers of infectious zoonotic diseases, both protozoan and helminthic, among mammals. 2. Beef that has not been sufficiently cooked presents a threat of infestation with the beef tapeworm, while pork can be the source of infestation with the pork tapeworm and of trichinosis. 3. Domestic dogs and cats are a source of rabies and toxoplasmosis in man. 4. Dogs and wild carnivores as well as cats, are responsible for the spread of some helminthic diseases. 5. Many rodents are crops pests, and many are vectors and reservoirs of grave infections. 6. Tularaemia,

for instance, penetrates tin mucous membranes and skin if persons who drink water drawn from source contaminated by infested animals; it is also transmitted by ticks and bloodsucking insects, carrying the infection from rodents to man.

**Exercise 4. Fill in the blanks**

1. Many of these ... belong to the order of ungulates; brucellosis and ... are transmitted through the milk of....2. Representatives of the order of carnivores, ..., are potential vectors of visceral ... (kalaazar). 3. In certain areas .... are vectors of toxoplasmosis. 4. Dogs and wild carnivores as well as cats, are responsible for the..... some helminthic diseases. 5. Many rodents are ....., and many are vectors and reservoirs of.....6. . , and other infections can be trans- milled through rodents. 7. Since the food of ... consists of hard bark, grain, etc. 8. Domestic ... and ... are a source of rabies and ... in man. 9. Among the vectors are ..., ..., ..., ..., etc. 10. In certain areas.....of the local dogs are ... of toxoplasmosis.

**LESSON 5**

**Exercise 1. Translate the following text using the dictionary**

**HISTORY OF THE HORSE**

The oldest known horse ancestors were not horses at all, but little three-toed and four-toed animals about the size of a fox terrier. Scientists call this little animal Eohippus, which means “the dawn horse”.

Eohippus lived nearly 60 million years ago, during the early part of the first epoch of the present era. It stood about a foot high. It had four toes on the first foot and three on the hind foot. Each toe bore a toenail, the primitive hoof. In the lower leg Eohippus had two bones, in contrast with one in the lower leg of the modern horse. The teeth of this little dawn horse were small and showed on top only the beginnings of the ridges that are prominent on the teeth of the modern horse. These hard ridges on the tops of the modern horse’s teeth are especially useful in chewing grass and hay.

Fossils of a slightly larger horse, called Mesohippus, are found in the rock layers of the second epoch of this present era. Mesohippus was about as large as a sheep. It had three toes on each foot, but the central toe was large and carried most of the weight, although the two smaller side toes still touched the ground. One of the bones in the lower leg had become very much smaller. The teeth had well- developed ridges.

In the next or third epoch, we find the fossils of a still larger horse, called



Merychippus. Merychippus had a foot that looked much like that of a modern horse, although there were still two very small side toes that did not touch the ground. The small bone in the lower leg was fused with the large bone, thus making only one bone in the lower leg. The teeth were real horse's teeth. Merychippus had the general form and appearance of the modern horse, but was considerably smaller than our horses are. The modern horse, called Equus, finally developed from this line of ancestor.

### **New words and phrases**

four-toed animals- to'rt tuyoqli hayvonlar

toenail-tuyoq

fossil-toshga aylangan hayvon yoki o'simlik qoldig'i

ridges-qirra

well- developed ridges-o'tkir qirralar

considerably- sezilarli

ancestor-ajdod

dawn-horse –ibtidoiy ot

terrier –terer (it turi)

epoch – epoxa, zamon

hind – orqa oyoq

primitive – qadimgi, burungi

hoof –tuyoq

in contrast –tafovutda, solishtirishda

prominent –atoqli, mashhur

slightly – arzimas, nozik

layer – qatlam, qavat

fuse with –birlashmoq, aralashmoq

considerable –katta, yirik

### **Exercise 2. Answer the questions**

1. How scientists called a little animal, which means “the dawn horse”?
2. How many years ago Eohippus lived?
3. How called fossils of a slightly larger horse?
4. How called the fossils of a still larger horse?
5. How called modern horses?

### **Exercise 3. Translate the following sentences and underline the terms**

1. The oldest known horse ancestors were not horses at all, but little three-toed and four-toed animals about the size of a fox terrier.
2. Scientists call this little animal

Eohippus, which means “the dawn horse”. 3. Eohippus lived nearly 60 million years ago, during the early part of the first epoch of the present era. 4. The teeth of this little dawn horse were small and showed on top only the beginnings of the ridges that are prominent on the teeth of the modern horse. 5. One of the bones in the lower leg had become very much smaller. The teeth had well- developed ridges. 6. In the next or third epoch, we find the fossils of a still larger horse, called Merychippus. 7. The modern horse, called Equus, finally developed from this line of ancestor.

#### **Exercise 4. Fill in the blanks**

1. Scientists call this little animal Eohippus, which means “.....”. 2. Eohippus lived nearly ..... years ago, during the early part of .... epoch of the present era. 3. The teeth of this little dawn ... were small and showed on top only the beginnings of the ridges that are ... on the teeth of the ..... 4. .... had a foot that looked much like that of ... horse, although there were still two very small side toes that did not touch the ground. 5. The small bone in the lower leg ..... the large bone, thus making only one bone in the lower leg. 6. The modern horse, called....., finally developed from this line of ..... 7. The yellow- green scum that ... in troughs during the summer is not, in itself, harmful, but, it may catch and hold ... microbes. 8. The small bone in the .....was fused with the large bone, thus making only one bone in the ...9. These hard ... on the tops of the ... horse’s ... are especially useful in ... grass and hay.

## **LESSON 6**

**Exercise 1. Translate the following text using the dictionary**

### **HOW TO KEEP ANIMALS HEALTHY AND PRODUCTIVE (I)**

**Animal Husbandry** Livestock management is an art that has been developed from years of observation and experience in breeding and caring for farm animals. The practitioner or specialist is called an animal husbandman. His duty is to keep the animals under his care in health and to nurse them when sick. He may be sure that he is doing everything within his power to maintain conditions most conducive to animal health if he will apply the fundamentals of livestock management briefly described in the following paragraphs.

**Balanced Ration**—A sufficient quantity of palatable and nutritious feed is needed by animals in order to maintain their condition and production. Such a ration is one balanced as to proteins, fats, carbohydrates, minerals and vitamins. The properties of these components should be varied with the purpose for which the

animals are kept, For instance, the ration of a high-producing dairy cow should include a relatively large amount of minerals and carbohydrates and should be fed according to the pounds of milk produced. Too much feed of excellent quality may be as injurious as too little.

**Pure Water**—Drinking water should be supplied plentifully and be fresh and kept reasonably clean. For the dairy barn, individual drinking cups to keep water before the cows constantly are highly recommended. It is reported that they increase milk production 10 per cent. A supply of water should be available in yards and pastures. Care should be taken to guard the water from filth of all kinds as polluted water is unfit for drinking purposes. The yellow- green scum that appears in troughs during the summer is not, in itself, harmful, but, it may catch and hold dangerous microbes. By emptying the water and thoroughly scrubbing the trough with a 5 percent solution of blue vitriol this vegetable growth may be killed.

The drinking cups become foul through decomposition of accumulated refuse and saliva, so need similar attention from time to time. Domestic water supplies are made safe by chlorination.

#### **New words and phrases**

livestock- ot-ulov

breeding-urchitmoq, ko'paytirmoq

carbohydrates-uglevod

dairy cow- sog'in sigir

high-producing- yuqori hosildorlik

dangerous microbes- xavfli mikroblar

injurious-yarador

decomposition-yemirilish, parchalanish

chlorination-xlorlanish

accumulated-yig'ilgan, to'plangan

observation – kuzatuv

conducive – muvofiq qiladigan, qulay

palatable –mazali, totli, lazzatli

nutritious – oziq bo'ladigan

plentifully – mo'l, ko'l, serob

reasonably –anchagina, mulohaza bilan

pasture –yaylov, o'tloq

guard –qorovullik qilmoq

filth –kir, chang-chung

scrub –o'simlik, buta

**Exercise 2. Answer the questions**

1. Who is the animal husbandman?
2. What is the duty of animal husbandman?
3. What is the balanced ration?
4. What can you say about pure water?
5. How many percent does the milk increase in pure water?

**Exercise 3. Translate the following sentences and underline the terms**

1. Livestock management is an art that has been developed from years of observation and experience in breeding and caring for farm animals. 2. He may be sure that he is doing everything within his power to maintain conditions most conducive to animal health if he will apply the fundamentals of livestock management briefly described in the following paragraphs. 3. Such a ration is one balanced as to proteins, fats, carbohydrates, minerals and vitamins. 4. For instance, the ration of a high-producing dairy cow should include a relatively large amount of minerals and carbohydrates and should be fed according to the pounds of milk produced. 5. Drinking water should be supplied plentifully and be fresh and kept reasonably clean. 6. A supply of water should be available in yards and pastures. 7. The drinking cups become foul through decomposition of accumulated refuse and saliva, so need similar attention from time to time. 8. By emptying the water and thoroughly scrubbing the trough with a 5 percent solution of blue vitriol this vegetable growth may be killed.

**Exercise 4. Fill in the blanks**

1. The ... or specialist is called... 2. A sufficient quantity of palatable and nutritious feed is needed by animals in order to maintain their... 3. Such a ration is one balanced as to ..., fats, carbohydrates, .... 4. For instance, the ration of a high-producing ... cow should include a relatively large amount of... and should be fed according to the pounds of ... produced. 5. ... should be supplied plentifully and be fresh and kept reasonably clean. 6. The ... that appears in troughs during the summer is not, in itself, ..., but, it may catch and hold ... microbes. 7. For the ... barn, ... drinking cups to keep ... before the ... constantly are highly recommended. 8. The yellow- green ... that appears in troughs during the ... is not, in itself, harmful, but, it may catch and hold ... microbes. 9. The ... of these ... should be varied with the purpose for which the ... are kept, for instance, the ration of a ... dairy cow should include a relatively large amount of ... and ... and should be fed according to the ... of milk produced.

## LESSON 7

**Exercise 1.** *Translate the following text using the dictionary*

### **HOW TO KEEP ANIMALS HEALTHY AND PRODUCTIVE (II)**

Nature's means of controlling diseases and promoting growth of both plants and animals is through the ultraviolet rays of the sun. Accordingly barns should be built with plenty of windows to admit an abundance of sunshine. To be most effective the sunlight must be direct, as the passing of the light through window glass filters out its growth-giving and germ killing properties.

Stables should be designed in order to keep the animals clean. Manure should be removed daily and drawn to the field or stored at some distance from the stable. Stables should be disinfected at least twice a year. White washing the walls aids in maintaining sanitation. Attention should be paid to arrangement for making the barn work easy and to prevent crowding. Among the points which must be considered in planning the stables are the following: the site, the building materials, the walls, ceilings and floors, the lighting, and the drainage. Protection against fire by such means as fire hose and lightning rods is good insurance.

Keeping the hair and skin in good condition by grooming and occasional washing improves both the health and appearance of the animals. Such attention tends to promote cleanliness, especially of the milk. Wiping the udder and teats just before milking with a paper towel moistened with a solution of sodium hypochlorite is good practice.

Barnyards, paddocks, and open pens provide places for animals to exercise and secure fresh air. They must be well drained and fenced, and sheltered from the wind. When animals are forced to wade through mud and ashes they are much more subject to diseases and injuries of the udder and feet. By concreting low places in the barnyard the nuisance of the mud-hole and wallow may be overcome. A platform of areaway of concrete is suggested as a good investment. If animals are fed in the yard, suitable racks should be provided to prevent wasting the feed and to keep it clean.

#### **New words and phrases**

ultraviolet rays-ultrabinafsha nurlari

an abundance-mo'lchilik

disinfected-dizinfeksiya

arrangement-reja

stables-barqaror

to prevent-oldini olmoq  
grooming-otboqar  
occasional washing-vaqti-vaqti bilan cho'miltirish  
wallow - ag'anamoq  
udder-yelin, emchak  
barn-omborxonona  
germ-mikrob  
property-xo'jalik  
admit-joylashmoq  
filter-tozalovchi  
direct-bevosita  
manure-tezak, go'ng  
aid-yordam, ko'mak  
arrangement-reja, dastur, kelishuv  
consider-o'ylab chiqmoq muhokama qilmoq  
drainage-drenaj  
tend-odatlanib qolmoq  
cleanliness-orastalik, tozalik  
teat – so'rgich

**Exercise 2. Answer the questions**

1. Why does the sunlight must be effective?
2. How times a year do the stables disinfected?
3. What does help to clean and wash udder and teat?
4. Where may the cattle exercise and secure fresh air?
5. Why should barns be built with windows?

**Exercise 3. Translate the following sentences and underline the terms**

1. Accordingly barns should be built with plenty of windows to admit an abundance of sunshine. 2. To be most effective the sunlight must be direct, as the passing of the light through window glass filters out its growth-giving and germ killing properties. 3. Among the points which must be considered in planning the stables are the following: the site, the building materials, the walls, ceilings and floors, the lighting, and the drainage. 4. Attention should be paid to arrangement for making the barn work easy and to prevent crowding. 5. Protection against fire by such means as fire hose and lightning rods is good insurance. 6. If animals are fed in the yard, suitable racks

should be provided to prevent wasting the feed and to keep it clean. 7. When animals are forced to wade through mud and ashes they are much more subject to diseases and injuries of the udder and feet.

**Exercise 4. Fill in the blanks**

1. Protection against fire by such means as ... and .... is good insurance. 2. Manure should be removed daily and drawn to the field or stored at some ... from the stable. 3. Attention should be paid to ... for making the barn work easy and to prevent crowding. 5. Keeping the hair and skin in good ... by grooming and occasional washing improves both the health and ... of the animals. 6. Barnyards, ..., and open pens provide places for ... to exercise and secure fresh air. 7. A platform of ... of concrete is suggested as a good .... 8. If animals are ... in the yard, suitable ... should be provided to prevent ... the feed and to keep it clean. 9. Wiping the ... and ... just before ... with a paper towel ...with a solution of sodium ... is good practice.

**LESSON 8**

**Exercise 1. *Translate the following text using the dictionary***

**RABBIT**

Ancient historical chronicles have often made mention of this popular Rodent whose prolific nature has caused it to become a nuisance at various times in the world's history. The zoological name, *Lepus*, dates back to the Roman Empire, and at that time it included all the Hare family. The name, however, originated with the Greek civilization that came before the Roman and meant, in the language, "small and thin". Aristotle called it the *Dasypus* (but this name has since used to classify another species of animal). Pliny gave the rabbit the name *Cuniculus*, because of its habit of burrowing runways underneath the ground that look somewhat like the water drains of *cuniculus* which were dug under the ancient city of Rome.

The word "rabbit" is a more recent name that arose out of the language spoken in the middle European states during the Reformation. The prolific nature of this animal has at various times called for laws and regulations to prevent it from overrunning the country. It originated in Spain, overran Italy and its environs, and Augustus ordered his soldiers to exterminate it.

After several minor attempts to check its multiplication, we find that France at one time asked the scientist Pasteur for advice, and he prescribed the use of "hen-colic" bacteria. In Europe the successful checking of these Rodents is accomplished in some sections by keeping them in hutches instead of permitting them to run wild

about the country.

Australia is the latest place to suffer from the scourge, and the government exacts heavy penalties from the land-owners if they do not destroy a certain number of rabbits each year. This destruction is usually accomplished by fumigation and poisoning, though occasionally trapping is resorted to. There is a very interesting species of the rabbit that was originally found in the Porto Santo-Madeira Islands, which lie off the northwestern coast of Africa, that is known as the "silk Rabbit", *Lepus huxleyi*. A variation of this species which has been successfully raised in England is called the Angora, or wool, Rabbit.

### **New words and phrases**

chronicles-yilnomalar  
prolific nature-serunum tabiat  
nuisance-ko'nglsizlik  
zoological name-zologiya ismi  
civilization-sivilizatsiya  
to prevent-oldini olmoq  
regulations-tartibga solish  
to exterminate-ildizini qurutmoq  
prescribed-tayinlagan  
accomplished-bajargan  
permitting-izn beryapti  
destruction-vayrona  
fumigation-kimyoviy gazlar b-n dizinfeksiya  
mention-eslatib o'tmoq  
prolific-serunum  
burrow-kovak  
underneath-tagida, ichida  
dig-qazimoq  
arise-vujudga kelmoq  
overrun-to'lib ketmoq  
originate-paydo bo'lmoq  
minor-kichik  
multiplication-ko'paytirish  
non-colic-sanchiqsiz  
scourge-ofat, falokat



exact-aniq, batartib  
occasionally-ahyon-ahyonda  
trap-qopqon, tuzoq  
originally-asl, aslida  
bud-g'uncha, kurtak  
preference-afzal ko'rish, ortiq deb bilish

**Exercise 2. Answer the questions**

1. What does the zoological name "Lepus"?
2. Who called Lepus as Dasypus?
3. Where did the multiplication find?
4. What about Australia in the text?
5. What is name of "silk rabbit"?

**Exercise 3. Translate the following sentences and underline the terms**

1. Ancient historical chronicles have often made mention of this popular Rodent whose prolific nature has caused it to become a nuisance at various times in the world's history. 2. The zoological name, Lepus, dates back to the Roman Empire, and at that time it included all the Hare family. 3. The name, however, originated with the Greek civilization that came before the Roman and meant, in the language, "small and thin". 4. It originated in Spain, overran Italy and its environs, and Augustus ordered his soldiers to exterminate it. 5. After several minor attempts to check its multiplication, we find that France at one time asked the scientist Pasteur for advice, and he prescribed the use of "hen-colic" bacteria. 6. Australia is the latest place to suffer from the scourge, and the government exacts heavy penalties from the land-owners if they do not destroy a certain number of rabbits each year. 7. This destruction is usually accomplished by fumigation and poisoning, though occasionally trapping is resorted to.

**Exercise 4. Fill in the blanks**

1. The zoological name,....., dates back to the .., and at that time it included all the ..... family. 2. The name, however, originated with the...civilization that came before the .... and meant, in the language, "....". 3. Pliny gave the rabbit the name ..., because of its habit of burrowing runways underneath the ground that look somewhat like the water drains of cuniculus which were dug under the ancient city of ....4. It originated in ..., overran ... and its environs, and .... ordered his soldiers to exterminate it. 5. .... is the latest place to suffer from the scourge, and the government exacts heavy penalties from the .... if they do not destroy a certain number of .... each

year. 6. A variation of this species which has been successfully raised in ... is called the ..., or wool, .... 7. Ancient historical .... have often made ... of this popular ... whose prolific nature has caused it to become a... at various times in the world's history. 8. After several ... attempts to check its ..., we find that France at one time asked the scientist ... for advice, and he ... the use of "hen-colic" bacteria.

## LESSON 9

**Exercise 1. Translate the following text using the dictionary**

### HISTORY OF RABBITS

Southern Europe is the place of origin of the rabbit. It is found in varying quantities in every continent on the globe; but the main producing sections are the central and southern parts of Europe and Australia. Its home is in runways or burrows that it makes in the ground, usually among low lying bushes. The food of the rabbit consists of soft parts of plants, such as leaves, buds, or roots; and when it can find them it will eat vegetables and garden plants in preference to other plants.

Something of the prolific nature of the rabbit can readily be seen from the fact that it breeds every five weeks from March to October, and each litter has from 5 to 12 young. These young are immature and naked when born; but in the warm climates they develop so rapidly that in 5 months they are fully infancy. In the colder climates, however, the maturing process takes 12 months. The elders are more careful of their young than the hares are, and the loss during infancy is not so great as in the latter species.

#### New words and phrases

producing sections-ishlab chiqarish seksiyalari

burrows-kovak

leaves-barglar

buds-kurtak

roots-ildiz

prolific-sermahsul

immature-yosh

latter species-so'nggi turlar

warm climates-iliq iqlim sharoiti

origin-kelib chiqish, manba

vary-farq qilmoq, farqlanmoq

bush-but

runway-uchish va qo'nish yo'lagi

naked-yalang'och

rapidly-tezkor

mature-pishgan, yetilgan

hare-yovvoyi quyon

loss-yoqolish

infancy-go'daklik, bolalik

**Exercise 2. Answer the questions**

- 1) Where is the place of origin of the rabbit?
- 2) Where is the main producing sections of the rabbit?
- 3) Which kind of food consists of the rabbit's eating?
- 4) Which kind of rabbits are more careful?
- 5) When do rabbits it breed?

**Exercise 3. Translate the following sentences and underline the terms**

1. Southern Europe is the place of origin of the rabbit. It is found in varying quantities in every continent on the globe; but the main producing sections are the central and southern parts of Europe and Australia. 2. Its home is in runways or burrows that it makes in the ground, usually among low lying bushes. 3. The food of the rabbit consists of soft parts of plants, such as leaves, buds, or roots; and when it can find them it will eat vegetables and garden plants in preference to other plants. 4. Something of the prolific nature of the rabbit can readily be seen from the fact that it breeds every five weeks from March to October, and each litter has from 5 to 12 young. 5. These young are immature and naked when born; but in the warm climates they develop so rapidly that in 5 months they are fully matured. 6. In the colder climates, however, the maturing process takes 12 months.

**Exercise 4. Fill in the blanks**

1. Its home is in ... or burrows that it makes in the ..., usually among low lying ....2. Southern ... is the place of origin of the ..... 3. It is found in varying ... in every continent on the globe; but the main ... sections are the central and southern parts of Europe and Australia. 4. The food of the ... consists of soft parts of ..., such as ..., ..., or ...; and when it can find them it will eat ... and garden .... in preference to other plants. 5. Something of the ... nature of the rabbit can readily be seen from the fact that it breeds every ... from .., and each litter has from ..... young. 6. The .... are more careful of their young than the ... are, and the loss during .... is not so great as in the latter species. 7. These young are...and ... when born; but in the warm climates

they develop so rapidly that in.... they are fully matured. 8. In the colder climates, however, .... process takes ... 8. Australia is the latest ... to suffer from the scourge, and the ... exacts heavy ... from the land-owners if they do not ... a certain number of ... each year.

## LESSON 10

**Exercise 1. Translate the following text using the dictionary**

### THE BEAVER

The name “beaver” comes from an old English word “bever”, and it is believed that it is intended to designate the colour for which this animal is noted. The average adult weighs from 30 to 50 pounds, although occasionally heavier specimens are found. The home of the Beaver is anywhere where inland bodies of water are found, whether stream, river, pond, or lake. It does not need salt water regions. It seeks a quiet place where it builds large huts in which it lives, after building a dam across the water. This is done by felling trees, some of which are quite large, and then cutting off the branches and dragging or floating them to the desired position, where they are held in place by soil or dirt carried there in the forelegs. The wide flat tail is not used as a towel, but rather as a means of steering in the water, and as an alarm signal.

Besides building these huts, it makes long canals and underground dug-outs, which also serve as a home for the female and the young. The Beaver chews the bark of those parts of the trees that cannot be easily moved, as well as small bushes such as the hazel. It prefers the inner bark, usually of willow, birch, and aspen. Conifers are very rarely touched by the Beaver, unless from dire necessity.

The mating season is usually from the first of February to the middle of March, and the young are born in late May and early June. There is but one litter annually, and though occasionally there may be 5 or 6 young, the usual number is 3 or 4. In the case of young females there may be but 2 in the litter. It takes from 2 to 2,5 years for a Beaver to mature. The natural enemies of the Beaver are the larger predatory animals, of which the Lynx, the Wolf, and the Wolverine are examples; but, as its home is usually surrounded by, or under, the water, it is quite well protected against their depredations.

### New words and phrases

designate-belgilamoq

average adult-kattalar miqdori

occasionally-ba'zan

dragging-sudramoq  
floating-suvda suzmoq  
position-pozitsiya  
underground-yer osti  
hazel-yong'oq daraxti  
willow-tol  
predatory animals-yirtqich hayvonlar  
protected-himoya qilmoq  
beaver-qunduz  
come from-...dan kelib chiqmoq  
inland-markaziy  
stream-kichik daryo  
pond-hovuz, havza  
dam-ko'tarma, damba  
cut off-uzib qo'ymoq  
hut-kulba  
branch-shox, (soha)  
desire-tilamoq  
soil-tuproq  
foreleg-hayvonlarning oldingi oyog'i  
steer-boshqarmoq  
dug-out-suqmoq, tiqmoq  
chew-chaynamoq  
bark-daraxt po'stlog'i  
inner-ichki, ichkaridagi  
birch-qayin  
aspen-ansol, tog'terak  
rarely-kamdan-kam  
necessity-ehtiyoj, zaruriyat  
mate-juftlashmoq  
annually-yillik  
surround-o'ramoq, o'rab olmoq  
protect against -...ga qarshi kurashmoq

**Exercise 2. Answer the questions**

1) How much the adult beavers weigh?

- 2) Where do we find beavers?
- 3) Which piece of body means of steering in the water, and as an alarm signal?
- 4) What do they chew and eating with it?
- 5) What is the natural enemies of the beavers?

**Exercise 3. Translate the following sentences and underline the terms**

1. The average adult weighs from 30 to 50 pounds, although occasionally heavier specimens are found. 2. The name “beaver” comes from an old English word “bever”, and it is believed that it is intended to designate the colour for which this animal is noted. 3. This is done by felling trees, some of which are quite large, and then cutting off the branches and dragging or floating them to the desired position, where they are held in place by soil or dirt carried there in the forelegs. 4. The home of the Beaver is anywhere where inland bodies of water are found, whether stream, river, pond, or lake. 5. The wide flat tail is not used as a trowel, but rather as a means of steering in the water, and as an alarm signal. 6. Besides building these huts, it makes long canals and underground dug-outs, which also serve as a home for the female and the young. 7. The mating season is usually from the first of February to the middle of March, and the young are born in late May and early June. 8. In the case of young females there may be but 2 in the litter. It takes from 2 to 2,5 years for a Beaver to mature.

**Exercise 4. Fill in the blanks**

1. The home of the Beaver is anywhere where inland bodies of water are found, ..., ..., or ...2. The name “....” comes from an old ... word “bever”, and it is believed that it is intended to designate the colour for which this .... is noted. 3. Besides building these ..., it makes long canals and underground ..., which also serve as a home for the ... and ....4. The mating season is usually from the first of ... to the middle of..., and the young are born in late.... and early ....5. The natural ... of the Beaver are the larger ... animals, of which the ..., the ..., and the ... are examples; but, as its home is usually surrounded by, or under, the water, it is quite well protected against their depredations. 6. In the case of young .... there may be but 2 in the litter. It takes from ...to ... years for a Beaver to mature. 7. This is done by felling ..., some of which are quite ..., and then cutting off the branches and .... or ... them to the desired position, where they are held in place by soil or dirt carried there in the ....8. It prefers the inner bark, usually of ..., ..., and .... 9. ... are very rarely touched by the ..., unless from dire necessity. 10. The wide flat ... is not used as a trowel, but rather as a means of ... in the ..., and as an ...

## LESSON 11

### Exercise 1. *Translate the following text using the dictionary*

#### SABLE

It is an extremely restless creature, avoids the presence of man, is quick and shrewd, and seeks the depths of the forest for its home and food. From observations made over a long period of years it has been shown that very few Low Grade peltries come into the markets. This is due to the following reason: the sable does not have to go far for food in the warmer months, and, therefore, does not leave tracks or other indications such as occur later on, when snow is on the ground and food is hard to procure.

The sable is carnivorous in that its principal food consists of mammals and birds, yet, like other members of the Marten Family, at times, it feeds on berries and fruit.

The mating season does not start until late in January and early in February. After 9 weeks of gestation, from 2 to 6 young are born, though the average litter contains but 4 or 5, which are cared for by the female alone in the holes of trees. The ability of the sable to hide itself quickly keeps it from the ravages of most of the forest's predatory animals.

#### New words and phrases

extremely-juda

shrewd-betoqat, bezovta

observations-kuzatuv

indications-alomat

occur-sodir bo'lmoq

to procure-qo'lga kiritmoq

carnivorous-yirtqich

restless-betoqat, bezovta

creature-jonivor

avoid-oldini olmoq

presence-hozir bo'lish

seek-qidirmoq, izlamoq

pelt-hayvon terisi

track-izidan tushmoq

principal-ko'pincha, asosiy, bosh

ravages-vayron qilmoq

**Exercise 2. Answer the questions**

1. When do we start the mating season?
2. What kind of animal is the sable?
3. Which thing does only come into the markets few?
4. Describe the nature of the sable.

**Exercise 3. Translate the following sentences and underline the terms**

1. From observations made over a long period of years it has been shown that very few Low Grade peltries come into the markets. 2. The sable is carnivorous in that its principal food consists of mammals and birds, yet, like other members of the Marten Family, at times, it feeds on berries and fruit. 3. The sable is carnivorous in that its principal food consists of mammals and birds, yet, like other members of the Marten Family, at times, it feeds on berries and fruit. 4. After 9 weeks of gestation, from 2 to 6 young are born, though the average litter contains but 4 or 5, which are cared for by the female alone in the holes of trees. 5. The ability of the sable to hide itself quickly keeps it from the ravages of most of the forest's predatory animals. 6. This is due to the following reason: the sable does not have to go far for food in the warmer months, and, therefore, does not leave tracks or other indications such as occur later on, when snow is on the ground and food is hard to procure.

**Exercise 4. Fill in the blanks**

1. The sable is ... in that its principal food consists of ... and ..., yet, like other members of the Marten Family, at times, it feeds on ... and ....2. The ability of the ...to hide itself quickly keeps it from the ... of most of the forest's ... animals. 3. From ... made over .....of years it has been shown that very few Low Grade peltries come into the markets. 4. After ... weeks of gestation, from ... to ... young are born, though ... litter contains but ... or ..., which are cared for by the female alone in the .... of trees. 5. This is due to the ... reason: the ... does not have to go far for ... in the ... months, and, therefore, does not leave ... or other ... such as occur later on, when snow is on the ... and food is hard to procure. 6. The mating ... does not start until late in ... and early in February.

**LESSON 12**

**Exercise 1. Translate the following text using the dictionary**

**NATURE AND USES OF POULTRY (I)**

Birds in domestication are divided according to their relations to men into three general classes: Poultry, Pigeons, and Cage Birds. The group of poultry includes



fowls, turkeys, guineas, peafowls, pheasants, ostriches, ducks, geese, and swans. Birds of the poultry group are alike in the several characteristics which determine adaptability to, and a high degree of usefulness in, domestication. They are terrestrial in habit. Fowls, turkeys, guineas, peafowls, and pheasants are land birds with no power of sustained flight. The aquatic habit of ducks and geese of the species that have been domesticated, is not their principal habit. They are essentially land birds. In domestication ducks and geese within a few generations lose the power of flight to such an extent that they are the most easily restrained of all domestic creatures.

They are omnivorous feeders, like man, and hence may be fed largely on food wasted by man and on foods wasted by or not available for the larger domestic animals. They are docile in disposition and readily adapt themselves to the conditions of life which domestication imposes. Of the many kinds of birds valuable for food purposes it is significant that only five are commonly found in a state of domestication: four kinds of poultry (hens, ducks, turkeys, geese), and pigeons.

They tend to improve in domestication in qualities most valuable to man. This is most noticeable in a comparison of poultry and pigeons. Improvement in pigeons is possible, and much has been done in that line, but no such marked general improvement has taken place in pigeons as the common kinds of poultry. They are completely under the control of man in domestication. In this respect the pigeon affords a most striking contrast. All kinds of poultry can be restrained by fences or kept in yards; pigeons can be controlled only in cages.

They are dependent upon man for existence in civilization. Aerial birds may maintain themselves in settled districts independently of man. Birds of the poultry group, once domesticated, become dependent on man and can exist in contact with civilization only as the property of individuals who protect them. Poultry contribute to the welfare of man in more ways than any other class of creatures. They supply him with flesh and eggs for food, and feathers for comfort or ornament, utilize many wastes of the house and farm, are of service in agriculture, and minister to man's pleasure. The use of poultry flesh as food is governed by its convenience, quality, and cheapness.

### **New words and phrases**

peafowl-tovus

determine-belgilamoq

domestication-xonakilashtirilgan

aquatic-suvda yashaydigan

restrain-o'zini bosmoq  
hence-shundan beri  
available-yaroqli, sotiladigan  
disposition-joylashuv  
significiant-muhim  
commonly-odatda  
tent to-odatlanib qolmoq  
valuable-qimmatbaho  
noticeable-sezilarli  
improvement-ijobiy  
strike-shiddat, hujum  
contrast-solishtirmoq  
dependent-muhtoj  
existence-mavjud  
aerial- havoga oid  
contribute-xayr qilmoq  
ornament-bezak  
utilize-foydalanmoq  
convenience-qulaylik  
govern-boshqarmoq  
poultry-xonaki qush  
pigeons-kabutarlar  
fowl-qush  
turkey-kurka  
guinea-chag'alay  
pheasant-qirg'ovul  
swans-oqqushlar  
adaptability-moslashuvchanlik  
terrestrial-yerdagi  
sustain-sog'lik  
flight-safar  
omnivorous-o'simlik va go'sht b-n oziqlanadigan

**Exercise 2. Answer the questions**

1. How many kinds of birds in domestication that divided according to their relations to men into?

2. Which birds are the aquatic birds?
3. Say the kinds of poultry.
4. Where kept all kind of poultry?
5. Which birds settled districts independently of men?

**Exercise 3. *Translate the following sentences and underline the terms***

1. Birds of the poultry group are alike in the several characteristics which determine adaptability to, and a high degree of usefulness in, domestication. 2. Birds in domestication are divided according to their relations to men into three general classes: Poultry, Pigeons, and Cage Birds. 3. Fowls, turkeys, guineas, peafowls, and pheasants are land birds with no power of sustained flight. 4. In domestication ducks and geese within a few generations lose the power of flight to such an extent that they are the most easily restrained of all domestic creatures. 5. This is most noticeable in a comparison of poultry and pigeons. Improvement in pigeons is possible, and much has been done in that line, but no such marked general improvement has taken place in pigeons as the common kinds of poultry. 6. Poultry contribute to the welfare of man in more ways than any other class of creatures. 7. The use of poultry flesh as food is governed by its convenience, quality, and cheapness

**Exercise 4. *Fill in the blanks***

1. Poultry contribute to the ... of man in more ways than any other ... of creatures. 2. Birds of the ... group are alike in the several ... which determine ... to, and a high degree of ...in, domestication. 3. Improvement in ... is possible, and much has been done in that line, but no such marked general ... has taken place in ... as the common kinds of poultry. 4. This is most noticeable in a ... of poultry and pigeons. 5. All kinds of ... can be restrained by ... or kept in yards; ... can be controlled only in cages. 6. They supply him with flesh and ... for food, and feathers for comfort or ornament, ...many wastes of the ... and farm, are of service in ..., and minister to man's pleasure. 7. In domestication ... and ... within a few ... lose the power of flight to such an ... that they are the most easily restrained of all ... creatures.

**LESSON 13**

**Exercise 1. *Translate the following text using the dictionary***

**NATURE AND USES OF POULTRY (II)**

The birds of the poultry group are all small. Their size is such that at any season and in any climate an ordinary family can use a carcass while fresh. Their conformation is such that the killing and dressing of poultry are comparatively easy

and clean processes, often performed by women, and even by quite young children. The flesh of poultry, compared with that of mammals grown for food purposes in domestication, is finer grained and, when in proper condition, more tender. It is at the same time easily digested and highly nutritious. For the grower, as a rule, poultry is actually cheap meat. The agricultural service of the birds and their feeding largely on stuffs that would otherwise go to waste make the cost of production on farms small. It is this cheapness and convenience, as already noted, that determine the use of enormous quantities of poultry by producers and bring about the almost universal desire to grow poultry wherever there is opportunity to do so.

The eggs are the most unique of food products. Eggs may be kept reasonably fresh and sweet in conditions and at temperatures in which meat could be kept for only a short time. Eggs may be kept reasonably fresh and sweet in conditions and at temperatures in which meat could be kept for only a short time. The most important use of eggs, however, is in combination with other ingredients in the endless variety of food concoctions that have been devised. While eggs for eating are often regarded as luxury, eggs for cooking are generally regarded as a necessity. In a close analysis of subject, the demand for eggs has a great deal of influence in determining the relative popularity of the different kinds of poultry, and also in increasing the production of poultry. Feathers are a by-product in poultry culture in ostrich farming, which is limited to a few localities and not extensive anywhere. The production of feathers for commerce is never a direct object in poultry keeping. The feathers of the common kinds of poultry when saved and sold will, it is usually estimated, bring just about enough to pay for dressing the birds and for the preparation of the feathers for market.

### **New words and phrases**

conform-muvofiq kelmoq

reasonably-anchagina

ingredients-tarkibiy qism

poultry-xonaki go'sht

feather-pat

regard-shunday deb hisoblamoq

commerce-tijorat

unique-tanho

nutritious- yemish bo'ladigan

determine-belgilamoq  
mammals-sut emizuvchilar  
palatability- mazali, lazzatli  
influence-ta'sir ko'rsatish  
determine-belgilamoq  
ordinary-oddiy  
conformation-moslik, tog'ri kelish  
comparatively-solishtirganda  
grain-urug'  
tender-taklif, muloyim  
digest-hazm qilmoq, singdirmoq  
otherwise-har holda, har qalay  
enormous-azim, ulkan  
endless-nihoyasiz, oxiri yo'q  
cocncotion-ixtiro qilish  
extensive-keng, yirik  
estimate-mo'ljal, taxmin

**Exercise 2. Answer the questions**

1. What is the birds' conformation?
2. What do think which meat is cheaper than others?
3. Which product is kept reasonably fresh and sweet in conditions and at temperatures in which meat could be kept for only a short time?
4. What is the uniqueness of the feathers?

**Exercise 3. Translate the following sentences and underline the terms**

1. Their conformation is such that the killing and dressing of poultry are comparatively easy and clean processes, often performed by women, and even by quite young children. 2. The flesh of poultry, compared with that of mammals grown for food purposes in domestication, is finer grained and, when in proper condition, more tender. It is at the same time easily digested and highly nutritious. 3. The agricultural service of the birds and their feeding largely on stuffs that would otherwise go to waste make the cost of production on farms small. 4. It is this cheapness and convenience, as already noted, that determine the use of enormous quantities of poultry by producers and bring about the almost universal desire to grow poultry wherever there is opportunity to do so. 5. Eggs may be kept reasonably fresh

and sweet in conditions and at temperatures in which meat could be kept for only a short time. 6. The most important use of eggs, however, is in combination with other ingredients in the endless variety of food concoctions that have been devised. 7. Feathers are a by-product in poultry culture in ostrich farming, which is limited to a few localities and not extensive anywhere.

#### **Exercise 4. Fill in the blanks**

1. The common ... of the ... group are all small. 2. Their size is such that at any ... and in any ... an ordinary family can use a carcass while fresh. 3. It is at the same time ... digested and ... nutritious. 4. For the grower, as a rule, ... is actually cheap meat. 5. Eggs may be kept reasonably ... and ... in ... and at ... in which meat could be kept for only a short time. 6. Eggs may be kept reasonably ... and ... in conditions and at ... in which meat could be kept for only a short time. 7. While ... for eating are often regarded as ..., eggs for cooking are generally regarded as a ....8. The ... of feathers for commerce is never a direct object in ... keeping. 9. The most important use of ..., however, is in combination with other ... in the endless variety of food .... that have been devised. 10. In a close analysis of subject, the ... for eggs has a great deal of influence in ... the relative ... of the different kinds of poultry, and also in increasing the ... of poultry. 11. The agricultural service of the ... and their ... largely on stuffs that would ... go to waste make the cost of ... on farms small.

## **LESSON 14**

### **Exercise 1. Translate the following text using the dictionary**

#### **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 transports 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.

### **New words and phrases**

substance-modda, tub mohiyat  
alimentary-ta'minlanish  
secretion-sekret, shira  
assist-yordam bermoq  
defense-himoya  
internal-ichki  
extracellular-hujayradan tashqari  
plasma-plazma  
constantly-doimiy ravishda  
blood- qon  
fulfills-ta'minlamoq  
functions-vazifalar  
tissue-to'qima  
metabolism-metabolizm  
excretion- najasni tashqariga chiqarib yuborish  
endocrine glands-endokrin bezlar  
equalizing-tenglashtirish  
regulation-to'giranish  
hydrogen-vodorod  
specialized-maxsus  
environment-atrof-muhit  
evidently-ayon, oshkor  
maintenance-ta'mir

### **Exercise 2. Answer the questions**

1. What is the functions of the blood fulfills?
2. Why is an important aid in equalizing body temperature?
3. What is the homeostasis?

### **Exercise 3. Translate the following sentences and underline the terms**

1. It carries nutrient substances from the alimentary canal to the tissues.
2. Because of its high specific heat it is an important aid in equalizing body temperature.
3. It is

concerned in the regulation of the hydrogen ion concentration in the organism. 4. For proper functioning the cells of the body, particularly the highly specialized ones, require a remarkably constant environment. 5. It transports oxygen from the lungs to the tissues. 6. It assists in the body defenses against microorganisms. 7. It aids in the equalization of the water content of the body. 8. Because of its high specific heat it is an important aid in equalizing body temperature. 9. 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. 10. This is spoken of as the internal environment, or fluid matrix, of the organism.

**Exercise 4. Fill in the blanks**

1. For proper functioning ... of the body, particularly the highly ... ones, require a remarkably ... environment. 2. Evidently many of the ... of the blood are directed toward the ... of the constancy of the internal ..., of which the blood ... is a part. 3. It assists in the body ... against microorganisms. 4. It removes the ... products of ... from the tissues to the ... of excretion. 5. It carries nutrient ... from the alimentary canal to the ... 6. It transports the ... of the ... glands. 7. Because of its high ... heat it is an important aid in ... body ... 8. This is spoken of as the internal ..., or fluid matrix, of the .... 9. It aids in the ... of the water ... of the body.

**LESSON 15**

**Exercise 1. Translate the following text using the dictionary**

**THE RUMINANT STOMACH (I)**

In herbivorous animals it is essential that the alimentary canal has somewhere in its course a roomy compartment where the bulky, fibrous food can be delayed in its passage through the canal and undergo soaking and fermentation. This requirement in animals with simple stomentation. This requirement in animals with simple stomachs is fulfilled in the cecum and colon; in ruminants, ber designated the rumen, and to a lesser extent in the cecum and colon. Synthesis in the alimentary canal is also developed in ruminants. These advantages are due mainly to the great size of the rumen. The ruminant stomach, characterized anatomically by its great size and its division into several distinct compartments, is probably an evolutionary modification of the simple stomach.

The ruminant stomach is compound and consists of four compartments or divisions, designated as rumen, reticulum, omasum, and abomasum. The relative size



of the four compartments varies with the age of the animal. In the newborn calf the first three compartments are small. They develop as the animal grows and passes from a milk diet to one containing grain and roughage.

The rumen presents dorsal and ventral sacs, which freely communicate with each other through a large opening surrounded by muscular pillars. There is also a pair each of longitudinal, dorsal coronary, and ventral coronary pillars. The rumen communicates freely with the reticulum over the ruminoreticular fold. From the cardia to the reticulo-omasal orifice extends the peculiar esophageal or reticular groove. In the ox it is 7 or 8 inches in length. The mucous membrane of the rumen is nonglandular and in most situations is covered with papillae, which are especially well developed in the ventral sac.

### **New words and phrases**

herbivorous animals-o't bilan oziqlanadigan hayvonlar

fermentation-to'lqinlash

stomach-qorin og'rig'i

muscular pillars-tayanch muskullar

longitudinal-uzunlik

essential-muhim, ahamiyatli

bulky-katta va o'gir

fibrous-ildizli

delay-kechiktirmoq

undergo-boshdan kechiktirmoq

passage-o'tmoq

soak-namlamoq, singdirmoq

requirement-ehtiyoj

colon-ikki nuqta

anatomically-anatomik

distinct-aniq

evolutionary-rivojlanish

modification-kichik o'zgarish

compound-yomonlashtirmoq

newborn-yangi tug'ilgan

ventral-tuynuk

sac-qopchiq

fold-taxlamoq

cardia-yurakka oid  
extend-uzaytirmoq  
peculiar-ajib, ajoyib  
groove-o'yiqlik, kesilgan joy

**Exercise 2. Answer the questions**

1. What is the essential that the alimentary canal in herbivorous animals?
2. What is the ruminant stomach?
3. Give the definitions of rumen, reticulum, omasum, and abomasum.
4. What is the rumen covers up?
5. How long is the reticulo-omasal of the ox?

**Exercise 3. Translate the following sentences and underline the terms**

1. This requirement in animals with simple sto- mentation. 2. Synthesis in the alimentary canal is also developed in ruminants. 3. The ruminant stomach, characterized anatomically by its great size and its division into several distinct compartments, is probably an evolutionary modification of the simple stomach. 4. The anterior and posterior pillars are especially well developed and powerful. 5. They develop as the animal grows and passes from a milk diet to one containing grain and roughage. 6. There is also a pair each of longitudinal, dorsal coronary, and ventral coronary pillars. 7. The mucous membrane of the rumen is nonglandular and in most situations is covered with papillae, which are especially well developed in the ventral sac. 8. The rumen communicates freely with the reticulum over the ruminoreticular fold.

**Exercise 4. Fill in the blanks**

1. These ... are due mainly to the great ... of the rumen. 2. There is also a pair each of ..., dorsal coronary, and ... coronary pillars. 3. They develop as the animal grows and passes from a..... to one containing ... and roughage. 4. Synthesis in the ... canal is also ... in ruminants. 5. In the ox it is .... inches in length. 6. The rumen communicates freely with the reticulum over the ... fold. 7. In the newborn ... the first three ... are small. 8. The anterior and posterior ... are especially well ... and powerful. 9. From the cardia to the ... orifice extends the ... esophageal or ... groove. 10. In herbivorous ...it is essential that the ... canal has somewhere in its course a roomy ... where the bulky, fibrous food can be delayed in its passage through the canal and undergo soaking and .... 11. The... presents ... and ventral sacs, which freely ... with each other ... a large opening ... by muscular pillars.

## LESSON 16

### Exercise 1. *Translate the following text using the dictionary*

#### THE RUMINANT STOMACH (II)

The reticulum lies against the diaphragm and liver. It is small and somewhat flask-shaped. It communicates with the rumen over the ruminoreticular fold and with the omasum through the comparatively small retico-omasal orifice. Its base is below the inlet and the outlet. The mucous membrane is nonglandular and is thrown into folds, so that it resembles a honeycomb.

The omasum is somewhat globe-shaped. It communicates with the reticulum through the reticulo-omasal orifice and with the abomasum through the large omaso-abomasal orifice. The sulcus omasi is a groove extending mainly downward from the inlet to the outlet. The interior of the omasum presents numerous folds or laminae. They are attached to the wall of the organ except in the region of the sulcus. As regards length, the folds can be grouped into about five orders. The longest folds extend almost across the organ; the smallest are mere ridges; the others are of intervening lengths. The leaves have some muscular tissue in their structure and are studded with numerous papillae covered with cornified epithelium. Certain ruminants have no omasum; that of the sheep and goat is not well developed.

The abomasum is the glandular compartment of the ruminant stomach. It communicates with the omasum and, through the pylorus, with the duodenum. It is divided by a constriction into two portions, the fundic and pyloric regions. Fundic and pyloric glands, respectively, are found in these parts. The mucous membrane of the former region is thrown into about 12 large spiral folds. The mucous membrane of the pyloric region is similar in appearance to that of the pyloric region of other animals.

#### New words and phrases

flask-shaped-butilka shaklli

orifice-teshik, og'iz

inlet-kirish tuynugi

outlet-chiqish tuynugi

throw into-ilova qilmoq

resemble-o'xshamoq

honeycomb-asalari ini

globe-shaped-doira shaklli

downward-pasayayotgan

interior-ichki tomon

attach-mahkamlamoq  
ridge-tog' tizmasi  
tissue-to'qima  
stud-knopka  
compartment-kupe, bo'lma  
portion-porsiya  
constriction-qisqarish  
gland-bez

**Exercise 2. Answer the questions**

1. Where does the reticulum lie?
2. Which organ is globe shaped?
3. Say the uniqueness of the abosum?
4. Which thing is a groove extending mainly downward from the inlet to the outlet?

**Exercise 3. Translate the following sentences and underline the terms**

1. The mucous membrane is nonglandular and is thrown into folds, so that it resembles a honeycomb. 2. The leaves have some muscular tissue in their structure and are studded with numerous papillae covered with cornified epithelium. 3. The mucous membrane of the former region is thrown into about 12 large spiral folds. 4. Certain ruminants have no omasum; that of the sheep and goat is not well developed. 5. The abomasum is the glandular compartment of the ruminant stomach. 6. As regards length, the folds can be grouped into about five orders. 7. The leaves have some muscular tissue in their structure and are studded with numerous papillae covered with cornified epithelium. 8. Fundic and pyloric glands, respectively, are found in these parts.

**Exercise 4. Fill in the blanks**

1. It ... with the rumen over the ... fold and with the omasum through the comparatively small ... orifice. 2. The leaves have some muscular ... in their structure and are studded with numerous .... covered with cornified epithelium. 3. The mucous ... of the former region is thrown into about ... spiral folds. 4. Certain ... have no omasum; that of the ... and ... is not well developed. 5. They are attached to the wall of the ... except in the region of the ... 6. It is divided by a ... into two ..., the fundic and pyloric regions. 7. The ... have some muscular ... in their structure and are studded with numerous ... covered with cornified epithelium. 8. The...is the glandular ... of the ruminant stomach. 9. The leaves have some muscular ... in their structure and are studded with numerous ... covered with cornified ....10. The mucous

... of the former ... is thrown into about ... large spiral folds.

## **LESSON 17**

### **Exercise 1. *Translate the following text using the dictionary***

#### **SKULL**

Skull is the collection of flat and irregularly shaped bones, which protects the brain and forms the skeleton of the face. These bones support the organs of mastication, keep patent the nasal and pharyngeal passages, hold the eye in its socket, give protection to the very delicate organs of hearing, and give the head of an animal its characteristic outline. The skull as a whole is not solid.

The skull is divided into two parts: 1) the cranium, and 2) the face. The former consists of the posterior part, which encloses the brain, while the face lies entirely to the front of the head. In the young animal's skull these two portions can be separated, but in the adult the whole skull, except for the lower jaw is fused together into a complete whole. Most of the bones of the skull are flat bones developed from a structure which is partly cartilage and partly fibrous membrane. The bones which enclose the brain and its membranes are ten in number—four single and three paired.

The most striking feature of the skull of horse, ox, sheep, or pig is comparatively small size of the cranium compared to that of the face; but this is not so in the cat and the short-skulled breeds of dogs, such as the pug or bulldog. In these latter the proportions more nearly resemble those of the human being. This is explained to some extent by the difference in size of the brain, but to a greater extent by the more extensive development of mouth and masticatory organs. The more coarse and innutritious is the food the greater is the provision that must be made for chewing, and therefore the more extensive is the development of teeth, tongue, etc. In the carnivora the food needs less chewing, and the mouth and its contents are therefore smaller.

Another striking feature in ruminants is the comparative smallness and weak appearance of the incisive bones, occasioned by the absence of upper incisor teeth. In dogs the shape of the skull and its proportions differ according to the breed. The skull has been altered by artificial selection over a long period of time probably more than any other part of the skeleton.

#### **New words and phrases**

support-ushalb turmoq

nasal-burun bn bog'liq

delicate-nozik, nafis  
outline-shakl, ko'rinish  
enclose-devor, o'ramoq  
to fuse- birlashtirmoq, aralashtirmoq  
cartilage-tog'ay  
enclose-solmoq, qo'yimoq  
breed-ko'payishmoq  
bulldog-bulldog (it turi)  
latter-oxiri, oxorodagi  
provision-ta'minlash  
carnivore-yirtqich hayvonlar  
incisive-ziyrak  
occasion-vaziyat  
absense-yo'qlik  
upper-yuqori  
alter-o'zgartirmoq  
artificial-sun'iy

**Exercise 2. Answer the questions**

1. Why do we need the skull?
2. Count on parts of the skull.
3. Which kind of the skull are the most striking feature?
4. What is the carnivore?
5. How many bones in the brain and its membranes?

**Exercise 3. Translate the following sentences and underline the terms**

1. Skull is the collection of flat and irregularly shaped bones, which protects the brain and forms the skeleton of the face. 2. The former consists of the posterior part, which encloses the brain, while the face lies entirely to the front of the head. 3. Most of the bones of the skull are flat bones developed from a structure which is partly cartilage and partly fibrous membrane. 4. The more coarse and innutritious is the food the greater is the provision that must be made for chewing, and therefore the more extensive is the development of teeth, tongue, etc. 5. The most striking feature of the skull of horse, ox, sheep, or pig is comparatively small size of the cranium compared to that of the face; but this is not so in the cat and the short-skulled breeds of dogs, such as the pug or bulldog. 6. This is explained to some extent by the difference in size of the brain, but to a greater extent by the more extensive development of mouth

and masticatory organs. 7. In these latter the proportions more nearly resemble those of the human being.

**Exercise 4. Fill in the blanks**

1. The ... which enclose ... and its... are ten in number—four single and three paired.  
2. The most ... feature of the skull of ..., ..., ..., or...is comparatively small size of the ... compared to that of the face; but this is not so in the ... and the short-skulled breeds of ..., such as the pug or ....  
3. Skull is the collection of ... and irregularly shaped ..., which protects the ... and forms the ... of the face.  
4. Most of the ... of the skull are flat bones developed from a ... which is partly cartilage and partly ... membrane.  
5. This is explained to some extent by the ...in size of the ..., but to a greater extent by the more extensive ... of mouth and ... organs.

**LESSON 18**

**Exercise 1. Translate the following text using the dictionary**

**BONE**

Bone forms the framework upon which the rest of the body is built. The collection of the body is generally referred to as the “skeleton”, but this term also includes the cartilages which join the ribs to the breast-bone or sternum, form the larynx, etc. Bone is composed partly of fibrous tissue, partly of bone-earth, mixed together. Two kinds of bone are considered: dense bone, such as forms the shafts of the long bones of the limbs, and cancellous or spongy bone, such as is found in the short bones and at the end of the long bones. Dense bone is found in a tube-like form, with a central cavity in which normally yellow marrow is found, composed mainly of fatty substances; the walls of the tube are stout and strong, and the outer surface is covered by “bone membrane” or periosteum.

Cancellous bone has a more open framework, is irregular in shape, and, instead of possessing a cavity, its centre is divided into innumerable tiny spaces by a fine network of bony threads, which support the important red marrow. This red marrow is the tissue of the body that is engaged in the formation of red blood-cells. Periosteum also covers the outer surfaces of the short ones. All bone is penetrated by a series of very fine canals, in which run blood-vessels, nerves, lymph vessels, etc., for the growth, maintenance, and repair of the bone. Around these Haversian canals the bone is arranged in circular plates or scales which are called lamellae, the lamellae are separated from each other by spaces or “lacunae”, each of which contains a single bonecell. Even the lamellae consist of fine tubes known as “ca- naliculi” carrying

processes of the bone-cells. Each lamella is composed of very fine interlacing fibres.

Bones grow in thickness from the periosteum surrounding them, the inner surface of which is constantly transformed into hard bone; while the long bones grow in length from a plate of cartilage which runs across the bone at a short distance from each of its ends, and which on one surface is also constantly forming bone until the growth of the animal ceases.

### **New words and phrases**

penetrated-kirmoq, o'tmoq

lymph-limfa

larynx-hiqildoq

limb-shoh-shabba

tube-like-quvurga o'xshash

cavity-bo'shliq

fatty-moyli

surface-yuza

engage-jalb qilmoq

blood-cell-qon hujayrasi

blood-vessels-qon tomiri

bonecell-suyak hujayrasi

Thickness-quyuqlashmoq

cease-to'xtamoq, tugatmoq

### **Exercise 2. Answer the questions**

1. What is the "skeleton"?
2. What is bone composed of?
3. Describe cancellous bone.
4. What are the functions of bones?

### **Exercise 3. Translate the following sentences and underline the terms**

1. Two kinds of bone are considered: dense bone, such as forms the shafts of the long bones of the limbs, and cancellous or spongy bone, such as is found in the short bones and at the end of the long bones. 2. This red marrow is the tissue of the body that is engaged in the formation of red blood-cells. 3. Bone forms the framework upon which the rest of the body is built. 4. The collection of the body is generally referred to as the "skeleton", but this term also includes the cartilages which join the ribs to the breast-bone or sternum, form the larynx, etc. 5. Cancellous bone has a more open



framework, is irregular in shape, and, instead of possessing a cavity, its centre is divided into innumerable tiny spaces by a fine network of bony threads, which support the important red marrow. 6. Even the lamellae consist of fine tubes known as “canaliculi” carrying processes of the bone-cells. 7. This red marrow is the tissue of the body that is engaged in the formation of red blood-cells.

**Exercise 4. Fill in the blanks**

1. Two kinds of bone are considered: ... bone, such as forms the shafts of the long bones of the limbs, and cancellous or ... bone, such as is found in the ... bones and at the end of the ... bones. 2. Bone is composed partly of fibrous ..., partly of ..., mixed together. 3. This red marrow is the ... of the body that is engaged in the formation of red ....4. The collection of the ... is generally referred to as the ..., but this term also includes the cartilages which join the ribs to the ... or sternum, form the ..., etc. 5. All bone is penetrated by a series of very fine canals, in which run ..., ..., ... ..., etc., for the growth, maintenance, and repair of the bone. 6. Even the lamellae consist of fine tubes known as “canaliculi” carrying processes of the bone-cells. 7. Bones grow in thickness from the ... surrounding them, the inner surface of which is constantly transformed into ... bone. 8. Each ... is composed of very fine interlacing .... 9. Around these ... canals the bone is arranged in circular plates or scales which are called ..., the lamellae are separated from each other by spaces or ..., each of which contains a single... 10. Dense bone is found in a ... form, with a central cavity in which normally yellow ... is found, composed ... of fatty substances; the walls of the tube are ... and ..., and the outer ... is covered by ... or periosteum.

**LESSON 19**

**Exercise 1. Translate the following text using the dictionary**

**BRAIN (I)**

The brain and the spinal cord together form what is called the central nervous system. The twelve pairs of cranial nerves and the many pairs that leave the spinal column, together with the complicated network of nerve-fibres originating from or associated with the ganglia in the chest and abdomen, form the peripheral nervous system. This latter is composed of two kinds of nerves: a) cranial and spinal, and b) sympathetic nerves. These are all closely connected with each other, but their functions differ. The cranial and spinal nerves are concerned in the transmission of messages to and from the brain, generally either messages of sensation (by sensory nerves), or orders of movement to the muscular system (motor nerves). Sympathetic

nerves govern the activities of the abdominal and thoracic organs chiefly.

The brain in its simplest form in lowly vertebrate animals is a thickened part at the front end of the spinal cord, developed to govern the organs of special sense, viz. smell, hearing, and taste. In fishes for example, there are marked bulgings of nervous matter forming the fore-, mid-, and hind-brain, and that part connected with nerves of sight is the most highly developed. In higher animals the fore-brain is the most specialised. This fore-brain is in the form of two hemispheres, connected with each other by a white, fairly dense mass, called the “corpus callosum”, and connected with the rest of the brain by the “cerebral peduncles”, elongations of the midbrain. The hemispheres of the fore-brain are known as the “cerebral hemispheres”; the mid-brain is formed by the peduncles chiefly; and the hindbrain is composed of the cerebellum, pons, and medulla.

Cerebrum, or cerebral hemispheres, occupies the anterior part of the bony brain cavity. The two hemispheres are separated from each other by a deep cleft, the “median longitudinal fissure”, which has in its deeper part the corpus callosum, and are divided from the posterior part of the brain by the “transverse fissure”.

The Mid-Brain is a short stalk that connects the fore and hind parts. It is composed of the peduncles and four rounded eminences called “corpora quadrigemina”, that lie above them.

The Hind-Brain is formed by the “cerebellar hemispheres”, which lie in the most posterior and upper part of the bony cavity; the “pons”, a bridge of fibres which connects the various parts of the brain with each other; and the “medulla”. The medulla is the direct continuation forwards of the spinal cord, and is similar to it in appearance, though larger. In it are the centres that govern the heart, respiration, circulation, and the action of the digestive system from the mouth to the large intestine.

### **New words and phrases**

brain-miya

nervous system-nerv sistemasi

transmission-uzatish

spinal-orqadagi

cord-chilvir

abdomen-qorin

sensation-his-tuyg’u

midbrain-orqamiya

thicken-qalinlashtirmoq  
respiration-nafas olish  
circulation-serkulatsiya  
digestive system-hazm qilish sistemasi  
intestine-ichak-chavoq  
bulging-to'la, to'lgan  
hind-orqa  
dense-zich  
mass-juda ko'p  
elongation-uzayish  
occupy-istiqomat qiluvchi  
stalk-poya  
corpora-kapral

**Exercise 2. Answer the questions**

1. How many pairs of cranial nerves?
2. How many kinds of nerves?
3. What does the fore-brain connect with?
4. What is the “corpora quadrigemina”?
5. Where does the Hind-Brain lie?

**Exercise 3. Translate the following sentences and underline the terms**

1. The twelve pairs of cranial nerves and the many pairs that leave the spinal column, together with the complicated network of nerve-fibres originating from or associated with the ganglia in the chest and abdomen, form the peripheral nervous system. 2. This latter is composed of two kinds of nerves: a) cranial and spinal, and b) sympathetic nerves. 3. In fishes for example, there are marked bulgings of nervous matter forming the fore-, mid-, and hind-brain, and that part connected with nerves of sight is the most highly developed. 4. The medulla is the direct continuation forwards of the spinal cord, and is similar to it in appearance, though larger. 5. In it are the centres that govern the heart, respiration, circulation, and the action of the digestive system from the mouth to the large intestine. 6. These are all closely connected with each other, but their functions differ. 7. Cerebrum, or cerebral hemispheres, occupies the anterior part of the bony brain cavity. 8. The Hind-Brain is formed by the “cerebellar hemispheres”, which lie in the most posterior and upper part of the bony cavity; the “pons”, a bridge of fibres which connects the various parts of the brain with each other; and the “medulla”.

#### **Exercise 4. Fill in the blanks**

1. Sympathetic nerves govern the activities of the ... and ... organs chiefly. 2. The ... is the direct continuation forwards of the ... cord, and is similar to it in ..., though larger. 3. The ... and the ... cord together form what is called the ... nervous system. 3. These are all closely ...with each other, but their ... differ. 4. In ... for example, there are marked ... of nervous matter forming the fore-, mid-, and ..., and that part connected with ... of sight is the most highly developed. 5. The ... is the direct ... forwards of the spinal cord, and is ... to it in appearance, though ....6. Cerebrum, or cerebral ..., occupies the ... part of the bony brain cavity. 7. These are all closely ... with each other, but their ... differ. 8. In... animals the ... is the most ....9. This ... is in the form of two ..., connected with each other by a white, fairly dense mass, called the "... ...", and connected with the rest of the ... by the "cerebral peduncles", ... of the midbrain. 10. The ... is formed by the "... ...", which lie in the most ... and ...part of the bony cavity; the "pons", a bridge of ... which connects the ... parts of the ... with each other; and the "medulla".

#### **LESSON 20**

##### **Exercise 1. Translate the following text using the dictionary**

#### **BRAIN (II)**

The brain is composed of white and grey matter. The grey matter consists of cells, in which all the activities of the brain commence, and variously arranged nerve-fibres. The cells vary in size and shape in different parts of the brain, but all of them give off a number of processes, some of which form nerve-fibres.

The white matter is made up of a large number of nerve-fibres, each of which is connected to a cell in the grey matter, arranged in various "paths". The chief of these paths are either afferent, or associative.

In the first place the cerebrum is non-sensitive: it can be handled, cut or injured without any signs of pain in the subject. The cerebrum is concerned with the higher senses, such as memory, initiative, volition and intelligence. In addition to this the movements of the skeletal muscles that are not purely reflex are controlled in various areas of the surface of the cerebral hemispheres. It has been established that the main functions of this part are to coordinate muscular movement, to preserve the body balance, and, by assistance from the visual centres, to govern direction. Each half of the cerebellum controls the muscular system of its own side of the body, and is in communication with the opposite side of the cerebrum.

The functions of those parts that lie below the cerebellum and behind the cerebral hemispheres are very complex. In the first place, it is through the medulla that communication between the brain and the rest of the body takes place. There are areas composed of outgoing fibres, and other areas composed of incoming fibres. It is the central controlling station of such vital functions as heart action, respiration, circulation, the action of the whole digestive system; it gives rise to all the cranial nerves except three, viz. those of smell, vision, and of the muscles of the eyeball; and it possesses the centres that control mastication, swallowing, sucking, vomiting, voice-production, coughing, the calibre of the arteries, movements of the iris, the secretion of saliva and sweat, the amount of sugar in the urine, and the act of shivering. It is remarkable that such a large number of important centres should be situated in a matter of only a few inches of nerve tissue.

The brain proper is covered over by a thin membrane called the “pia mater”, the bones of the cranium are lined by a thick membrane called the “dura mater”, and between these is an irregular network called “the arachnoid”. Between the arachnoid and the pia mater is a small amount of fluid, which serves as kind of water-bed in which the brain floats.

### **New words and phrases**

commence-boshlamoq  
variously-bir-biriga o’xshash  
path-yo’lak  
assosiative-hamkor,  
establish-asos solmoq  
coordinate-koordinatsiyalamoq  
assistance-yordam  
visual-tomoshabop  
respiration-nafas olish  
saliva-so’lak  
sweat-terlamoq  
float-suvda suzmoq

### **Exercise 2. Answer the questions**

1. How many colours is the brain composed of?
2. What is the peculiarities of the white matter?
3. Say about uniqueness of the cerebrum.
4. What is the vital functions of central controlling station?

5. What is called a thin membrane?

**Exercise 3. *Translate the following sentences and underline the terms***

1. The cells vary in size and shape in different parts of the brain, but all of them give off a number of processes, some of which form nerve-fibres. 2. The white matter is made up of a large number of nerve-fibres, each of which is connected to a cell in the grey matter, arranged in various “paths”. 3. The chief of these paths are either efferent, afferent, or associative. 4. In the first place the cerebrum is non-sensitive: it can be handled, cut or injured without any signs of pain in the subject. 5. Each half of the cerebellum controls the muscular system of its own side of the body, and is in communication with the opposite side of the cerebrum. 6. There are areas composed of outgoing fibres, and other areas composed of incoming fibres. 7. The functions of those parts that lie below the cerebellum and behind the cerebral hemispheres are very complex. 8. It is remarkable that such a large number of important centres should be situated in a matter of only a few inches of nerve tissue. 9. The functions of those parts that lie below the cerebellum and behind the cerebral hemispheres are very complex.

**Exercise 4. *Fill in the blanks***

1. There are areas composed of ... fibres, and other areas composed of ... fibres. 2. The ... of those parts that lie below the ... and behind the cerebral... are very complex. 3. It is remarkable that such a large number of important centres should be situated in a matter of only a few inches of nerve tissue. 4. The white ... is made up of a large number of ..., each of which is connected to ... in the grey matter, arranged in ... “paths”. 5. It has been ... that the main functions of this ... are to coordinate ... movement, to preserve the body ... and, by ... from the ... centres, to govern direction. 6. The ... vary in size and shape in different parts of the ..., but all of them give off a number of ..., some of which form nerve-fibres. 7. In ... to this the movements of the ... that are not purely reflex are controlled in various ... of the surface of the cerebral hemispheres. 8. Each half of the ... controls the... system of its own side of the body, and is in... with the ... side of the cerebrum.

## PART II

### LESSON 21

**Exercise 1.** *Translate the following text using the dictionary*

#### THE CELL

Living material is “alive” only because of the chemical reactions which occur within it—reactions that are catalyzed by the numerous enzyme systems present. The medium in which these reactions occur is known as protoplasm, a term universally used to refer to the living material (the material that carries on the processes of metabolism and reproduces itself) within the body of all organisms, both plant and animal.

Protoplasm is basically the same in all forms of life. In all living organisms, it has the same chemical composition (proteins, carbohydrates, lipids, water, and the nucleic acids), and it performs the same essential metabolic processes (liberation of energy for reproduction, synthesis and growth, and differentiation). This statement is not intended to suggest that differences do not exist, for they do. Protoplasm differs not only between species but between individuals within the same species, a fact demonstrated when skin grafts and organ transplants are rejected except in the case of identical twins. These differences are due primarily to the almost unbelievable variety of ways in which the chemical compounds of protoplasm (particularly the proteins) can be put together, and to the various adaptations which have been improvised during the course of evolution to carry out the embryo necessary for life.

Science makes use of two kinds of units. Although accepted as standards, the dimensional units used for measuring time, distance, volume, and weight have been arrived at arbitrarily. The second kind of units are those with a physical reality—units that can be seen, touched, described, and measured. Protoplasm, except in unicellular organisms, is not one continuous mass of metabolizing and self-reproducing material. Instead it is organized and divided into units of the latter type, each unit having an individuality of its own. These units of protoplasm are called cells. Complex multicellular forms, both plant and animal, exhibit a number of different cell types, yet all types are basically alike in that they are composed of protoplasm enclosed within a limiting membrane of some kind and containing a nucleus which is responsible for directing the activities of the cell.

Almost every cell known to man is microscopic in size; that is, cells cannot be observed with the unaided eye. The few exceptions include the ova of birds, reptiles, amphibians, and fishes, which are unusually large because of the yolk material that

has been added to nourish the developing embryo.

### **New words and phrases**

catalyze-katalizm

protoplasm-protoplazma

lipids-yog'lar

nucleic acids-nuclein kislota

exception-istisno

adaptation-moslashuv

amphibians- amfibiya

unaided-yordamsiz

arbitrarily-asossiz

embryo-embron

medium-ahborot vositalari

universally-umumbashariy

synthesis-sisntetik

graft-ulangan o'simlik

transplant-transplantatsiya

reject-rad etmoq

primarily-asosan, xususan

imptovise-uyushtirmoq

dimensional-o'lchovli

exhibit-eksponat

basically-asosan

yolk-tuxunning sarig'i

nourish-boqmoq, qornini to'yg'izmoq

### **Exercise 2. Answer the questions**

1. What do we count to the same chemical composition?
2. How many kinds of science of units?
3. What does the first kind of unit include?
4. What does the second kind of unit include?
5. What is the complex multicellular forms?

### **Exercise 3. Translate the following sentences and underline terminologies**

1. Protoplasm is basically the same in all forms of life. In all living organisms, it has the same chemical composition (proteins, carbohydrates, lipids, water, and the nucleic acids), and it performs the same essential metabolic processes (liberation of energy



for reproduction, synthesis and growth, and differentiation). 2. The second kind of units are those with a physical reality—units that can be seen, touched, described, and measured. 3. The few exceptions include the ova of birds, reptiles, amphibians, and fishes, which are unusually large because of the yolk material that has been added to nourish the developing embryo. 4. These units of protoplasm are called cells. 5. The few exceptions include the ova of birds, reptiles, amphibians, and fishes, which are unusually large because of the yolk material that has been added to nourish the developing embryo. 6. Protoplasm differs not only between species but between individuals within the same species, a fact demonstrated when skin grafts and organ transplants are rejected except in the case of identical twins. 7. Although accepted as standards, the dimensional units used for measuring time, distance, volume, and weight have been arrived at arbitrarily. 8. Almost every cell known to man is microscopic in size; that is, cells cannot be observed with the unaided eye.

**Exercise 4. Fill in the blanks**

1. Complex multicellular forms, both ... and ..., exhibit a number of different ... types, yet all types are basically alike in that they are composed of ... enclosed within a limiting membrane of some kind and containing a nucleus which is responsible for ... the activities of the cell. 2. The few exceptions include the ova of ..., ..., ..., and ..., which are unusually large because of the yolk material that has been added to nourish the developing ... 3. Protoplasm differs not only between species but between ... within the same species, a fact demonstrated when skin grafts and organ ... are rejected except in the case of identical ... 4. Almost every cell known to man is ... in size; that is, ... cannot be observed with the ... eye. 5. ... is basically ... in all forms of life. 6. Although accepted as standards, the ... units used for measuring time, ..., ..., and ... have been arrived at arbitrarily.

**LESSON 22**

**Exercise 1. Translate the following text using the dictionary**

**THE CELL CONCEPT**

Discovery and Significance. Because cells are so small, most of our knowledge about them has been made possible through the development and refinement of instruments capable of relatively great magnification. Of these, the first practical microscope was built around the middle of the seventeenth century by Anton van Leeuwenhoek, a Dutchman who made a hobby of lens grinding. Because a different

instrument was required for each type of specimen studied, van Leeuwenhoek built over 200 microscopes during his lifetime. He made numerous observations and was able to see such things as muscle fibers, the blood vessels and circulating blood in the tail of a fish.

Cells were first observed in 1665 by Robert Hooke, an Englishman, who no doubt used a microscope very much like the ones built by van Leeuwenhoek. Hooke first observed what he called the cell in a thin section of cork. He found the cork to be composed of many small spaces which reminded him of the cells in a monastery, hence the name “cell”. Hooke obviously saw only the cell walls which surrounded the protoplasm that at one time occupied the now empty spaces. Not until 1839 was protoplasm itself discovered by J.E.Purkinje. In the same year, two German biologists, M.J. Schleiden, a botanist, and Theodor Schwann, a zoologist, enunciated the cell theory, which states that the bodies of all living organisms are composed of cells and cell products. Since that time many discoveries concerning the structure and function of the cell and its parts have been made. Some of these discoveries are very recent; in fact, many significant observations in this area have been made within the last ten or fifteen years.

Modern biologists are convinced that many discoveries concerning the cell, particularly at the molecular level, are yet to be made. They agree that such natural phenomena as growth, development, heredity, evolution, aging, and even death probably amount to nothing more than varied aspects of cellular metabolism and behavior. Most of the conditions which we term diseases are due principally to a failure of cells to function normally or to respond effectively to an outside influence. The concept of the cell, including all that is currently known about its structure and activities, represents the most significant single idea in all of biology, an idea comparable to understanding the structure of the atom in physics or chemistry.

### **New words and phrases**

discovery-kashfiyot

significance-muhimlilik

knowledge-bilim

development-rivojlanish

refinement-nazokat

magnification-ajoyiblilik

observations-tekshiruvlar

blood vessels-qon tashuvchilar  
molecular level-molekulyar bosqich  
evolution-davr  
capable-qobiliyatli  
grind-tuymoq  
specimen-namuna  
cork-daraxt po'kagi  
phenomena-hodisalar  
cellular-hujayrali  
principally-asosan  
failure-muvaffaqiyatsizlik  
respond-javob bermoq  
comparable-taqqoslab bo'ladigan

**Exercise 2. Answer the questions**

1. How many microscopes built van Leeuwenhoek during his lifetime?
2. What was the hobby of a Dutchman?
3. When were cells the first observed?
4. What is Theodor Schwann's profession?
5. Who was discovered protoplasm?

**Exercise 3. Translate the following sentences and underline terminologies**

1. Cells were first observed in 1665 by Robert Hooke, an Englishman, who no doubt used a microscope very much like the ones built by van Leeuwenhoek. 2. He made numerous observations and was able to see such things as muscle fibers, the blood vessels and circulating blood in the tail of a fish. 3. Hooke obviously saw only the cell walls which surrounded the protoplasm that at one time occupied the now empty spaces. 4. They agree that such natural phenomena as growth, development, heredity, evolution, aging, and even death probably amount to nothing more than varied aspects of cellular metabolism and behavior. 5. Modern biologists are convinced that many discoveries concerning the cell, particularly at the molecular level, are yet to be made. 6. The concept of the cell, including all that is currently known about its structure and activities, represents the most significant single idea in all of biology, an idea comparable to understanding the structure of the atom in physics or chemistry. 7. Some of these discoveries are very recent; in fact, many significant observations in this area have been made within the last ten or fifteen years.

#### **Exercise 4. Fill in the blanks**

1. Since that time many ... concerning the ... and ... of the cell and its parts have been made. 2. Most of the ... which we term diseases are due principally to a failure of cells to function ... or to respond ... to an outside influence. 3. Modern ... are convinced that many ... concerning the ..., particularly at the ... level, are yet to be made. 4. The ...of the cell, including all that is currently known about its ... and activities, ... the most ... single idea in all of ..., an idea comparable to understanding the structure of the ... in physics or chemistry. 5. Some of these ... are very recent; in fact, many significant ... in this area have been made within the last ...years. 6. He made numerous ... and was able to see such things as muscle ..., the blood ...and ... blood in the tail of a fish. 7. Hooke obviously saw only the ... walls which ... the ... that at one time ... the now ... spaces. 8. Because a ... instrument was required for each type of specimen studied, .... built over ... microscopes during his lifetime.

### **LESSON 23**

#### **Exercise 1. *Translate the following text using the dictionary***

#### **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 portion 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 semipermeable ability, 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.

### **New words and phrases**

physiologist-fiziolog  
biochemist-biokimyogar  
geneticist-genetik  
cytologist-sitolog  
cytoplasm-sitoplazma  
spontaneously-o'z-o'zidan paydo bo'lmoq  
disintegration-parchalamoq  
diffusion-diffuziya  
metabolism-metabolizm  
environment-atrof-muhit  
cell-hujayra, bo'lma  
total-butkul  
limit-chegara  
algae-suv o'ti  
suspend-ilmoq  
constitutes-tuzilishlar  
refer-nazarda tutmoq  
minor-ahamiyatsiz  
interchange-o'zaro alishmoq  
thus-shunday qilib

### **Exercise 2. Answer the questions**

1. Who is learned about the visible structure of the cell?
2. What are essential components of the cell?
3. Which things are composed of the plasma membrane?
4. What is the important function of the plasma membrane?
5. How can the plasma membrane spontaneously repair itself?

### **Exercise 3. Translate the following sentences and underline terminologies**

1. As stated earlier a cell is a mass of protoplasm enclosed within a limiting membrane, whose activities are controlled and directed by a nucleus. 2. The two basic and essential components of the cell are the nucleus and the cytoplasm, including its organelles. 3. Waste materials of metabolism, as well as any secretory products, must pass to the outside of the cell. 4. The plasma membrane holds the contents of the cell together, of course, and separates the cell as a distinct functional unit of protoplasm. 5. The mass of protoplasm that constitutes a cell is enclosed within a plasma membrane, and in plants within an additional cell wall. 6. Much has been learned about the visible structure of the cell since the days of Schleiden and Schwann. 7. The mass of protoplasm that constitutes a cell is enclosed within a plasma membrane, and in plants within an additional cell wall. 8. The plasma membrane is composed of both proteins and lipids. 9. The plasma membrane is elastic and can spontaneously repair itself from minor tearing, but more severe injury usually results in disintegration of the cell. 10. Perhaps the most important function of the plasma membrane is to allow, through its selective ability or semipermeability, the passage of materials into and out of the cell by means of diffusion, osmosis, and active transport.

#### **Exercise 4. Fill in the blanks**

1. The plasma membrane is composed of both proteins and lipids. 2. Much has been learned about the visible structure of the cell since the days of Schleiden and Schwann. 3. The plasma membrane is elastic and can spontaneously repair itself from minor tearing, but more severe injury usually results in disintegration of the cell. 4. The mass of protoplasm that constitutes a cell is enclosed within a plasma membrane, and in plants within an additional cell wall. 5. The two basic and essential components of the cell are the nucleus and the cytoplasm, including its organelles. 6. 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. 7. 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. 8. As stated earlier a cell is a mass of protoplasm enclosed within a limiting membrane, whose activities are controlled and directed by a nucleus.

## **LESSON 24**

### **Exercise 1. *Translate the following text using the dictionary***

#### **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 as a distinct, spherical body usually located near the center of the cell. In the nondividing 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 chromonemata, the number being constant for each species. These threads become transformed into chromosomes as the cell begins to divide. The chromosome threads contain the DNA 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.

#### **New words and phrases**

nucleus-yadro

membrane-membrana

nondividing cell-bo'limas hujayra

cytoplasm-sitoplazma

nucleoplasm-yadroplazma

chromosomes-xromosoma

genetic-genetik

cell-hujayra

preserve-saqlamoq

stain-dog' qilmoq

spherical-sharsimon

presence-ishtirok etish

enclose-devor-panjara bilan o'ramoq

porous-g'ovak

interchange-o'zaro aralashtirilgan

permit-izn bermoq  
fluid-suyuq  
surround-o'ramoq  
reproduction-tug'ilish, ko'payish  
utilize-foydalanmoq  
hence-shundan beri  
suspend-ilmoq, osmoq  
network-tizim  
synthesis-sintez  
mass-to'plamoq

**Exercise 2. Answer the questions**

1. Who was first observed and recognized the nucleus of the cell?
2. When was first observed and recognized the nucleus of the cell?
3. Explain, what is it nondividing cell?
4. What are enclosed in the contents of the nucleus?
5. What is the difference between DNA and RNA?

**Exercise 3. Translate the following sentences and underline terminologies**

1. In living material it is barely visible, but in fixed (preserved) and stained preparations, it appears as a distinct, spherical body usually located near the center of the cell. 2. This membrane permits the interchange of material between the nucleus and the surrounding cytoplasm. 3. This network is composed of a definite number of chromosome threads or chromonemata, the number being constant for each species. 4. The chromosome threads contain the DNA 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). 5. 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. 6. On the inside, the nucleus contains a clear, viscous fluid called nuclear sap or nucleoplasm in which is suspended the chromatin network.

**Exercise 4. Fill in the blanks**

1. The nucleus of the ... was first observed and recognized as a universal ... by Robert Brown in ... 2. This ... permits the interchange of material between the ... and the ... cytoplasm. 3. This network is composed of a definite number of ... threads or..., the number being ... for each species. 4. The ... information contained on the ... molecules is transmitted by ... from the nucleus to the ... of the cell, where it is ... 5.



The contents of the nucleus are enclosed by a double, porous membrane, the nuclear membrane. 6. This ... permits the ... of material between the ... and the surrounding .... 7. Since the ... contains all the..., hence all the ... information, within most ..., it has ... control over all the ... of the cell. 8. This ... permits the interchange of material between the ... and the surrounding ....9. These ... become ... into ... as the ... begins to divide.

## **LESSON 25**

**Exercise 1. *Translate the following text using the dictionary***

### **CYTOPLASM AND CYTOPLASMIC INCLUSIONS**

Cytoplasm is the gelatin-like material or ground substance in which the other components of the cell, including the nucleus, are suspended. This cytoplasm is a mixture of macromolecules, proteins and ribonucleic acid, smaller organic molecules, and ions. Cytoplasm is a colloidal material which can be either a sol or a gel, depending upon the physiological state of the cell. Cytoplasm serves as a medium in which a number of metabolic activities can occur. These metabolic activities occur through the functioning of the organelles suspended in the cytoplasm.

The electron microscope has revealed a network of tubules and vesicles in nearly all cells of higher plants and animals. This continuous system of membrane-bound cavities or canals that ramify throughout the cytoplasm is known as the endoplasmic reticulum. The reticulum is a complex membrane system. It often opens to the surface of the cell by communicating with the invaginations of the plasma membrane, and it is also continuous with openings in the outer layer of the nuclear membrane.

Ribosomes are found in all cells either scattered along the endoplasmic reticulum or lying free in the cytoplasm. They are dense, spherical bodies composed of about 60 per cent ribonucleic acid and 40 per cent protein. Most of the RNA present probably carries the genetic information needed for the ribosomes to carry out their function, that of assembling amino acids into protein molecules within the cell.

The Golgi apparatus has been a subject of controversy among biologists for many years. Although its presence in both plant and animal cells was finally demonstrated beyond doubt with the electron microscope, its function remains obscure. Cells of the liver, pancreas, and salivary glands are particularly suited for demonstrating the Golgi complex (Golgi body). Mitochondria are rod-shaped or spherical bodies, depending upon the cell type, scattered throughout the cytoplasm.

They are about five microns in length and are therefore visible with the optical microscope. All mitochondria are double-membraned structures. Mitochondria are the centers of aerobic cellular respiration.

The lysosome, discovered in the mid-1950's, is a spherical, sac-like body that contains a number of hydrolytic enzymes. These enzymes are thought to be responsible for the digestion of food materials stored within the cell and for the breakdown of foreign particles, such as bacteria, in the white blood cells. Chloroplasts are highly organized bodies containing chlorophyll. They are found only in the cells of green plants and are centers of photosynthetic activity. Vacuoles are also seen in almost all cells. Animal cells usually have several small vacuoles scattered throughout their cytoplasm, whereas the mature plant cell typically contains a single large vacuole near the center of the cell.

A number of cells, particularly unicellular organisms, show some cytoplasmic projections from their external surface. These organelles of locomotion may take the form of either cilia or flagella. Both types of structures are slender and filamentous. Cilia are relatively short projections and are usually present in large numbers covering the entire surface of the cell. Flagella are longer and are less numerous than cilia, each cell usually possessing only one or two.

Fibrils are embedded in the cytoplasm of some cell types. These fibrils are composed primarily of proteins and may function either as contracting (myo-) or conducting (neuro-) fibrils.

### **New words and phrases**

gelatin-jelatin

substance-modda

colloidal-kolloid

ion-ion

organic-organik

metabolic-metabolizm

occur-sodir bo'lmoq

reveal-ochmoq, fosh qilmoq

tubule-naycha

vesicle-vesikula

cavity-tish kovagi

ramify-qo'pol

throughout-har tomonlama

endoplasmic-endoplazmatik  
reticulum-ritikulum  
complex-kompleks  
imagination-o'ylash, hayol qilish  
outer-tashqi  
layer-qatlam  
ribosome-ribosoma  
scatter-qochmoq  
dense-zich, qalin  
ribonucleic-ribonuklein  
acid-kislota, oksid  
assemble-to'plamoq, yig'ilmoq  
controversy-munozara, bahs  
apparatus-apparat  
beyond-narigi tarafda  
demonstrate-isbotlamoq  
obscure-noaniq  
pancreas-oshqozon osti bezi  
visible-ko'zga ko'rinarli  
mitochondria-metaxondriya  
cellular-hujayrali, uyali  
respiration-nafas olish  
aerobic-aerob  
lysosome-lizosoma  
spherical-sharsimon  
hydrolytic-gidrolitik  
responsible-javobgar, mas'ul  
digestion-hazm qilish  
breakdown-buzilish  
chlorophyll-xlorofil  
vacuole-vakuola  
external-tashqi  
unicellular-hujayrasiz  
flagella-flagella  
slender-nozik

filamentous-tolali

**Exercise 2. Answer the questions**

1. What is cytoplasm?
2. Why scientists use Golgi apparatus?
3. Say about fibrils!
4. When lysosome discovered?
5. What ribosomes do?

**Exercise 3. Translate the following sentences and underline terminologies**

1. Cytoplasm is a colloidal material which can be either a sol or a gel, depending upon the physiological state of the cell. 2. These metabolic activities occur through the functioning of the organelles suspended in the cytoplasm. 3. Cytoplasm is the gelatin-like material or ground substance in which the other components of the cell, including the nucleus, are suspended. 4. The electron microscope has revealed a network of tubules and vesicles in nearly all cells of higher plants and animals. 5. The reticulum is a complex membrane system. 6. It often opens to the surface of the cell by communicating with the invaginations of the plasma membrane, and it is also continuous with openings in the outer layer of the nuclear membrane. 7. Most of the RNA present probably carries the genetic information needed for the ribosomes to carry out their function, that of assembling amino acids into protein molecules within the cell. 8. Cells of the liver, pancreas, and salivary glands are particularly suited for demonstrating the Golgi complex (Golgi body). 9. Vacuoles are also seen in almost all cells. 10. Animal cells usually have several small vacuoles scattered throughout their cytoplasm, whereas the mature plant cell typically contains a single large vacuole near the center of the cell. 11. A number of cells, particularly unicellular organisms, show some cytoplasmic projections from their external surface. 12. Cilia are relatively short projections and are usually present in large numbers covering the entire surface of the cell.

**Exercise 4. Fill in the blanks**

1. Animal ... usually have several small vacuoles scattered throughout their ..., whereas the mature plant cell typically contains a single large ... near the ... of the cell. 2. ... is the gelatin-like material or ground substance in which the other ... of the cell, including the ..., are suspended. 3. ... are rod-shaped or spherical ..., depending upon the cell type, scattered throughout the ... 4. Cells of the liver, pancreas, and salivary glands are particularly suited for .... the ... complex. 5. A number of cells, particularly ... organisms, show some .... projections from their ... surface. 6. ... are

relatively short ... and are usually present in large numbers ... the entire surface of the cell. 7. The ..., discovered in the ..., is a spherical, saclike body that contains a number of ... enzymes. 8. These organelles of ... may take the form of either ... or flagella. Both types of structures are ... and .... 9. Fibrils are embedded in the ... of some ... types. 10. It often opens to the surface of the ... by communicating with the ... of the plasma ..., and it is also ... with openings in the outer layer of the ... membrane. 11. Flagella are ... and are less ... than ..., each cell usually ... only one or two. 12. Cytoplasm is the ... material or ground ... in which the other ... of the cell, including the ..., are suspended.

## **LESSON 26**

**Exercise 1. *Translate the following text using the dictionary***

### **CELL SIZE AND FUNCTIONING**

Cells are different with respect to content and shape as well as to size. This differentiation allows the cell to function more efficiently. Every different cell type in the human body has a characteristic appearance when viewed under the microscope. The most highly differentiated of all cells is the nerve cell, which produces very long, filamentous fibers. The same kind of differences exists in plant cells, but the degree of variation is probably not as great in plants as in animals, as most plant cells are rectangular or cylindrical in shape. In any event, biologists have observed that the cell type responsible for any particular function is perfectly adapted for that function.

Within the human body the range for cell size is from a few microns to one metre. White blood cells have a diameter ranging from approximately 8 to 20 microns, depending upon the particular type. Skeletal muscle fibers may be as long as 4 centimeters and as thick as 100 microns. Cells of the liver, spleen, salivary glands, pancreas, and kidney measure approximately 10 to 15 microns.

Plant cells also show a wide range in cell size, but the cells within a particular plant probably show less variation in size than those of higher animals. Each cell has a dual responsibility to maintain itself and to participate in the total life of the organism. In all of its activities the cell requires the availability of a continuous energy source along with a supply of raw materials. Energy is utilized to make possible the numerous chemical reactions which give “life” to the cell; raw materials are necessary for the synthesis of compounds. These metabolic processes are essential to the life of the cell itself. Beyond this, cells contribute to the total life of the organism in a variety of ways. Muscle cells contract, nerve cells conduct impulses, gland cells secrete,

white blood cells engulf and destroy bacteria, cells in the leaf of a green plant carry on photo synthesis.

Every part of the cell must function properly and on schedule, for if a single chemical reaction fails to occur, the cell not only becomes disabled, it dies. Likewise, if groups of cells fail to function properly, the organism may die.

### **New words and phrases**

particular-ma'lum, belgilangan

differentiate-farqlamoq

muscle-muskul

skeletal-skelet

nerve-nerv/asab tomirlari

rectangular-to'rtburchak

cylindrical-silindr

range-qator

spleen-taxtakach

kidneys-buyraklar

contribute-qo'llab quvvatlamog

schedule-ro'yhat, tartib

carry on-davom ettirmog

approximately-tahminan

characteristic-xususiyat

### **Exercise 2. Answer the questions**

1. Which cell is the most highly differentiated of all cells?
2. How many cells of the liver, spleen, salivary glands, pancreas, and kidney measure?
3. How many microns have white blood cells?
4. Explain about plant cells?
5. Which cell is engulfing and destroying bacteria?

### **Exercise 3. Translate the following sentences and underline terminologies**

1. Every different cell type in the human body has a characteristic appearance when viewed under the microscope.
2. In any event, biologists have observed that the cell type responsible for any particular function is perfectly adapted for that function.
3. Skeletal muscle fibers may be as long as 4 centimeters and as thick as 100 microns.
4. Cells of the liver, spleen, salivary glands, pancreas, and kidney measure approximately 10 to 15 microns.
5. These metabolic processes are essential to the life

of the cell itself. 6. Beyond this, cells contribute to the total life of the organism in a variety of ways. 7. Every part of the cell must function properly and on schedule, for if a single chemical reaction fails to occur, the cell not only becomes disabled, it dies. 8. Beyond this, cells contribute to the total life of the organism in a variety of ways. 9. Muscle cells contract, nerve cells conduct impulses, gland cells secrete, white blood cells engulf and destroy bacteria, cells in the leaf of a green plant carry on photosynthesis. 10. Each cell has a dual responsibility—to maintain itself and to participate in the total life of the organism.

**Exercise 4. Fill in the blanks**

1. Skeletal muscle ... may be as long as ... centimeters and as thick as ... microns. 2. Beyond this, ... contribute to the total life of the ... in a variety of ways. 3. Energy is ... to make possible the ... chemical ... which give “life” to the cell; raw ... are necessary for the ... of compounds. 4. ... of the liver, spleen, salivary glands, pancreas, and ... measure approximately ... to... microns. 5. The same kind of ... exists in ... cells, but the degree of variation is probably not as great in plants as in animals, as most plant cells are ... or...in shape. 6. Likewise, if groups of ... fail to ... properly, the ...may die. 7. In all of its ... the cell requires the ... of a continuous ... source along with a supply of ... materials. 8. Every part of the ... must function properly and on ..., for if a single ... reaction fails to occur, the ... not only becomes ..., it dies.

**LESSON 27**

**Exercise 1. *Translate the following text using the dictionary***

**CELL DIVISION**

Cell division is the term used to refer to the processes involved when a single cell becomes two cells, or when a cell reproduces itself. The body of nearly every multicellular organism comes from a single cell, the fertilized egg, and it is only through the processes of cell division that this one cell becomes the body of an organism. Through this continuing increase in the number of cells, an organism grows until it reaches its adult size, its cells differentiating at the same time into the various tissues and organs that make up its body. The functions made possible by cell division growth, differentiation, renewal, and regeneration are common to all multicellular organisms, both plant and animal.

Cell division consists of two processes or events which in most tissues occur simultaneously. First, the chromosomes within the nucleus duplicate themselves and

form two daughter nuclei, a process called mitosis. Second, in a process called cytokinesis, the cytoplasm of the cells is divided into two parts, each containing one of the newly formed nuclei. When these two events happen, two completely new daughter cells are formed.

The chromosome, a structure composed primarily of desoxyribonucleic acid in association with some proteins, is formed during mitosis from the chromatin network or chromonemata within the nucleus. Each chromosome contains either one or two chromosome threads, depending upon the particular stage of mitosis in question. It is a distinct structure, behaving as a single unit and having an individuality of its own.

Chromosome number varies from one species to another. The garden onion has 16 chromosomes, the American elm has 56, and the apple 34. The crayfish has approximately 200 chromosomes, the horse 66, the housefly 12, and the mosquito 12. In 1926 the chromosome number for man was listed as 48, and this number was accepted by biologists until comparatively recently. Human chromosomes, measured as they reach their maximum degree of contraction during mitosis, have an average length of four to six microns.

The application of recent development in chromosome technology to problems of human diseases and abnormalities has been very rapid. It is becoming a standard procedure in large medical laboratories to look at the chromosome picture in all diseases that might have a hereditary basis. As more data is accumulated, it is quite possible that medical profession may discover that a number of the conditions which have puzzled it for many years are the result of defects in the chromosomes or in the balance of genetic material.

#### **New words and phrases**

multicellular-ko'p hujayrali

fertilize-urug'lamoq

tissue-to'qima

renewal-uzaytiriladigan

regeneration-regeneratsiya

simultaneously-sinxron

duplicate-nusxa, ko'chirma

mitosis-mitoz

cytokinesis-sitogenez

desoxyribonucluis-deziribonuklein

chromatin-xromatin



chromonemata-xromonemata  
structure-tuzilish  
crayfish-qisqichbaqa  
housefly-uy pashshasi  
comparatively-solishtirilganda  
contraction-qisqarish  
abnormality-me'yordan chetga  
rapid-tez, tezkor  
procedure-rasmiy marosim  
basis-asos, sabab  
accumulate-yig'moq

**Exercise 2. Answer the questions**

1. Explain cell division process.
2. What is a chromosome?
3. How many chromosomes have the crayfish and the mosquito?
4. When discovered people's chromosome?
5. What is a desoxyribonucleic process?

**Exercise 3. Translate the following sentences and underline terminologies**

1. The body of nearly every multicellular organism comes from a single cell, the fertilized egg, and it is only through the processes of cell division that this one cell becomes the body of an organism. 2. The functions made possible by cell division—growth, differentiation, renewal, and regeneration—are common to all multicellular organisms, both plant and animal. 3. Cell division consists of two processes or events which in most tissues occur simultaneously. 4. Second, in a process called cytokinesis, the cytoplasm of the cells is divided into two parts, each containing one of the newly formed nuclei. 5. Each chromosome contains either one or two chromosome threads, depending upon the particular stage of mitosis in question. 6. Chromosome number varies from one species to another. 7. The crayfish has approximately 200 chromosomes, the horse 66, the housefly 12, and the mosquito 12. 8. Human chromosomes, measured as they reach their maximum degree of contraction during mitosis, have an average length of four to six microns.

#### **Exercise 4. Fill in the blanks**

1. The ... made possible by ... —growth, differentiation, renewal, and regeneration—are common to all ... organisms, both ...and .... 2. As more data is accumulated, it is quite possible that medical profession may discover that a number of the ... which have puzzled it for many years are the result of ... in the ... or in the balance of genetic material. 3. In ... the chromosome number for ... was listed as ..., and this number was accepted by ... until comparatively .... 4. Human ..., measured as they reach their maximum degree of ... during ..., have an average ... of four to six microns. 5. The ... has approximately ... chromosomes, the horse..., the housefly ..., and the mosquito .....

6. Cell ... is the term used to refer to the ... involved when ... cell becomes two cells, or when a cell ... itself. 7. The garden onion has ...chromosomes, the ... elm has ..., and the apple ... 8. Cell ... consists of two processes or events which in most ... occur ....9. Each ... contains either one or two ... threads, depending upon the ... stage of ... in question. 10. Second, in a process called ..., the cytoplasm of the ... is divided into... parts, each containing... of the newly formed nuclei.

### **LESSON 28**

#### **Exercise 1. Translate the following text using the dictionary**

##### **ANIMAL TISSUES (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 diploblastic forms relatively simple. The five types of tissues found in the triploblastic 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 plate let (thrombocyte).

Erythrocytes are nonnucleated 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 5,000,000 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; and a granulocytes (lymphocytes and monocytes) which have nonlobed nuclei and lack granules 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.

### **New words and phrases**

triploblastic-tiriploplastik

germ-mikrob

epithelial-epiteliy

mesoderm-mezoderma

hollow-kavakli

tract-traktat

respiratory-nafas olish

entire-butun

line-chiziq

derivate-o'zak, manba

compactly-ixcham

dioxide-dioksid

nitrogen-nitrogen

hormone-garmon

internal-ichki  
irculate-jo'tamoq  
facilitate-yordam bermoq  
mobilization-safarbar qilmoq  
defense-mudofaa  
portion-qism, bo'lak  
intercellular-ichki hujayra  
plasma-plazma  
erythrocyte-eritrotsid  
lycotcyte-leykotsid  
trombotcyte-trombotsid  
nonnucleate-yadrosiz  
granulocyte-granulatsid  
granule-granula, dona  
monocyte-monotsid  
immune-immunitet  
diffuse-diffuziya  
stream-oqim  
capillary-kapilyar  
tissue-to'qima  
intestine-ichak-chovoq  
lymph-limfa

**Exercise 2. Answer the questions**

1. How many types of tissues do you know?
2. What is an epithelium?
3. Which organ is closely related to blood?
4. How much is the normal number of thrombocytes in man?
5. How much is the normal number of erythrocytes in man?

**Exercise 3. Translate the following sentences and underline terminologies**

1. The five types of tissues found in the triploblastic animal body are described below.
2. 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.
3. Epithelial tissues are the most cellular of all tissues in the body, and the cells are always arranged compactly.
4. Blood is a cell-containing fluid which transports oxygen, food materials, carbon dioxide, nitrogen-containing waste materials, and hormones.
5. 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). 6. They are the most numerous of the formed elements of blood, the number in man being 4,500,000 to 5,000,000 per cubic millimeter of whole blood under normal conditions. 7. 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. 8. This fluid has a milky appearance, and its composition varies according to the organ from which it is collected.

**Exercise 4. Fill in the blanks**

1. An ... is a group of ... that covers a body surface or lines hollow ... and ... within the body. 2. Blood is a ... fluid which transports ..., food materials, ..., nitrogen-containing waste ..., and hormones. 3. All ... aid in the body's ... against disease, either by ... foreign particles such as bacteria, or by participating in the ... mechanism. 4. The normal number of ... in man is ... per cubic millimeter of whole blood. 5. Lymph is a ... closely related to ... 6. It is formed in ... fluids (that is, the fluids which diffuse from the blood stream through ... walls into the tissue spaces) are collected into ... capillaries. 7. This fluid has a ... appearance, and its ... varies according to the ... from which it is collected. 8. They are the most ... of the formed elements of ..., the number in man being ... to ... per cubic millimeter of whole ... under normal conditions.

**LESSON 29**

**Exercise 1. Translate the following text using the dictionary**

**ANIMAL TISSUES (II)**

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.

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 are normally found as compact layers in the walls of such hollow organs 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, unbranched 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 axons, 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.

**PLANT TISSUES.** Although differentiation in plants does not result in organs as complex as among higher animals, plant tissues and organs do exist. Unlike animals, higher plants retain groups of embryonic cells throughout their lifetime, cells capable of proliferation and differentiation.

#### **New words and phrases**

mezenchyme-mezenxima

mesodermal-mezodermal

migrate-kuchib utmoq

cartilage-tog'ay

smooth-silliq

cardiac-yurakka oid

myofibril-miyofibrik

embed-o'yib o'rnatmoq, ichiga joylashtirmoq

urinary-siydik yo'li

bladder-qovuq

uterus-bachadon

soleen-taloq  
duct-naycha, kapilyar  
involuntary-beixtiyor  
consciously-ongli ravishda  
control-boshqaruv  
straight-to'g'ri, to'ppa-to'g'ri  
term-termin, atama  
resemble-o'xshamoq  
neuron-nevron  
enlarge-kattalashmoq  
extend-uzaytirmoq  
dendrity-tirishqoqlik  
impils-impuls  
spinal-orqa

**Exercise 2. Answer the questions**

1. What are connective tissues?
2. Which tissues compose the wall of the heart?
3. Which functions of nerve tissues do you know?
4. Which tissues cannot be consciously controlled?
5. Say about types of tissues.
6. What is the difference between plants and animals tissues?

**Exercise 3. Translate the following sentences and underline terminologies**

1. All connective tissues are derived from mesenchyme, migrating mesodermal cells.
2. 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).
3. Muscle tissue is differentiated into three types: smooth (or visceral), skeletal (or striated), and cardiac.
5. Smooth muscle cells are spindle-shaped, and each contains a single cigar-shaped nucleus located near the center of the cell.
6. Skeletal muscle tissue forms the “flesh” of the body.
7. Cardiac muscle tissue composes the wall of the heart and resembles skeletal muscle in structure.
8. Nerve tissue functions to conduct nerve impulses.
9. These fibers are of two types: dendrites, which conduct impulses toward the cell body, and axons, which conduct impulses away from the cell body.

#### **Exercise 4. Fill in the blanks**

1. Although they are ...by the presence of certain intercellular ... and ..., they are more variable in appearance than any of the other ... 2. Both are composed of ..., ..., and intercellular ..., but they differ ... according to the rigidity of the intercellular .... 3. There are... categories of connective tissues: the ... tissues proper (fibrous tissues concerned primarily with connecting one part of the body to another) and the ... connective tissues (cartilage and bone). 4. Muscle ...is differentiated into ... types: ... (or visceral), ... (or striated), and .... 5. Skeletal muscle tissue forms the “...” of the body. 6. Neurons occur in many ... and ... and, when grouped together in large numbers, form the ..., ..., and .... 7. Each ... or neuron consists of an enlarged ..., the cell body, from which two or more ... extend. 8. Cardiac ... tissue composes the wall of the ... and ...skeletal ... in structure.

### **LESSON 30**

#### **Exercise 1. Translate the following text using the dictionary**

##### **ORGAN SYSTEMS (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 two fold: **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 an 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.

The skeletal system is composed of varying amounts of bone and cartilage, 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.

### **New words and phrases**

particular-ma'lum bir

coordinate-koordinata, moslashtirmoq

enable-imkoniyat bermoq

function-vazifa

exist-mavjud bo'lmoq

illustrate-misol keltirmoq, oydinlashtirmoq

esophagus-qizilo'ngach

circulatory-aylanma

transport-tashish

hormone-garmon

nasal-burunga oid

trachea-traxeya

bronchial-bronxial

respiration-nafas olish

exchange-ayirboshlash  
tubule-naycha  
primitive-ibtidoiy  
excretory-ajralib chiqish  
lung-o'pka  
framework-qobirg'a, sinch  
vary-o'zgarmoq  
vertebrate-umurtqali hayvonlar  
rib-qovurg'a  
voluntary-ko'ngilli  
cavity-bo'shliq  
impulse-ichki turtki

**Exercise 2. Answer the questions**

1. Which system is composed of such organs as the esophagus, stomach and others?
2. What is the function of digestive system?
3. Say about excretory system?
4. Which network is composed of varying amounts of bone and cartilage?
5. Which system involves all of the muscle tissues within the body?

**Exercise 3. Translate the following sentences and underline terminologies**

1. It is the coordinated functioning of all organ systems that enables an individual organism to maintain itself in its environment and to reproduce. 2. Although organs and organ systems exist in all multicellular forms, this level of differentiation is probably better illustrated in animals than in plants. 3. The digestive system is composed of such organs as the esophagus, stomach, small intestine, large intestine, pancreas, and liver. 4. The digestive system is composed of such organs as the esophagus, stomach, small intestine, large intestine, pancreas, and liver. 5. The circulatory system is composed of the heart, the blood vessels, blood, the lymphatic vessels, and lymph. 6. The skeletal system is composed of varying amounts of bone and cartilage, depending upon the group of animals in question. 7. 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. 8. 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.

#### **Exercise 4. Fill in the blanks**

1. As the various ... in the plant and animal body differentiate, they become associated with each other to form ... that carry out particular .... 2. Although organs and organ systems exist in all ... forms, this level of ... is probably ... illustrated in... than in plants. 3. The ... system is composed of the ..., the ..., ..., ..., and .... 4. In the ..., this system also serves to protect such organs as the ..., ..., and the ... contained within the rib cage. 5. The ... of this system is twofold: 1) to supply all of the ... within the body with the ... they need to carry on ..., and 2) to remove the ... and some of the water that is a waste product of .....

6. For example, fish possess gills, insects have a series of ... through which air flows, and a number of ..., particularly the more ... ones, carry on an ... dioxide ... through the body surface. 7. The ... system provides the body with a means of ... itself of ... waste materials. 8. The primary excretory ... are the ..., ..., ..., and .... 9. The primary ... organs are the ..., ..., skin, and liver.

### **LESSON 31**

#### **Exercise 1. Translate the following text using the dictionary**

#### **ORGAN SYSTEMS (II)**

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 glands 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. The body of the multicellular plant is differentiated, although not as extensively as in animals, into organs and organ system (roots, stems, and leaves).

### **New words and phrases**

peripheral- periferlik

sensory-hissiy

concern-aloqadorlik

internal-ichki

respond-javob bermoq

permit-izn bermoq

perpetuation of the species- turlarlarni (navlarni) abadiylashtirish (saqlab qolish)

ovary-tuxumdon

asexual-jinssiz

ductless-naychador

regulator-asbob-uskuna nazoratchisi

thyroid-qalqonsimonbez

adrenal-adrenalin

scale-kattalik

excretion-chiqarish

extensively- yirik, keng

stem-poya, negiz

### **Exercise 2. Answer the questions**

1. What is the function of nervous system.
2. What is the function of reproductive system?
3. Which thing is highly specific in endocrine system?
4. Which system is differentiated?

### **Exercise 3. Translate the following sentences and underline terminologies**

1. The reproductive system has as its sole function the perpetuation of the species through the production of new organisms. 2. In higher animals, this system permits the processes which we term intelligence—thought, reasoning, and memory. 3. The asexual methods of reproduction characteristic of primitive forms do not involve reproductive organs. 4. The endocrine system consists of the ductless glands, the

glands which produce chemical regulators called hormones. 5. The thyroid, pituitary, and adrenal glands are examples of organs which compose this system. 6. 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. 7. The body of the multicellular plant is differentiated, although not as extensively as in animals, into organs and organ system (roots, stems, and leaves).

#### **Exercise 4. Fill in the blanks**

1. The nervous system is composed of the ..., the ..., all the ... nerves, and the ... parts of those organs concerned with receiving stimuli from the ... or ... environment. 2. In higher ..., this system ... the ... which we term intelligence—thought, ..., and memory. 3. The body of the ... plant is ..., although not as ... as in animals, into ... and organ system (roots, stems, and leaves). 4. The ..., ..., and ... glands are examples of ... which compose this system. 5. The ... system has as its sole function the ... of the species through the ... of new organisms. 6. The ... methods of ... characteristic of primitive forms do not involve ... organs. 7. The ... system is composed of the skin and the specialized structures, such as hair, scales, feathers, and nails, which develop from it. 8. The ... system consists of the ... glands, the glands which produce chemical ... called ... 9. Not only does the ... system receive the stimuli and conduct the ... impulses that cause an ... to respond, but it also ... and ... the various body parts in ... with the ... received in the form of stimuli.

### **LESSON 32**

#### **Exercise 1. Translate the following text using the dictionary**

##### **BACTERIA**

Bacteria were first seen in connection with the making of lenses and the testing of the qualities. The compound microscope was invented by J. and Z. Janssen in 1590, but for nearly a century it remained unnoticed had little practical value; and if during that time it ever revealed microorganisms, no record of the fact was made.

Anton Van Leeuwenhoek.—In Delft, Holland, in the seventeenth century, there lived a man who in his mature years ground lenses. As his interest lay in making better and better lenses it was natural that he should test them on all sorts of objects. In so doing he made many valuable discoveries. He appears to have been the first to see yeasts, red blood corpuscles, spermatozoa, various details of muscle and nerve tissue, and some of the protozoa, as well as bacteria. These last he found in rain water,

in decaying matter, and in scrapings from his own teeth.

His first report of microscopic discoveries, in 1674, was followed by many others, including one on bacteria in 1683 which was illustrated with a picture. Because of their motility he thought them to be tiny animals, as did also zoologists for more than a century thereafter.

We now realize that Leeuwenhoek was a remarkable man. He had unusual powers of observation, patience, skill and ingenuity. Wholly without scientific training, he nevertheless had the true scientific spirit.

At that time no one suspected that these interesting little microorganisms had any economic significance, that some of them later would be included among man's greatest benefactors and others among his worst enemies. Nearly two centuries passed before these facts were brought to light by Pasteur and his contemporaries.

### **New words and phrases**

lenses-linzalar

compound-birikma

unnoticed-sezilmagan

reveal-fosh qilmoq

microorganism-mikroorganizm

lay-qo'yimoq, solmoq

spermatozoa-spermatozoidlar

protozoa-protozoidlar

decay-yemirilmoq

scrapping-tozalab tashlamoq

thereafter-...dan so'ng

nevertheless-shunga qaramay

remarkable-ajoyib

patience-toqat

ingenuity-zukkolik

suspect-...deb o'ylamoq

benefactor-muruvvat qiluvchi

contemporary-zamonaviy

### **Exercise 2. Answer the questions**

1. How were first seen bacteria?
2. Who was invented the first microscope?
3. Who was Anton Van Leeuwenhoek?

4. What did Anton Van Leeuwenhoek for our society?

**Exercise 3. *Translate the following sentences and underline terminologies***

1. The compound microscope was invented by J. and Z. Janssen in 1590, but for nearly a century it remained unnoticed had little practical value; and if during that time it ever revealed microorganisms, no record of the fact was made. 2. As his interest lay in making better and better lenses it was natural that he should test them on all sorts of objects. 3. These last he found in rain water, in decaying matter, and in scrapings from his own teeth. 4. His first report of microscopic discoveries, in 1674, was followed by many others, including one on bacteria in 1683 which was illustrated with a picture. 5. He had unusual powers of observation, patience, skill and ingenuity. Wholly without scientific training, he nevertheless had the true scientific spirit. 6. Because of their motility he thought them to be tiny animals, as did also zoologists for more than a century thereafter. 7. Nearly two centuries passed before these facts were brought to light by Pasteur and his contemporaries.

**Exercise 4. *Fill in the blanks***

1. Bacteria were first seen in ... with the making of ... and the testing of the qualities. 2. In Delft, ..., in the ... century, there lived ... who in his ... years ground lenses. 3. In so doing he made many ... discoveries. 4. He appears to have been the first to see yeasts, red ... corpuscles, ..., various details of ... and nerve ..., and ... of the ..., as well as .... 5. These last he found in ... water, in decaying matter, and in ... from his own .... 6. His first report of ... discoveries, in ..., was followed by many others, including one on ... in ... which was ... with a .... 7. We now realize that ... was a ... man. 8. At that time no one ... that these interesting little ... had any economic ..., that ... them later would be ... among man's greatest ... and others among his ... enemies.

**LESSON 33**

**Exercise 1. *Translate the following text using the dictionary***

**EFFECTS OF TEMPERATURE (I)**

The temperature to which bacteria are exposed may either destroy them or influence their activities favorably or adversely. Injury by Heat.—Bacterial species vary greatly in their resistance to heat. The two genera, Bacillus and Clostridium, are made up of spore formers, and the spores of some species can withstand steam heat above the boiling point for a half-hour or longer. Most kinds of non-spore-forming bacteria are killed if heated in a liquid medium for a few minutes at 60° C.

In determining the heat resistance of bacteria several factors have to be considered jointly: 1) the degree of temperature, 2) the length of time during which the bacteria are exposed to the heat, 3) whether the bacteria are heated in a moist or a dry condition, 4) the hydrogen-ion concentration of the medium in which the bacteria are heated, and 5) the character of the medium in other respects. For example, bacteria are killed at a lower temperature in water than in cream.

The first two of these conditions are self-explanatory. The presence of moisture makes bacteria more susceptible to heat, probably because the proteins of their protoplasm are more readily coagulated when wet than when dry. In laboratory practice dry glassware is sterilized at a temperature about 40° C higher than is used for culture media, and generally the time of heating is much longer. With regard to the hydrogen-ion concentration of the medium in which the bacteria are heated, it has been abundantly shown that even a slight increase in acidity or alkalinity from the neutral point increases the effectiveness of the heat. For this reason acid fruits are more easily sterilized than vegetables or meats.

As a common basis for comparative studies in heat resistance of bacteria a thermal death point is sometimes determined. Unfortunately there is not complete uniformity in the definitions of the thermal death point, but the following is in good repute: "The thermal death point is the least degree of heat required to kill all the individuals when heated in standard nutrient broth for ten minutes". Note that all five of the factors named above are taken account of in a thermal death point test carried out by this definition. As some kinds of bacteria, however, are not commonly grown in nutrient broth the character of the medium is sometimes varied.

Since the different individuals in a culture vary greatly in their resistance to heat, some dying much more quickly than others at the thermal death point, a thermal death rate is sometimes preferred, although it is more difficult to determine. Where a fixed temperature of heating is used, as in canneries, a thermal death time is sometimes determined, i.e., the time required to kill the organisms when heated at a temperature previously determined upon. This temperature is usually above the boiling point, and, if so, its significance is with reference to spore-forming organisms.

#### **New words and phrases**

expose-ko'rsatmoq

favorably-iltifotli

adversely-noqulay

resistance-qarshilik ko'rsatish



vary-farq qilmoq  
spore-spora  
former-sobiq  
withstand-chidamoq  
steam-bug'lamoq  
above-yuqorida  
medium-axborot vositalari  
determine-belgilamoq  
jointly-umumiy  
moisture-namlik  
presence-bor bo'lish  
susceptible-ta'sirlanmoq  
coagulate-coagulyatsiya qilish  
protoplasm-protoplazma  
glassware-shisha buyum to'plami  
culture media-madaniyat vositalari  
neutral-neytral  
acidity-kislotalar  
alkalinity-alkanlar  
thermal-issiqlik  
uniformity-formal  
nutrient-oziqylanish  
cannery-konserva zavodi  
require-ehtiyoj sezmoq  
previously-avvalgi

**Exercise 2. Answer the questions**

1. Say about temperature.
2. Which bacteria is killed if heated in a liquid medium for a few minutes at 60° C.
3. Explain the heat resistance of bacteria with several factors?
4. What is a self-explanatory?
5. What do you think what is a thermal death point?

**Exercise 3. Translate the following sentences and underline terminologies**

1. The two genera, Bacillus and Clostridium, are made up of spore formers, and the spores of some species can withstand steam heat above the boiling point for a half-hour or longer.
2. In determining the heat resistance of bacteria several factors have to

be considered jointly: 1) the degree of temperature, 2) the length of time during which the bacteria are exposed to the heat, 3) whether the bacteria are heated in a moist or a dry condition, 4) the hydrogen-ion concentration of the medium in which the bacteria are heated, and 5) the character of the medium in other respects. 3. With regard to the hydrogen-ion concentration of the medium in which the bacteria are heated, it has been abundantly shown that even a slight increase in acidity or alkalinity from the neutral point increases the effectiveness of the heat. 4. As some kinds of bacteria, however, are not commonly grown in nutrient broth the character of the medium is sometimes varied. 5. Where a fixed temperature of heating is used, as in canneries, a thermal death time is sometimes determined, i.e., the time required to kill the organisms when heated at a temperature previously determined upon.

#### **Exercise 4. Fill in the blanks**

1. The temperature to which ... are exposed may either destroy them or ... their ... favorably or adversely. 2. Most kinds of ... bacteria are killed if ... in a liquid ... for a few minutes at 60° C. 3. With regard to the ... concentration of the medium in which the ... are heated, it has been ... shown that even a slight increase in acidity or ... from the ... point increases the ... of the heat. 4. Unfortunately there is not complete ... in the definitions of the ... death point, but the following is in good repute: "The ... death point is the ... degree of heat required to kill all the ... when heated in ... nutrient broth for ten minutes". 5. Since the different ... in a culture vary greatly in their ... to heat, some ... much more ... than others at the ... point, a thermal death rate is ... preferred, although it is more ... to determine. 6. This ... is usually above the ... point, and, if so, its ... is with reference to ... organisms.

### **LESSON 34**

#### **Exercise 1. Translate the following text using the dictionary**

##### **EFFECTS OF TEMPERATURE (II)**

Injury by Low Temperature.-Very few kinds of bacteria are killed by cooling' down to 0° C, although some species of Neisseria fail to survive this temperature if kept there in a moist state. Even most pathogens of warm-blooded animals may live for months in a refrigerator.

Actual freezing, however, must be looked upon as lethal to vegetative cells; but it is not injurious to spores, which contain very little free water. Just how freezing kills bacteria is not certain, although the mechanical action of the ice crystals is strongly suspected of being responsible. Freezing bacteria suspended in water is much

more fatal to them than freezing in cream or other material that does not become so solid. Slow freezing at the temperature of an ice-salt mixture (about-16°C) is more effective than freezing very quickly at the temperature of liquid air (about-190°C.). It has also been found that repeated freezing and thawing is much more lethal than continuous freezing. About seven repeated freezing's at close intervals are sufficient to kill all the individuals of the typhoid organism in a very young broth culture in less than two hours, whereas they will live for several weeks if kept continuously frozen.

Effects of Temperature on Physiological Activities. --Bacteria are much influenced by temperatures within a range not fatal to them. For each species and each physiological activity we must recognize three cardinal points of temperature a maximum, an optimum, and a minimum.

Such a wide range of temperature requirements is found in different species of bacteria that a thermal grouping has been set up. 1) Thermophiles are those that grow best at relatively high temperatures, with a temperature range of 30° C to 80° C. 2) Mesophylls are those that grow best at moderate temperatures, with a temperature range of 10° C to 45° C. 3) Psychrophilic are those that grow best at relatively low temperatures, with a temperature range of 0° C to 25° C. It will be noted that there is considerable overlapping in the temperature range for growth of the three groups—i.e., that the minimum for one group is considerably below the maximum for another. There is also considerable variation in temperature range of the different species in a group. The optimum temperatures run about as follows: thermophiles 50° to 60°C, mesophiles 30° to 37°C, and psychrophilic 15° to 20°C.

Thermophiles are particularly troublesome in the dairy industry, as even their vegetative cells withstand pasteurization. Mesophiles include all the common forms that grow best at room and blood temperatures. Psychrophiles develop in cold soils and even in the refrigerator.

We use the term 'microphile' for bacteria that have a narrow range of temperature for growth—i.e., whose maximum and minimum temperatures are relatively close together. For example, the gonococcus will show very little growth above 40° C or below 30° C, whereas by contrast *Escherichia coli* has a range from about 44°C to about 8°C. Most microphiles are mesophilic, with a temperature range between 30° and 40° C. In general, the optimum temperature is much closer to the maximum than to the minimum. This is shown by the two species mentioned above, both of which have an optimum of 37° C. When bacteria are submitted to temperatures a little above the maximum or below the minimum they are not killed

but go into a relatively dormant state.

### **New words and phrases**

cool-og'ir, vazmin

survive-qolmoq

moist-nam

pathogen-patogen

warm-blood-issiq qon

suspect-hayol qilmoq

fatal-falokatli

mixture-aralashma

sufficient-yetarli

cardinal-kardinal

set up- tashkil etmoq

termophil-termofil

mesophyl-mezofil

psychrophilic-fizioxrofil

overlap-bir-birini qoplamoq

variation-xilma-xillik

troublesome-tashvish keltiradigan

gonococcus-gonokok

dormant-yashirin, harakatsiz

### **Exercise 2. Answer the questions**

1. How are killed very few kinds of bacteria?
2. What is a slow-freezing?
3. Explain about thermopiles?
4. In how temperature stands most microphiles?
5. Say about mezophyls?

### **Exercise 3. Translate the following sentences and underline terminologies**

1. Actual freezing, however, must be looked upon as lethal to vegetative cells; but it is not injurious to spores, which contain very little free water. 2. Freezing bacteria suspended in water is much more fatal to them than freezing in cream or other material that does not become so solid. 3. It has also been found that repeated freezing and thawing is much more lethal than continuous freezing. 4. About seven repeated freezing's at close intervals are sufficient to kill all the individuals of the typhoid organism in a very young broth culture in less than two hours, whereas they will live

for several weeks if kept continuously frozen. 5. Thermophiles are particularly troublesome in the dairy industry, as even their vegetative cells withstand pasteurization. 6. For example, the gonococcus will show very little growth above 40° C or below 30° C, whereas by contrast Escherichia coli has a range from about 44°C to about 8°C. Most microphiles are mesophilic, with a temperature range between 30° and 40° C. 7. This is shown by the two species mentioned above, both of which have an optimum of 37° C.

#### **Exercise 4. Fill in the blanks**

1. Freezing ... suspended in ... is much more ... to them than ... in cream or other ... that does not ... so solid. 2. Thermophiles are those that ... best at relatively high ..., with a temperature range of ... to ... 3. Psychrophilic are those that ... best at relatively low temperatures, with a ... range of ... to ... 4. It will be noted that there is ... overlapping in the ... range for growth of the three groups— i.e., that the ... for one group is ... below the ... for another. 5. For example, the ... will show very little growth above ... or below ..., whereas by contrast ... coli has a range from about ... to about...6. This is shown by the two species ... above, both of which have an optimum of ... 7. When ... are submitted to ... a little above the ... or below the ... they are not killed but go into a relatively ... state. 8. Slow ... at the ... of an ice- salt mixture (about—16°C) is more effective than ... very quickly at the temperature of liquid ... (about —190°C.).

### **LESSON 35**

#### **Exercise 1. Translate the following text using the dictionary**

##### **EFFECTS OF MOISTURE AND DESICCATION**

Moisture, like temperature, is a relative term, and bacteria may be exposed to any degree from almost pure water to almost absolute dryness.

Maximum Water Supply—Bacteria, being virtually aquatic, are not injured by excess of moisture, except indirectly through restriction of the air supply, as in a water logged soil. Diffusion from the atmosphere into the water provides a limited supply of air. Effects of Desiccation—Bacteria do not require an excessive amount of water to live normally. In a soil that is only moderately moist, that will just hold together when squeezed in the hand, they will live and multiply in the thin films of water on the soil particles.

When exposed to dry air, however, vegetative cells are more or less injured. Some delicate pathogens (for example, the meningococcus that causes meningitis)

will die very quickly—in an hour or less—if dried in a thin layer on a glass slide. Spores, being dormant, are not affected by desiccation, and may live in an air-dry state for years.

There are a number of conditions that determine the lethal effect of desiccation.

1) The medium in which the bacteria are dried is important. Drying on glass in a thin film of an aqueous suspension is much more effective than drying in a thick mass of a viscous material such as sputum, milk, or agar, because such materials slow down desiccation and under some conditions make it less complete.

2) Drying in light, even of relatively low intensity, is more effective than drying in darkness.

3) Drying at body temperature or from temperature is more effective than drying near or below the freezing point.

4) Drying in air is more effective than drying in a vacuum or in an atmosphere of nitrogen. Oxidation may be one of the lethal agents in normal drying.

Taking advantage of these facts, a method has been devised for keeping on hand supplies of living bacteria. They are dried on strips of blotting paper at a low temperature and stored in a dark refrigerator. Under these conditions even delicate pathogens have been kept alive, although dormant, for years.

### **New words and phrases**

desiccation-cho'kich

expose to-ko'rsatmoq

dyness-rang berish

virtual-faktga asoslangan

aquatic-suvga oid

excess-ortiqchalik

indirectly-bilvosita

restriction-chegaralamoq

supply-ta'minlamoq

log-yog'och, xoda

excessive-ko'p, serob

moderately-o'rtacha

squeeze-yozmoq

multiply-ko'paymoq

meningococcus-meningit

slide-sirg'anmoq

suspension-bo'shatish  
thick-yo'g'on  
sputum-balg'am  
intensity-intensivlik  
oxidation-oksidlanish  
devise-o'y lab topmoq  
blot-dog' qilmoq  
delicate-nozik

**Exercise 2. Answer the questions**

1. Which thing is being virtually aquatic, are not injured by excess of moisture?
2. Explain effects of desiccation?
3. Say a number of functions effects of desiccation.
4. What is a meningococcus?

**Exercise 3. Translate the following sentences and underline terminologies.**

1. Bacteria, being virtually aquatic, are not injured by excess of moisture, except indirectly through restriction of the air supply, as in a waterlogged soil. 2. In a soil that is only moderately moist, that will just hold together when squeezed in the hand, they will live and multiply in the thin films of water on the soil particles. 3. Spores, being dormant, are not affected by desiccation, and may live in an air-dry state for years. 4. Drying on glass in a thin film of an aqueous suspension is much more effective than drying in a thick mass of a viscous material such as sputum, milk, or agar, because such materials slow down desiccation and under some conditions make it less complete. 5. Drying at body temperature or from temperature is more effective than drying near or below the freezing point. 6. Drying in air is more effective than drying in a vacuum or in an atmosphere of nitrogen. 7. Oxidation may be one of the lethal agents in normal drying. 8. Taking advantage of these facts, a method has been devised for keeping on hand supplies of living bacteria.

**Exercise 4. Fill in the blanks**

1. Moisture, like ..., is a relative term, and ... may be exposed to any ...from almost pure ... to almost ... dryness. 2. In a soil that is only ... moist, that will just hold together when squeezed in the hand, they will live and ... in the thin films of ... on the soil particles. 3. Some delicate ... (for example, the meningococcus that causes meningitis) will die very quickly—in ... or less—if dried in a thin layer on ... slide. 4. Drying in ..., even of relatively ... intensity, is more ... than drying in darkness. 5. Drying at body ... or from temperature is more ...than ...near or below the ... point.

6. Oxidation may be one of the ... agents in ... drying. 7. Taking ... of these facts, ... has been devised for keeping on hand ... of living bacteria. 8. They are dried on strips of ... paper at a low ... and stored in ... refrigerator.

## LESSON 36

**Exercise 1.** *Translate the following text using the dictionary*

### EFFECTS OF LIGHT AND OTHER RADIATIONS

Most kinds of bacteria can make no direct use of light, as green plants do, but thrive well in darkness. A few of the red and purple bacteria of the other Thiobacteriales, however, can utilize the energy of light and carry on photosynthesis.

Injury by Light-Light is well known to be injurious to most kinds of bacteria even lethal under some conditions. We have no convenient way of expressing light intensity as we do temperature, for example, and hence it is not easy to put a discussion of its effects on a quantitative basis. The diffuse light of a room that which is suitable for reading has but little effect on most kinds of bacteria. Direct sunshine, is highly fatal, killing some kinds of bacteria in a few seconds, others in a few minutes, and spores in a few hours.

The length of light wave is important. Starting with the short wave ultraviolet, the lethal effect lessens as the wave length increases to the long wave infra-red, which is relatively harmless. In fact there is very little killing by light other than in the ultraviolet range. Light is more injurious in the presence of air than in a vacuum or an atmosphere of nitrogen.

Limitations to Light Injury- Although light has a strong killing effect on bacteria under certain conditions, it should be realized that these conditions are often modified. Passage of light through glass cuts out most of the effective ultraviolet rays. Passage of light through water diminishes its intensity greatly, until at a depth of a foot or so below the surface it is relatively harmless. The tiniest particles of solid material are sufficient to shade bacteria that are favourably placed.

Effects of Radiations Other Than Light- Radium and X-ray emanations of moderate intensity have very little direct effect on bacteria. Bacteria are sometimes killed in tissues so treated, but their death is probably due to a change in their chemical environment brought about by the action of the rays on the tissues. It has been shown, however, that bacteria can be killed by radium and by X-rays of great intensity. An electrical current, in itself, appears to be relatively harmless to bacteria.



Earlier experiments in this field resulted in claims of injury, but close analysis of these experiments revealed the likelihood that in some cases germicidal chemicals such as ozone and chlorine, set free by the current, had been the lethal agents.

### **New words and phrases**

quantitative-miqdoriy

suitable-mos

direct-bevosita

lethal-halokatli

wave-silkimoq

ultraviolet-ultrabinafsha

lessen-ozaytirmoq

infra-red-infra qizil nurlari

presence-ishtirok etish

vacuum-vakuum

modify-biroz-o'zgartirmoq

diminish-qisqartirmoq

favourably-qulay

emanation-ifodalamoq

moderate-o'rtacha, salgina

harmless-ziyonsiz

germicidal-mikrob chaqirish

ozone-ozon

chlorine-xlorin

### **Exercise 2. Answer the questions**

1. Advantages and disadvantages of light for bacteria.
2. Explain the difference of X-rays and radium?
3. Why the length of light is important?
4. Say about limitations to light injury.

### **Exercise 3. Translate the following sentences and underline terminologies**

1. A few of the red and purple bacteria of the other Thiobacteriales, however, can utilize the energy of light and carry on photosynthesis. 2. Light is well known to be injurious to most kinds of bacteria even lethal under some conditions. 3. The diffuse light of a room that which is suitable for reading has but little effect on most kinds of bacteria. 4. Direct sunshine, is highly fatal, killing some kinds of bacteria in a few seconds, others in a few minutes, and spores in a few hours. 5. Starting with the short

wave ultraviolet, the lethal effect lessens as the wave length increases to the long wave infra-red, which is relatively harmless. 6. Although light has a strong killing effect on bacteria under certain conditions, it should be realized that these conditions are often modified. 7. Passage of light through water diminishes its intensity greatly, until at a depth of a foot or so below the surface it is relatively harmless. 8. Bacteria are sometimes killed in tissues so treated, but their death is probably due to a change in their chemical environment brought about by the action of the rays on the tissues.

#### **Exercise 4. Fill in the blanks**

1. Most kinds of ... can make no direct use of light, as green ... do, but thrive ... in darkness. 2. Light is well known to be ... to most kinds of ... even lethal under ... conditions. 3. We have no ... way of expressing light intensity as we do ..., for example, and hence it is not easy to put a ... of its effects on a ... basis. 4. Direct ..., is highly fatal, ... some kinds of ... in a few seconds, others in a few minutes, and ... in a few hours. 5. Passage of light through ... cuts out most of the effective ... rays. 6. The tiniest particles of solid ... are sufficient to shade ... that are ... placed. 7. Radium and X-ray ... of moderate ... have very little ... effect on bacteria. 8. An electrical current, in itself, ... to be relatively ... to bacteria. 9. It has been shown, however, that ... can be killed by ... and by ... of great intensity. 10. Earlier ... in this field resulted in ... of injury, but close analysis of these ... revealed the likelihood that in some cases ... chemicals such as ... and chlorine, set ... by the current, had been the ... agents.

### **LESSON 37**

#### **Exercise 1. Translate the following text using the dictionary**

##### **A LITTLE ABOUT VIRUSES**

Development of Virology. In 1892 the Russian scientist D. I. Ivanovsky published an article on the reproduction of tobacco mosaic disease with the help of an unicellular extract. Since that time virology began to develop. In 1911 P. Rous discovered that sarcoma of the fowl could be transmitted by an agent separable from the tumour cells. It was the second large stage in the history of virology.

Genuine revolution in virology was connected with the introduction of monolayer cell culture method for cultivation of viruses. With the help of this hundreds of unknown viruses were isolated and identified. In our days virology took a new incentive owing to impetuous development of biochemistry, biophysics and other fundamental sciences. Modern molecular biology suggested a number of delicate and

effective methods both for the isolation and investigation of viruses. They are: electron microscopy, ultracentrifugation, electrophoresis in gels, fractionation on different absorbents, isoelectrofocusing and many others. In its turn virology gave some original methods for immunology, microbiology and some other sciences.

**Classification.** There is no really scientific classification of viruses up to date. We do not know about origin and evolution of viruses well enough, but every scientific classification is based on evolutionary principles. Classification of V. M. Zhdanov and S. Ya. Gaidamovich is accepted today in the world. There are some cardinal properties which differ viruses from other organisms and prove that they are not substances but living units: 1) presence of only one of two nucleic acids in the compound of virus, 2) absence of autonomous metabolism and its connection with cell-master's metabolism, 3) absence of cellular structures, 4) disjunctive mode of reproduction. This mode consists of separable synthesis of viral components in a cell with subsequent connection of them into the whole viral particle virion. So far as viruses differ from animals and plants, they are isolated into the independent kingdom Vira (Viruses).

According to two types of genetic substance viruses are divided into the RNA-viruses (viruses containing ribonucleic acid) and DNA-viruses (viruses containing desoxiribonucleic acid). There are 9 families in the DNA-subtype and 12 in the RNA-subtype.

**Morphology.** There are two large groups of viruses, which differ one from another morphologically. The first group includes viruses of simple structure. They consist of only RNA or DNA and protein subunits connected with nucleic acid. Tobacco Mosaic Virus is the most well-known representative of this group. The viruses of the second group consist, at least, of three architectural elements, i.e. a nucleic acid located in the middle of virion, a capsule, and an envelope the latter frequently consists of some smaller elements. It is difficult to tell about virus morphology generally, because every type of virus has too many particular features and differences.

**Chemical Composition.** Simple viruses consist of two substances: ribo- or deoxiribonucleic acid and proteins. Viral proteins do not differ from animal or plant ones neither in architecture nor in aminoacids composition. The viruses of the second group such as Influenza virus have in their composition nucleic acid, proteins, carbohydrates and lipids. Chemical composition of the latter two is similar to the chemical composition of carbohydrates and lipids of the cell master.

## New words and phrases

mosaic-mozayka  
virology-virusologiya  
sarcoma-rak turi  
fowl-qush, tovuq  
transmit-olib uzatmoq  
separable-ajratiladigan  
tumour-shish  
stage-bosqich  
genuine-asl nusxa  
revolution-inqilob  
isolate-ayirmoq  
identify-tanimoq  
impetuous-berilib ketgan, jo'shqin  
investigation-tadqiqot  
ultracentrifugation-ultrasentrifuga  
classification-klassifikatsiya  
evolutionary-evolutsion  
prove-isbotlab bermoq  
absence-yo'qlik  
reproduction-tug'ilish  
separable-ajraladigan  
viral-virusga oid  
subsequent-keyingi, kelgusi  
subtype-kichik til  
morphologically-morfologik  
subunit-pastki qism  
representative-vakil  
frequently-tez-tez  
feature-bo'lak  
composition-kompozitsiya  
similar to-o'xshash  
master-ega, xo'jayin

### **Exercise 2. Answer the questions**

1. Who published an article on the reproduction of tobacco mosaic disease with the

help of an unicellular extract?

2. When Ivanovskiy published an article on the reproduction of tobacco mosaic disease with the help of an unicellular extract?

3. How many groups of viruses are there?

4. How many families are in the DNA-subtype?

5. How many families are in the RNA-subtype?

**Exercise 3. Translate the following sentences and underline terminologies**

1. In 1911 P. Rous discovered that sarcoma of the fowl could be transmitted by an agent separable from the tumour cells. 2. Since that time virology began to develop. 3. Genuine revolution in virology was connected with the introduction of monolayer cell culture method for cultivation of viruses. 4. Modern molecular biology suggested a number of delicate and effective methods both for the isolation and investigation of viruses. 5. In its turn virology gave some original methods for immunology, microbiology and some other sciences. 6. We do not know about origin and evolution of viruses well enough, but every scientific classification is based on evolutionary principles. 7. This mode consists of separable synthesis of viral components in a cell with subsequent connection of them into the whole viral particle virion. 8. Viral proteins do not differ from animal or plant ones neither in architecture nor in aminoacids composition. 9. The viruses of the second group such as Influenza virus have in their composition nucleic acid, proteins, carbohydrates and lipids.

**Exercise 4. Fill in the blanks**

1. In ... the Russian scientist ... published an article on the ... of tobacco ... disease with the help of an ... extract. 2. In 1911 ...discovered that ... of the fowl could be ...by an agent ... from the ... cells. 3. It was the ... large stage in the ... of virology. 4. With the help of this ... of unknown ... were ... and identified. 5. In our days ... took a new ... owing to ... development of ..., ... and other fundamental sciences. 6. They are: electron microscopy, ..., electrophoresis in gels, ... on different ..., .... and many others. 7. In its turn ... gave some original methods for ..., ... and some other sciences. 8. Classification of ... and ... is accepted today in the world. 9. This mode consists of separable ... of viral ... in a cell with subsequent ... of them into the whole viral ... virion. 10. There are 9 families in the ... and 12 in the ....11. They consist of only... or... and protein ... connected with ...acid. 12. The ... of the second group consist, at least, of three ... elements, i.e. ... acid located in the middle of ..., a capsule, and an envelope the latter frequently consists of some smaller elements.

## LESSON 38

**Exercise 1.** *Translate the following text using the dictionary*

### **VIRUSES AND MALIGNANT DISEASES IN ANIMALS AND POULTRY**

About 80 years have passed from the moment of the isolation of a filterable virus by the Russian scientist D. Ivanovsky. Virology as science has made great progress since then. The most important discoveries in this field of science have taken place during last 30-40 years. The most urgent problem which is of great interest both for physicians and veterinary doctors is the problem of studying oncogenic viruses, the causative agents of cancer in animals. Viruses which cause leukemia and sarcoma in poultry have been isolated long ago.

H. Ellermann and T. Bang (1908) isolated the virus in avian leukosis and P. Rous (1911) discovered the causative agent in avian sarcoma. Unfortunately, nobody paid attention to those findings for a long time.

In the thirtieth of the XX century the above mentioned agents were used by medical scientists as models for investigations of some problems of viroil carcinogenesis. Professor L. A. Zilberg is the founder of virus-genetic origin of cancer. But Zilberg's hypothesis had a lot of opponents as the study of oncogenic viruses was not developed to a considerable extent. One of their main arguments was the fact that it was impossible to isolate the virus from a cancerous cell. In connection with the development of oncovirology it was established that the presence of the virus was not obligatory in the cell but its trace might be found there. This fact became evident after the discovery of revertase.

This ferment is always present in the viruses causing leukosis in poultry or mice. Its presence showed a destructive action produced by the virus on the cell genome. In other words the virus affecting the genome of the cell converted it into a cancerous one. And, eventually, the virus might be present in the cell genome in a defective state as a provirus but under certain conditions it could involve the cell mechanism and change the cell into a malignant one. These data brought triumph to the virus-genetic theory of cancer origin. More and more evidence are accumulated in favour of this theory. A large amount of oncogenic viruses, such as: DNK-type and RNK-type have been isolated and investigated. Proper measures of cancer control can be found only in case the cause of the disease is known. Thus, people may hope that the study of virus-genetic theory will help to find in the coming future a magic "bullet" against cancer causing great social and moral damage.

## New words and phrases

filterable-filtrlangan  
oncogenic-ontogenez  
causative-sababli  
loukemiya-lukemiya  
poultry-parrandachilik  
avian-parranda  
unfortunately-baxtga qarshi  
finding-topilma  
mention-eslatib o'tmoq  
carcinogenesis-kanserogenez  
hypothesis-gipotezis  
opponent-raqib  
considerable-yirik  
extent-maydon  
oncovirology-onkovirusologiya  
establish-asos solmoq  
obligatory-soqchilik  
revertase-revertaz  
evident-ayon, shubhasiz  
ferment-bijg'imoq, fermentlamoq  
destructive-buzuvchi  
malignant-xavfli(tanadagi shish, o'smalarga nisbatan)  
accumulate-yig'moq  
favour-yordam-ko'mak  
investigate-o'rganib chiqmoq  
bullet-o'q otmaydigan  
moral-ruhiy

### **Exercise 2. Answer the questions**

1. Who isolated the virus in avian leukosis?
2. Who discovered the causative agent in avian sarcoma?
3. When mentioned agents were used by medical scientists as models for investigations of some problems of viroil carcinogenesis?
4. Who is the founder of virus-genetic origin of cancer?

**Exercise 3. *Translate the following sentences and underline terminologies***

1. The most important discoveries in this field of science have taken place during last 30-40 years. 2. The most urgent problem which is of great interest both for physicians and veterinary doctors is the problem of studying oncogenic viruses, the causative agents of cancer in animals. 3. Viruses which cause leukemia and sarcoma in poultry have been isolated long ago. 4. In the thirtieth of the XX century the above mentioned agents were used by medical scientists as models for investigations of some problems of viroil carcinogenesis. 5. One of their main arguments was the fact that it was impossible to isolate the virus from a cancerous cell. 6. This ferment is always present in the viruses causing leukosis in poultry or mice. 7. Its presence showed a destructive action produced by the virus on the cell genome. 8. A large amount of oncogenic viruses, such as: DNK-type and RNK-type have been isolated and investigated.

**Exercise 4. *Fill in the blanks***

1. About ... years have passed from the moment of the ... of a filterable virus by the ... scientist D. Ivanovsky. 2. ... as science has made great ... since then. 3. ... and T. Bang (1908) isolated the virus in avian leukosis and ... (1911) discovered the causative agent in avian sarcoma. 4. In the thirtieth of the... century the above mentioned agents were used by ... scientists as models for ... of some problems of ... carcinogenesis. 5. Professor ... is the founder of ... origin of cancer. 6. This ... is always present in the ... causing ... in poultry or mice. 7. And, eventually, the ... might be present in the cell ... in a defective state as a provirus but under certain ... it could involve the cell ...and change the cell into a ...one. 8. A large amount of ... viruses, such as: ... and ... have been isolated and investigated. 9. Thus, people may hope that the study of ... theory will help to find in the coming future a magic "...” against ... causing great ... and ... damage.

**LESSON 39**

**Exercise 1. *Translate the following text using the dictionary***

**THE SKELETON**

The skeleton is composed of a varying number of bones in the different animals, and it varies even among individuals of the same species and breed. These variations are due to age in some cases, the younger animals have certain bones separate that fuse together later; while in the tails of all animals the number of bones is likely to differ according to the varying length of that structure in animals of the same breed and size. The skeleton is divided into: 1) an axial part, consisting of the



skull, the vertebral, the ribs with their cartilages, and the sternum or breastbone; and 2) an appendicular portion, consisting of the four limbs. In addition to these divisions, certain parts of the skeleton are embedded in the substance of organs, and are described as the visceral skeleton, e.g. the bones in the tongue, that in the heart of the ox, the snout of the pig, etc.

**Skeleton of the Ox**— The skull is remarkable from the fact that in the horned breeds the frontal bone carries variously shaped horn cores, and also because upper incisor teeth are absent from the incisive bone. The vertebral column differs from that of the horse in that 1) the bones of the neck are shorter and smaller; 2) the thoracic vertebrae are larger but fewer, there being only 12; 3) the number is the same, i.e. 6; 4) the sacrum possesses the same number of bones, but they are longer and more completely fused; and 5) the coccygeal vertebrae are longer and better developed and number from 16 to 21. The ribs are 13 in number; each is broader, longer, less curved, and less regular than in horse. The first 8 are sternal and the last 5 nonsternal. The sternum is longer in the horse. The fore-limb presents a number of small and comparatively unimportant differences in the scapular and humeral regions. In this part the shaft of the ulna is much more developed. It is still, however, almost completely fused to the shaft of the radius except for two small areas where fusion does not occur. The carpus consists of 6 bones, 4 in the upper row and 2 in the lower. The metacarpal region differs in that there are two large metacarpals completely fused together except at their lower ends, and a small metacarpal lying on the outside of the limb and only about 1.5 inches in length. The lower extremity of the fused metacarpal is split into two parts, each of which meets the phalanx corresponding to it at the fetlock joint. There are 4 digits present in the ox, but only the two central ones are at all well developed, the outer ones being very rudimentary and not attached to the rest of the skeleton. Each of the large digits has 3 phalanges which form the skeleton of the 'toes' of the ox. The third or lowermost in each case closely corresponds in shape to the outline of the claw. The pelvis as a whole is large and rough. The inlet is more elliptical, its dimensions being about 9.5 inches by 7 inches in average-sized cow. The femur has a small shaft and a small head, and it does not possess so many muscular irregularities. The tibia and fibula are somewhat like the same bones in the horse. The shaft of the fibula is not developed in bone, but it can usually be distinguished as a fibrous or cartilaginous cord running between the two extremities, which are laid down in bone. The bones of the tarsus or hock number 5, fusion having taken place between two pairs. Below the hock the hind limb is similar to the forelimb.

## New words and phrases

compose-yozmoq

vary-turli, xil

due to-...ga ko'ra

separate-ajratmoq

brees-urchitmoq

vertebral-umurtqali

breastbone-ko'krak qafasi

appendicular-appendikulyar

limb-shoh-shabba

shout-tumshuq

remarkable-ajoyib

frontal-old tarafdan

column-ustun

nonsternal-noodatiy

scapular-ko'krak suyagi

ulna-tirsak suyagi

metacarpal-metakarpal

fetlock-homiladorlik

rudimentary-elementar

correspond-mos kelmoq

pelvis-tos suyagi

digit-barmoq

rough-g'adur-budur

fibrous-tolali

externity-nihoya

distinguish-farqiga bormoq

forelimb-oldingi

### **Exercise 2. Answer the questions**

1. Say about the skeleton.
2. Explain, the vertebral column differs from the horse.
3. What is the carpus?
4. How many groups are in the lower extremity of the fused metacarpal?
5. Discribe the skeleton of the ox.

**Exercise 3. *Translate the following sentences and underline terminologies***

1. The skull is remarkable from the fact that in the horned breeds the frontal bone carries variously shaped horn cores, and also because upper incisor teeth are absent from the incisive bone. 2. . The ribs are 13 in number; each is broader, longer, less curved, and less regular than in horse. 3. The fore-limb presents a number of small and comparatively unimportant differences in the scapular and humeral regions. 4. It is still, however, almost completely fused to the shaft of the radius except for two small areas where fusion does not occur. 5. The metacarpal region differs in that there are two large metacarpals completely fused together except at their lower ends, and a small metacarpal lying on the outside of the limb and only about 1.5 inches in length. 6. There are 4 digits present in the ox, but only the two central ones are at all well developed, the outer ones being very rudimentary and not attached to the rest of the skeleton. 7. The shaft of the fibula is not developed in bone, but it can usually be distinguished as a fibrous or cartilaginous cord running between the two extremities, which are laid down in bone. 8. The bones of the tarsus or hock number 5, fusion having taken place between two pairs.

**Exercise 4. *Fill in the blanks***

1. The ... is composed of a varying number of bones in the different ..., and it varies even among ... of the same ... and breed. 2. The ... is divided into: 1) an axial part, consisting of the skull, the vertebral, the ribs with their ..., and the sternum or ...; and 2) an ... portion, consisting of the ... limbs. 3. In addition to these ..., certain parts of the ... are embedded in the ... of organs, and are described as the ... skeleton, e.g. the ...in the tongue, that in the heart of the .., the snout of the pig, etc. 4. The ...is remarkable from the ... that in the horned ... the frontal bone carries ... shaped horn cores, and also because upper ... teeth are absent from the ... bone. 5. The ribs are 13 in number; each is ..., longer, less ..., and less ... than in horse. 6. The carpus consists of ..., 4 in the upper row and... in the lower. 7. The inlet is more elliptical, its dimensions being about 9.5 inches by 7 inches in average-sized cow.8. The third or ... in each case closely ... in shape to the ... of the claw. 9. The ... of the tarsus or hock number ..., fusion having taken place between ... pairs. Below the ... the hind limb is ... to the forelimb. 10. The shaft of the ... is not developed in bone, but it can usually be distinguished as a fibrous or ... cord running between the two ..., which are laid down in bone.

## LESSON 40

### Exercise 1. *Translate the following text using the dictionary*

#### THE SKIN

The skin covers the surface of the body and consists of two main layers, the surface epithelium or epidermis and the subjacent, connective tissue layer — the corium or derma. Beneath the latter is a loose connective tissue layer, the superficial fascia or hypodermis, which in many places is transformed into subcutaneous fatty tissue. The hypodermis is connected with underlying deep fasciae, aponeuroses or periosteum.

The skin is continuous with several mucous membranes through mucocutaneous junctions, the most important of which are the vermilion border of the lip, the vulva and the anus. The skin protects the organism from injurious external influences, receives sensory impulses from the outside, excretes various substances and, in warm-blooded animals, helps to regulate the temperature of the body. The skin is provided with hairs, nails, and glands of various kinds.

There is a sharp boundary between the epithelial and the connective tissue portions of the skin, but not between the derma and the hypodermis; here the fibers of one layer pass directly over into the other. In most of the skin of the body the outer portion of the derma is provided with a series of irregular ridges called papillae; into the spaces between them the lower layers of the epidermis intrude.

The epidermis is a stratified squamous epithelium, the external layer of which hornifies. It is moistened by water only with difficulty and prevents the underlying tissues from drying; it thus serves as a protective layer.

Two layers are always present - the stratum Malpighian and the stratum corneum. The granular layer usually consists of but one layer of cells. Its frequent absence depends on the fact that the transformation of cells of the malpighian layer into those of the corneum does not proceed continuously, but occurs from time to time at different places. In contrast to what happens in the palms and soles, the epidermal cells in the other portions of the surface of the body become thin plates of keratin welded so closely together that they are hard to isolate.

The epidermis, entirely devoid of blood vessels, is nourished by the tissue fluid which penetrates the intercellular spaces of the malpighian layer from capillaries in the underlying connective tissue.

## New words and phrases

epidermis-epidermis  
derma-derma  
superficial-sayoz, yuzaki  
fascia-priborlar doskasi  
hypodermic-teri osti  
transform into-tubdan o'zgarmoq  
anus-anal teshigi  
boundary-chegara chizig'i  
squamous-dag'al  
stratify-tabaqalashtirmoq  
hornify-shoxlamoq  
thus-shuning uchun  
protective-himoyalovchi  
devoid-mahrum etilgan  
nourish-boqmoq  
penetrate –ichiga kirmoq, teshib o'tmoq

### **Exercise 2. Answer the questions**

1. What is the functions of the skin?
2. Explain the functions of epidermis.
3. What is papillae?
4. Which layers do you know from the text?

### **Exercise 3. Translate the following sentences and underline terminologies**

1. Beneath the latter is a loose connective tissue layer, the superficial fascia or hypodermis, which in many places is transformed into subcutaneous fatty tissue. 2. The hypodermis is connected with underlying deep fasciae, aponeuroses or periosteum. 3. The skin protects the organism from injurious external influences, receives sensory impulses from the outside, excretes various substances and, in warm-blooded animals, helps to regulate the temperature of the body. 4. The skin protects the organism from injurious external influences, receives sensory impulses from the outside, excretes various substances and, in warm-blooded animals, helps to regulate the temperature of the body. 5. There is a sharp boundary between the epithelial and the connective tissue portions of the skin, but not between the derma and the hypodermis; here the fibers of one layer pass directly over into the other. 6. The epidermis is a stratified squamous epithelium, the external layer of which hornifies. 7.

Two layers are always present—the stratum Malpighian and the stratum corneum. 8. In contrast to what happens in the palms and soles, the epidermal cells in the other portions of the surface of the body become thin plates of keratin welded so closely together that they are hard to isolate.

#### **Exercise 4. Fill in the blanks**

1. The ... covers the surface of the ... and consists of two main layers, the surface epithelium or ... and the subjacent, connective ... layer — the corium or derma. 2. The ... is continuous with several ... membranes through ... junctions, the most important of which are the ... border of the lip, the vulva and the anus. 3. The skin ... the organism from ... external influences, receives sensory ... from the outside, excretes ... substances and, in ... animals, helps to regulate the ... of the body. 4. There is a sharp ... between the ... and the connective ... portions of the skin, but not between the ... and the hypodermis; here the fibers of one layer pass ... over into the other. 5. The ... is a stratified ... epithelium, the external ... of which hornifies. 6. The ... layer usually consists of but one ... of cells. 7. Its frequent ... depends on the fact that the transformation of ... of the malpigh- ian layer into those of the ... does not ... continuously, but ... from time to time at different places. 8. In contrast to what happens in the ... and soles, the ... cells in the other ... of the surface of the body become thin ... of ... welded so closely ... that they are hard to isolate.

### **LESSON 41**

#### **Exercise 1. Translate the following text using the dictionary**

##### **THE DERMA**

The thickness of the derma cannot be measured exactly, because it passes over directly into the subcutaneous layer. The average thickness is approximately 1 to 2 mm; it is less on the eyelids and the prepuce (up to 0.6 mm), but reaches a thickness of 3 mm or more on the soles and palms. On the ventral surface of the body and on the underside of the appendages it is generally thinner than on the dorsal and upper sides.

The surface of the derma fused with the epidermis is usually uneven and covered with projecting ridges and papillae. This surface of the derma is soft and is called the papillary layer. The main dense portion of the derma is called the reticular layer. The two layers cannot be clearly separated.

The reticular layer consists of bundles of collagenous fibers which form a dense feltwork; the bundles run in various directions, but mainly more or less parallel to the

surface; less frequently, approximately perpendicular bundles are found. In the papillary layer and its papillae the collagenous bundles are much thinner and more loosely arranged.

The elastic fibers of the derma form abundant, thick networks between the collagenous bundles and are condensed about the hair follicles and the sweat and sebaceous glands. In the papillary layer they are much thinner and form a continuous fine network under the epithelium in the papillae. In the cheeks, however, the elastic network immediately under the epithelium is particularly dense. The cells of the derma are the same as those of the subcutaneous layer and are more abundant in the papillary than in the reticular layer.

Hypodermis. —The subcutaneous layer consists of loose connective tissue and is a continuation of the derma. Its collagenous and a few elastic fibers pass directly into those of the derma and run in all directions, mainly parallel to the surface of the skin. Where the skin is flexible, the fibers are few; where it is closely attached to the underlying parts, as on the soles and palms, they are thick and numerous. Depending on the portion of the body and the nutrition of the organism, varying numbers of fat cells develop in the subcutaneous layer. These are also found in groups in the deep layers of the derma. The fatty tissue of the subcutaneous layer on the abdomen may reach a thickness of 3 cm or more, while in the eyelids and penis the subcutaneous layer never contains fat cells.

The subcutaneous layer is penetrated everywhere by large blood vessels and nerve trunks and contains many nerve endings.

#### **New words and phrases**

thickness-quyuqlik

prepuce-oldinga surmoq

eyelid-qovoq

appendage-qo'shimcha qism

underside-pastki qismida

generally-odatda, umuman olganda

upper-yuqori

uneven-notekis, noraso

ridge-qirra

reticular-retikulyar

bundle-dasta, tutam

collageneous-kollagenli

fiber-tola  
feltwork-kigizdan ishlangan buyum  
elastic-elastik  
condense-suyuq holatga kelgan  
follicle-follikul  
sweat-ter bosmoq  
sebaceous-yog'li  
continuation-davomi  
abdomen-qorin  
trunk-daraxt(inson) tanasi

**Exercise 2. Answer the questions**

1. What is the hypodermis?
2. What are the functions of the derma?
3. Which thing consists of bundles of collagenous fibers which form a dense feltwork?
4. What are condensed about the hair follicles and the sweat and sebaceous glands?

**Exercise 3. Translate the following sentences and underline terminologies**

1. The thickness of the derma cannot be measured exactly, because it passes over directly into the subcutaneous layer. 2. On the ventral surface of the body and on the underside of the appendages it is generally thinner than on the dorsal and upper sides. 3. This surface of the derma is soft and is called the papillary layer. 4. The main dense portion of the derma is called the reticular layer. 5. The two layers cannot be clearly separated. 6. In the papillary layer and its papillae the collagenous bundles are much thinner and more loosely arranged. 7. The elastic fibers of the derma form abundant, thick networks between the collagenous bundles and are condensed about the hair follicles and the sweat and sebaceous glands. 8. The cells of the derma are the same as those of the subcutaneous layer and are more abundant in the papillary than in the reticular layer. 9. The subcutaneous layer consists of loose connective tissue and is a continuation of the derma. 10. Depending on the portion of the body and the nutrition of the organism, varying numbers of fat cells develop in the subcutaneous layer.

**Exercise 4. Fill in the blanks**

1. The average ... is approximately ... to ... mm; it is less on the eyelids and the prepuce (up to 0.6 mm), but reaches a thickness of ... mm or more on the ... and ....
2. This surface of the ... is soft and is called the ... layer. 3. The main dense ... of the ... is called the ... layer. 4. The two ... cannot be ... separated. 5. On the ventral ... of



the body and on the ... of the appendages it is ... thinner than on the ...and upper sides. 6. The reticular ... consists of bundles of ... fibers which form a dense ...; the ... run in various directions, but mainly more or less ... to the surface; less frequently, ... perpendicular ... are found. 7. In the papillary layer and its ... the ... bundles are much ... and more loosely arranged. 8. In the ... layer they are much ... and form ... fine network under the ... in the papillae. In the ..., however, the elastic network ... under the ... is particularly dense. 9. Where the ... is flexible, the ... are few; where it is closely attached to the ... parts, as on the soles and ..., they are thick and numerous. 10. The fatty ... of the subcutaneous layer on the ... may reach a thickness of ... or more, while in the ... and penis the ... layer never contains ... cells.

## **LESSON 42**

**Exercise 1. *Translate the following text using the dictionary***

### **THE LIVER**

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 remodelling.

**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 gray, 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 duct 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 coloured 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. 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 centre of the lobule in its long axis, is the central vein, while at the periphery are the branches of the portal vein (introlobular vein), the interlobular bile ducts, branches of the hepatic artery, and the lymphatics which form a network about the portal vein and its branches.

### **New words and phrases**

liver- jigar

indispensable-ajralmas

elaborate-mufassal

bile-o't, safro

cavity-kovak

intestine-ichak

outline-shakl, ko'rinish

indistinct-noaniq

partition-bo'lim, bo'lma, katak

contrary-boshqacha, teskari

lobulation-lobulatsiya

remain-qolmoq

honeycomb-asalari ini

impression-taassurot

distort-o'zgartirmoq

pancreatic-oshqozon osti bezi

glandular-bezli

drain-quritmoq

vein-vena tomiri

periportal-perifortal  
extend to-uzaytirmoq  
predominantly-asosan  
cross-section-oraliq bo'lim  
lymphatic-limfa  
artery-arteriya  
axis-o'q

**Exercise 2. Answer the questions**

1. Say about the liver's functions.
2. How is made up the mammalian liver?
3. What is the lobulation?
4. What is the bile excretory function of the liver?

**Exercise 3. Translate the following sentences and underline terminologies**

1. It occupies the upper right quadrant of the abdominal cavity, a part of its surface being attached to the diaphragm. 2. In the lower vertebrates this condition remains throughout life, but in the mammals the original architecture undergoes a complete remodelling. 3. The mammalian liver is made up of polygonal prisms, each representing an architectural unit or lobule, 0.7 to 2 mm in diameter. 4. The periphery of each lobule is translucent and gray, while its center is brown. 5. 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. 6. In the salivary and pancreatic glands each lobule represents a mass of glandular tissue drained by a duct of a certain order and size. 7. This is clearly seen in microscopic sections of a liver whose blood vessels have been injected with coloured masses. 8. The liver lobule has also been described as the amount of liver tissue which surrounds and is drained by the smallest interlobular bile ducts. 9. This theory considers only the bile excretory function of the liver and overlooks entirely the fact that the liver is predominantly an endocrine gland. 10. 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.

**Exercise 4. Fill in the blanks**

1. The ... plays an indispensable part in the ... of the body, and elaborates bile. It is the largest ... of the organism. 2. It occupies the upper right ... of the ... cavity, a part of its ... being attached to the diaphragm. 3. The ... liver is made up of ... prisms, each ... an ... unit or lobule, ... to ... mm in diameter. 4. In the pig, on the contrary,

each lobule is ... surrounded by a layer of connective ..., and the ... is obvious. 5. When a freshly ... surface of such a ... is scraped with a knife, the soft ... is squeezed out of the ... and the remaining ... give the impression of a ...structure. 6. In cirrhosis of the... in man, the connective tissue is greatly ... and the ... completely distorted. 7. According to this idea, the center of the ... lobule would be the ... in the ... areas, and the lobule would extend into the ... of the several ...anatomical lobules. 8. It also ... the structure of this ... as seen in such species as the .., in which the liver ... is demarcated by a ...connective tissue layer. 9. This theory considers only the bile ... function of the ... and overlooks entirely the ... that the liver is ... an endocrine gland. 10. Running through the centre of the ... in its long axis, is the central vein, while at the ... are the branches of the ... (introlobular vein), the interlobular bile ducts, ... of the hepatic artery, and the ... which form a ... about the ...vein and its branches.

## **LESSON 43**

### **Exercise 1. *Translate the following text using the dictionary***

#### **HEPATIC SINUSOIDS**

The plates of liver cells are separated from one another by the sinusoids of the liver. These are irregular tortuous blood spaces which pursue a radial course in the lobule and connect the ends of the interlobular portal veins with the intralobular central veins. They also receive blood from the branches of the hepatic artery. Although the direct connections of the sinusoids with both interlobular and intralobular (central) veins can be traced in sections, the connection between the hepatic artery and the sinusoids can be seen only in injection preparations and in the living animal. The finest branches of the hepatic artery empty into the sinusoids at the periphery of the lobule. The contraction or dilatation of these vessels determines the amount of arterial blood reaching a sinusoid at any given time.

The sinusoids must be distinguished from capillaries. As seen in living animals, the lining of the hepatic sinusoids appears as continuous refractile line. As seen in sections, the lining is composed of an irregular alternation of two kinds of cells connected by many intermediate forms. One of these, the undifferentiated lining cell, has a small dark nucleus so compact that practically no structural details can be made out within it. Its cytoplasm extends as a thin film along the sinusoid. The other lining cells are fixed macrophages the phagocytic stellate cells of von Kupffer. They are distinctly larger than the cell type just described. In sections their cytoplasm often

extends into well-defined processes, and one often gets the impression that these cells project into the lumen. They have large oval nuclei with a small, prominent nucleolus. Frequently these cells contain granules of green waste pigment, or engulfed erythrocytes in various stages of disintegration, and iron-containing granules. In animals vitally stained with lithium carmine or trypan blue they store large amounts of these dyes in granular form.

The undifferentiated lining cells of the first type do not store vital dyes. When, however, finely divided particulate matter such as Higgins' India ink is injected intravenously, the relatively large carbon particles are deposited in the Kupffer cells and in the indifferent lining cells of the liver sinusoids. The Kupffer cells take up more of the ink. Numerous transitional forms connect the two cell types. The more vital dye introduced, the more numerous and larger are the phagocytes. The increase is thought to be due to mobilization of the undifferentiated lining cells. Smooth muscle cells have been described at the junction of the sinusoids with the central veins. Marked changes occur continuously in the caliber of the sinusoids and in the rate of flow of blood through them. For the frog these changes have been explained as resulting from the activity of sphincters controlling the inflow and outflow of the blood of the sinusoids. This mechanism permits the storage and release of blood from the liver.

### **New words and phrases**

radia-radiatsiya

pursue-ketidan quvmoq

trace-alomat

distinguish-farqlamoq

refractile-singan

alternation-ketma-ketlik

structural-strukturaviy

define-ta'riflamoq, aniqlamoq

pigment-pigment, dog'

disintegration-parchalanish

lithium-litiy

vitaly-serg'ayrat

motilization-safarbar qilish

outflow-oqib o'tish

permit-izn so'ramoq

release-ozod qilmoq

inflow-oqib kelish

**Exercise 2. Answer the questions**

1. What is the functions of interloblar portal veins?
2. Say about sinusoids.
3. Which cells are fixed macrophagesthe phagocytic stellate cells of von Kupffer?
4. What from sinusoids must be distinguished?

**Exercise 3. Translate the following sentences and underline terminologies**

1. The plates of liver cells are separated from one another by the sinusoids of the liver. 2. They also receive blood from the branches of the hepatic artery. 3. Although the direct connections of the sinusoids with both interlobular and intralobular (central) veins can be traced in sections, the connection between the hepatic artery and the sinusoids can be seen only in injection preparations and in the living animal. 4. The finest branches of the hepatic artery empty into the sinusoids at the periphery of the lobule. 5. The contraction or dilatation of these vessels determines the amount of arterial blood reaching a sinusoid at any given time. 6. As seen in living animals, the lining of the hepatic sinusoids appears as continuous refractile line. 7. One of these, the undifferentiated lining cell, has a small dark nucleus so compact that practically no structural details can be made out within it. 8. In sections their cytoplasm often extends into well-defined processes, and one often gets the impression that these cells project into the lumen. 9. The more vital dye introduced, the more numerous and larger are the phagocytes. 10. The increase is thought to be due to mobilization of the undifferentiated lining cells. 11. For the frog these changes have been explained as resulting from the activity of sphincters controlling the inflow and outflow of the blood of the sinusoids.

**Exercise 4. Fill in the blanks**

1. They also receive ... from the branches of the ... artery. 2. The finest ... of the hepatic ... empty into the ... at the ... of the lobule. 3. As seen in sections, the ... is composed of an irregular ... of two kinds of cells connected by many ... forms. 4. The ... lining cells of the ... type do not store ... dyes. 5. The ... cells take up more of the ... 6. Numerous ... forms connect the ... types. 7. The ... is thought to be due ... of the ... lining cells. 8. . Marked changes occur ... in the caliber of the ... and in the rate of flow of ... through them. 9. One of these, the undifferentiated lining cell, has a small dark nucleus so compact that practically no structural details can be made out

within it. 10. For the ... these changes have been explained as ... from the activity of ... controlling the inflow and ... of the ... of the sinusoids. 11. This ... permits the ... and release of ... from the liver.

## **LESSON 44**

**Exercise 1.** *Translate the following text using the dictionary*

### **THE LIVER FUNCTIONS**

One of the most important functions of the liver is the formation of glycogen. It increases in the liver after meals and decreases during fasting, and may even disappear completely. It is present in submicro-scopic particles; the granular appearance in sections is due to the fixation. When stored in increasing amounts in the liver cells, it is seen at first in those around the central vein; when sufficient carbohydrate food is eaten, all the liver cells may take up glycogen. The liver gives up its glycogen in the reverse order; that is, the cells at the periphery of the lobule are the first to lose it. It is claimed that in mice the first site of deposition and removal of glycogen is about the central vein. Another important function of the liver is the formation of urea by deamination of arginine.

The liver cells contain much fat, but an estimate of the amount present cannot be determined by staining methods, for a good deal of it may be present in a masked form in the liver. Under some pathological conditions the liver cells may take up so much fat that most of the other constituents of their protoplasm are obscured.

Bile, the external secretion, is apparently elaborated continuously. It contains water, bile pigments, bile acids, cholesterol, lecithin, neutral fats and soaps, inorganic salts and traces of urea. The bile receives, from the epithelium of the bile ducts and possibly from the neck of the gallbladder, a mucinous nucleo-albumin. Bile pigment (from breakdown erythrocytes) is formed outside the liver cells. The bile acids are formed in the liver cells, for, if the liver is extirpated, no trace of bile acids can be found in the blood or urine. It is probable that cholesterol is not formed in the liver. When the excretion of bile is interrupted by mechanical obstruction of the bile ducts, bile continues to be formed and is absorbed from the liver at first through the lymphatics and later also by the blood vessels of the liver. When bile pigment reaches a concentration in the blood and tissues sufficient to stain the entire body yellow, the condition is known as jaundice. It may also be produced through the action of certain blood-destroying agents. Occlusion of the common bile duct causes a great disturbance in the digestion and absorption of fats, owing to the absence of bile acids

from the intestine. After certain dyes are introduced into the organism, they may be found in the bile. If a bit of liver be teased at an appropriate time after the injection of sodium sul- findigotate, the bile capillaries will be beautifully demonstrated.

### **New words and phrases**

glycogen-glikogen  
to fast-biriktirilgan  
submicro-submikro  
scopic-skopik  
fixation-ishqiboqlik  
deamination-zararsizlantirish  
Estimate-mo'ljal, taxmin  
constituent-hosil bo'lmoq  
lecithin-lesitsin  
inorganic-anorganik  
gallbladder-o't pufagi  
extirpate-tugatmoq  
urine-peshob, siydik  
cholesterol-xolestrol  
absorption-fikrini qamrab olish

### **Exercise 2. Answer the questions**

1. What is one of the most important functions of the liver?
2. How formates urea?
3. What is a bile?
4. Explain the process which happens in the liver.

### **Exercise 3. Translate the following sentences and underline terminologies**

1. It increases in the liver after meals and decreases during fasting, and may even disappear completely. 2. When stored in increasing amounts in the liver cells, it is seen at first in those around the central vein; when sufficient carbohydrate food is eaten, all the liver cells may take up glycogen. 3. The liver gives up its glycogen in the reverse order; that is, the cells at the periphery of the lobule are the first to lose it. 4. The liver cells contain much fat, but an estimate of the amount present cannot be determined by staining methods, for a good deal of it may be present in a masked form in the liver. 5. Bile, the external secretion, is apparently elaborated continuously. It contains water, bile pigments, bile acids, cholesterol, lecithin, neutral fats and



soaps, inorganic salts and traces of urea. 6. When the excretion of bile is interrupted by mechanical obstruction of the bile ducts, bile continues to be formed and is absorbed from the liver at first through the lymphatics and later also by the blood vessels of the liver. 7. It may also be produced through the action of certain blood-destroying agents. 8. Occlusion of the common bile duct causes a great disturbance in the digestion and absorption of fats, owing to the absence of bile acids from the intestine.

#### **Exercise 4. Fill in the blanks**

1. One of the most important ... of the liver is the ... of glycogen. 2. It increases in the ... after meals and decreases during fasting, and may even disappear completely. 3. The ... gives up its ... in the reverse order; that is, the ... at the ... of the lobule are the ... to lose it. 4. Another ... function of the ... is the ... of urea by ... of arginine. 5. Under some ... conditions the liver ... may take up so much fat that most of the other ... of their ... are obscured. 6. The bile receives, from the ... of the bile ducts and ... from the neck of the ..., a mucinous nucleo-albumin. 7. Bile ... (from breakdown erythrocytes) is ... outside the ... cells. 8. When the ... of bile is interrupted by mechanical ... of the bile ducts, ... continues to be formed and is ... from the liver at first through the ... and later also by the ... vessels of the liver. 9. It may also be ... through the ... of certain ... agents. 10. Occlusion of the common ... duct causes a great ... in the digestion and ... of fats, owing to the ... of bile acids from the intestine.

### **LESSON 45**

#### **Exercise 1. Translate the following text using the dictionary**

#### **THE GALLBLADDER**

The gallbladder is a pear-shaped, hollow viscus closely attached to the posterior surface of the liver. It consists of a blindly ending fundus, a body, and a neck which continues into the cystic duct. Normally it measures approximately 10 by 4 cm in adult man and has a capacity in most animals of 1 to 2 cc per kilogram of body weight. It shows marked variations in shape and size, and is frequently the seat of pathological processes which change its size and the thickness of its wall. The mucosa is easily destroyed, so that in most specimens removed even a short time after death, large areas of epithelium are found to be desquamated or disintegrating. The wall consists of the following layers: a mucous layer consisting of a surface epithelium and lamina propria, a layer of smooth muscles, a perimuscular connective tissue layer, a serous layer, covering a part of the organ. The mucous layer is thrown into frequent

folds. The major folds are subdivided by many smaller folds; they are easily seen in the contracted or even partially distended organ. But when the viscus is greatly distended, its wall becomes much thinner and most of the folds disappear, although some of them can always be seen.

The epithelium consists of tall columnar cells with oval nuclei, containing a few scattered chromatin granules, toward the base of the cell. The cytoplasm stains faintly with eosin. A typical striated border is lacking here, although fine cilia-like processes have been seen with phase contrast microscopy. Occasionally, neutral fat and other lipids may be demonstrated in the cell bodies. Mitochondria occurs in two zones of these cells as in the epithelium of the bile ducts. Goblet cells do not occur. Except in the neck of the viscus, there are no glands in its mucosa. In the lamina propria and in the perimuscular layer near the neck of the gallbladder are simple tubulo-alveolar glands. Their epithelium is cuboidal and clear, and the dark nuclei are compressed at the base of the cell. They thus stand out sharply against the darker, tall columnar epithelium of the gallbladder. These glands are said to secrete mucus. The next layer of the wall is composed of an irregular network of longitudinal, transverse, and oblique smooth muscle fibers, accompanied by a network of elastic fibers. The spaces between the bundles of muscles are occupied by collagenous, reticular and some elastic fibers, with a sprinkling of fibroblasts. The blood vessels and lymphatics contained in the perimuscular layer send branches into and through the muscular layer to the mucosa.

Under the muscular layer is a fairly dense connective tissue layer which completely surrounds the gallbladder and is in places continuous with the interlobular connective tissue of the liver. It contains many collagenous and a few elastic fibers and scattered fibroblasts with a few macrophages and lymphoid wandering cells, small lobules of fat cells, and the blood vessels, nerves and lymphatics supplying the organ. Not infrequently, particularly in the hepatic surface and near the neck, are peculiar, duct like, structures. They may be traced for considerable distances in this connective tissue layer, and some of them connect with the bile ducts. They are never connected with the lumen of the gallbladder, and are probably aberrant bile ducts laid down during the embryonic development of the biliary system. They have been called "true" Luschka ducts to distinguish them from epithelial outpouchings of the mucosa.

The portion of the gallbladder not attached to the liver is covered with the peritoneum. Through it the ramifying arteries, veins and lymphatics can be seen with the unaided eye. This serosal layer is continuous with that covering the liver. The

gallbladder at its neck continues into the cystic duct. The wall of the latter is thrown into prominent folds which constitute the spiral valve of Heister. These are said to contain smooth muscle bundles, and are thought to prevent distention or collapse of the cystic duct when the latter is subjected to sudden pressure.

### **New words and phrases**

posterior-orqa

blindly-ko'r

cystic-kista

disintegrate-parchalamoq

subdivide-bo'lmoq

scatter-har tomonga qochmoq, tarqatib yubormoq

striate-ko'chirish

phase-faza

oblique-noaniq, tushunarsiz

bundle-bog'lam, dasta

fairly-yetarli, yaxshigina

macrophage-makrofag

biliory-safro

embryonic-embrion

outpouch-quti

unaided- ko'makka muhtoj

serosal-seroz

prominent-mashhur, taniqli

distention-uzoqlashish

### **Exercise 2. Answer the questions**

1. What is a gallbladder?
2. How long normally measures the gallbladder?
3. What does epithelium consists of?
4. What is a perimuscular layer?
5. Say about serosal layer?

### **Exercise 3. Translate the following sentences and underline terminologies**

1. Normally it measures approximately 10 by 4 cm in adult man and has a capacity in most animals of 1 to 2 cc per kilogram of body weight. 2. It shows marked variations in shape and size, and is frequently the seat of pathological processes which change

its size and the thickness of its wall. 3. The wall consists of the following layers: a mucous layer consisting of a surface epithelium and lamina propria, a layer of smooth muscles, a perimuscular connective tissue layer, a serous layer, covering a part of the organ. 4. But when the viscus is greatly distended, its wall becomes much thinner and most of the folds disappear, although some of them can always be seen. 5. The epithelium consists of tall columnar cells with oval nuclei, containing a few scattered chromatin granules, toward the base of the cell. 6. The cytoplasm stains faintly with eosin. 7. Occasionally, neutral fat and other lipids may be demonstrated in the cell bodies. 8. Mitochondria occurs in two zones of these cells as in the epithelium of the bile ducts. 9. They are never connected with the lumen of the gallbladder, and are probably aberrant bile ducts laid down during the embryonic development of the biliary system. 10. The gallbladder at its neck continues into the cystic duct.

#### **Exercise 4. Fill in the blanks**

1. The ... is a pear-shaped, hollow ... closely attached to the posterior ... of the liver. 2. It consists of ... ending fundus, a body, and ... which ... into the cystic duct. 3. It shows marked ... in ... and ..., and is frequently the seat of ... processes which change its ... and the ... of its wall. 4. The wall ... of the following layers: ... layer consisting of a surface ... and ... propria, a layer of ... muscles, ... connective tissue layer, ... layer, ... a part of the organ. 6. But when the ... is greatly distended, its wall ... much ... and most of the folds ..., although some of them can ... be seen. 7. The ... consists of tall ... cells with oval nuclei, ... a few scattered ... granules, toward the ... of the cell. 8. A ... striated border is ... here, although fine ... processes have been seen with phase ... microscopy. 9. Mitochondria ... in two ... of these cells as in the ... of the ... ducts. 10. These are said ... smooth muscle bundles, and are ... to prevent ... or collapse of the ... duct when the latter is ... to sudden pressure. 11. They are ... connected with the lumen of the ..., and are probably ... bile ducts laid down during the ... development of the ... system. 12. The ... consists of tall ... cells with oval nuclei, ... a few scattered ... granules, toward the ... of the cell.

## **LESSON 46**

### **Exercise 1. Translate the following text using the dictionary**

#### **BLOOD CELLS, PLASMA, AND SERUM**

Blood is composed of a fluid part termed plasma and corpuscles or cells which float in the plasma. Three classes of blood cells are recognized: erythrocytes or red cells, leukocytes or white cells, and thrombocytes or platelets. The red colour of blood

is due to the erythrocytes and not to the plasma, for the latter is yellow to colourless, depending on the quantity examined and the species. In any animal, plasma is colourless when examined in thin layers. In some species it is colourless or only slightly yellow even when seen in large quantities; this applies to the cat, dog, sheep, and goat. In the cow and especially in the horse the plasma has a higher colour. The yellow colour of plasma is due chiefly to bilirubin, although carotene and other pigments are contributing factors.

The icterus index is a measure of the yellow colour in blood plasma. The index is determined by comparing the colour of plasma with that of standard solutions of potassium dichromate. Since the yellow colour of plasma is due chiefly to bilirubin, the icterus index is generally a measure of the concentration of this pigment in plasma. However, in horses and cattle, in which species the colour of the plasma is influenced by other pigments, the test may be of limited value.

Coagulation is a characteristic process that occurs in shed blood. Following coagulation, the blood clot usually shrinks, thereby squeezing out a clear, watery liquid termed serum. This substance may be defined as the fluid part of blood after clotting has occurred, whereas plasma is the fluid part before clotting has occurred.

ERYTHROCYTES-Mammalian red cells are nonnucleated. In the blood stream they are believed to exist normally as biconcave circular discs. The red corpuscles of most animals below the mammals are elliptical in shape and possess nuclei. When placed in a very weak salt solution, erythrocytes lose their biconcave shape, tending to become spherical; when placed in a strong salt solution, they become shrunken and crenated. The state of knowledge of the minute structure of the erythrocyte is still unsettled. Some regard the corpuscle as consisting of a spongelike stroma with hemoglobin deposited in its interstices. Others believe that the corpuscle is of the nature of a vesicle, whose membrane surrounds a mass of contents in a fluid condition. Still others adopt a somewhat intermediate view: the erythrocyte is believed to be a balloon containing an elastic stroma and hemoglobin and surrounded by a lipid-protein condensation which serves as a membrane. Erythrocytes are soft and easily compressible. They can therefore be readily forced through capillaries whose diameter is smaller than that of the erythrocyte. However, this may result in trauma to the red cells.

The erythrocyte contains, in different species, 62 to 72 gm of water per 100 ml of cells. The solids of red cells are composed of the pigment hemoglobin and stroma. Hemoglobin makes up much the greater part (about 95 per cent) of the solids. Stroma

is composed of proteins; the lipids lecithin; cholesterol, and cephalin; and inorganic substances. Hemoglobin gives the erythrocytes their property of carrying oxygen and of aiding in carbon dioxide transport and is therefore of great physiological importance.

### **New words and phrases**

serum-zardob

corpuscle-korpuskula

float-suvda suzmoq

bilirubin-billirubin

value-qadr, qimmat

thereby-bu orqali

shrink-kichraymoq

elliptical- qisqargan, elliptik

sponge-like-gupkaga o'xshash

unsettle-tinchlantirmoq

trauma-travma

solid-qattiq, og'ir, zil

cephalin-sefalin

inorganic-anorganik

vesicle-vesikula

### **Exercise 2. Answer the questions**

1. What is the functions of blood?
2. Say about the erythrocyte.
3. What is hemoglobin?
4. Which organ is a measure of the yellow colour in blood plasma?
5. What do you know about coagulation process?

### **Exercise 3. Translate the following sentences and underline terminologies**

1. Blood is composed of a fluid part termed plasma and corpuscles or cells which float in the plasma. 2. The red colour of blood is due to the erythrocytes and not to the plasma, for the latter is yellow to colourless, depending on the quantity examined and the species. 3. In the cow and especially in the horse the plasma has a higher colour. 4. The yellow colour of plasma is due chiefly to bilirubin, although carotene and other pigments are contributing factors. 5. Since the yellow colour of plasma is due chiefly to bilirubin, the icterus index is generally a measure of the concentration of this

pigment in plasma. 6. The icterus index is a measure of the yellow colour in blood plasma. 7. The index is determined by comparing the colour of plasma with that of standard solutions of potassium dichromate. 8. Mammalian red cells are nonnucleated. In the blood stream they are believed to exist normally as biconcave circular discs. 9. The red corpuscles of most animals below the mammals are elliptical in shape and possess nuclei. 10. The erythrocyte contains, in different species, 62 to 72 gm of water per 100 ml of cells. 11. Hemoglobin makes up much the greater part (about 95 per cent) of the solids. 12. Stroma is composed of proteins; the lipids lecithin; cholesterol, and cephalin; and inorganic substances.

#### **Exercise 4. Fill in the blanks**

1. Three ... of blood cells are recognized: ... or red cells, ... or white cells, and ... or platelets. 2. The red ... of blood is ... to the ... and not to the plasma, for the ... is yellow to ..., depending on the ... and the species. 3. In ... animal, is ... when ... in thin layers. 4. The yellow colour of ... is due chiefly to ..., although ... and other ... are ... factors. 5. Some ... the corpuscle as ... of a ... stroma with ... deposited in its interstices. 6. Still others adopt a ... intermediate view: the ... is believed to be a ... containing an elastic ... and hemoglobin and surrounded by a ... condensation which ... as a membrane. 7. The solids of red ... are composed of the ... hemoglobin and stroma. 8. Hemoglobin ... up much the ... part (about 95 per cent) of the solids. 9. The ... contains, in different species, ... to ... gm of water per... ml of cells. 10. Hemoglobin gives the ... their property of carrying ... and of aiding in carbon dioxide transport and is therefore of great ... importance.

### **LESSON 47**

#### **Exercise 1. *Translate the following text using the dictionary***

#### **HEMOLYSIS**

Hemolysis is the discharging of the hemoglobin from the red cells so that it becomes free in the plasma or other medium surrounding the cells. The earlier physiologists termed the process laking, and blood so treated was said to be laked. As indicated below, there are a number of ways of producing hemolysis, but since the exact structure of the erythrocyte is still unknown, the mechanism of hemolysis is imperfectly understood. Some of the methods have clinical significance, while others do not. Lowering the osmotic pressure of the plasma causes hemolysis. This lowering may be accomplished by adding weak salt solution or water to the blood. What occurs in such cases is a passage of water into the corpuscle by osmosis through its

semipermeable membrane, whereupon the corpuscle swells. This results in the stretching, or possibly mechanical rupture, of its membrane, and hemoglobin runs out into the surrounding medium. The transparent stroma left is spoken of as a shadow, or ghost, corpuscle. Solutions that cause hemolysis by osmosis are said to be hypotonic. Solutions into which erythrocytes may be placed without producing osmotic changes are said to be isotonic. Such solutions cause no alterations in the size of the corpuscles. Solutions that exert a higher osmotic pressure than blood plasma are said to be hypertonic. They cause water to pass from the corpuscles by osmosis, and shrinking of the corpuscles results. Such erythrocytes are said to be crenated.

The isotonic solution which has been studied most and is of greatest interest is physiological salt solution, known also as physiological saline. It is an aqueous solution of sodium chloride and is usually prepared so as to contain 0.9 per cent of sodium chloride. This concentration of sodium chloride in water is satisfactory for practical use in mammals wherever an isotonic solution of sodium chloride is required. However, studies by Aldred in which the vapor-pressure method was used indicate that the osmotic pressure of mammalian blood is somewhat higher than that of a solution containing 0.9 per cent of sodium chloride and that interspecies differences of considerable magnitude exist.

The osmotic pressure of the blood of birds is higher than that of the blood of mammals. In terms of equivalent concentrations of NaCl, the pigeon has an osmotic pressure of 1.004 and the hen 1.025. The frog, a cold-blooded animal, shows a value of 0.731, but the value for the tortoise is higher and very variable.

While it is true that a 0.9 per cent solution of sodium chloride is approximately isotonic with mammalian blood plasma and that weak salt solutions when mixed with blood cause hemolysis, yet the extent to which the osmotic pressure of plasma can be lowered without causing hemolysis of all, or even any, corpuscles is considerable, and it varies somewhat among different species. The point in terms of strength (per cent) of sodium chloride solution at which hemolysis just begins indicates the osmotic resistance of the weakest corpuscles (minimum resistance). The point at which complete hemolysis occurs indicates the resistance of the strongest corpuscles (maximum resistance). The test, which has some clinical application, is called the erythrocyte fragility test.

#### **New words and phrases**

hemolysis-gemoliz

discharge-ajralib chiqmoq



osmotic-ozmotik  
accomplish-ado etmoq  
where upon-shundan keyin  
swell-shishmoq, yiriklashmoq  
stretch-cho'zmoq  
rupture-to'satdan yorilish  
shadow-ko'lanka, soya  
ghost-arvoh  
isotonic-izotonik  
alternation-ketma-ketlik  
saline-tuzli, tuzlangan  
vapor-bug'  
magnititude-ko'lami, kattaligi  
resistance-qarshilik ko'rsatish

**Exercise 2. Answer the questions**

1. What is the hemolysis?
2. What do you know about isotonic solution?
3. Say about the osmotic pressure of the blood.
4. What is called some clinical application with hemolysis?

**Exercise 3. Translate the following sentences and underline terminologies**

1. Hemolysis is the discharging of the hemoglobin from the red cells so that it becomes free in the plasma or other medium surrounding the cells. 2. As indicated below, there are a number of ways of producing hemolysis, but since the exact structure of the erythrocyte is still unknown, the mechanism of hemolysis is imperfectly understood. 3. Some of the methods have clinical significance, while others do not. 4. This lowering may be accomplished by adding weak salt solution or water to the blood. 5. Solutions into which erythrocytes may be placed without producing osmotic changes are said to be isotonic. 6. They cause water to pass from the corpuscles by osmosis, and shrinking of the corpuscles results. 7. The isotonic solution which has been studied most and is of greatest interest is physiological salt solution, known also as physiological saline. 8. While it is true that a 0.9 per cent solution of sodium chloride is approximately isotonic with mammalian blood plasma and that weak salt solutions when mixed with blood cause hemolysis, yet the extent to which the osmotic pressure of plasma can be lowered without causing hemolysis of all, or even any, corpuscles is considerable, and it varies somewhat among different

species. 9. The point at which complete hemolysis occurs indicates the resistance of the strongest corpuscles (maximum resistance). 10. The test, which has some clinical application, is called the erythrocyte fragility test.

#### **Exercise 4. Fill in the blanks**

1. The earlier ... termed the process ..., and ... so treated was said to be laked. 2. Some of the ... have ... significance, while others do not. 3. This lowering may be ... by adding weak salt ... or water to the blood. 4. What ... in such cases is a passage of ... into the ... by osmosis through its ... membrane, whereupon the ... swells. 5. Solutions into which ... may be placed without producing ... changes are said to be isotonic. 6. They cause ... to pass from the ... by osmosis, and shrinking of the ... results. 7. The ... solution which has been studied most and is of greatest ... is physiological salt ..., known also as ... saline. 8. In terms of ... concentrations of NaCl, the ... has an osmotic pressure of ... and the ... 1.025. The frog, a ... animal, shows a value of 0.731, but the value for the ... is higher and very variable. 9. While it is true that a 0.9 per cent ... of sodium ... is approximately isotonic with ... blood ... and that weak salt ... when mixed with ... cause hemolysis, yet the ... to which the ... pressure of ... can be lowered without causing ... of all, or even any, ... is considerable, and it ... somewhat among ... species. 10. The point in ... of strength (per cent) of sodium ... solution at which ... just begins ... the osmotic ... of the weakest ... (minimum resistance).

## **LESSON 48**

### **Exercise 1. *Translate the following text using the dictionary***

#### **HEMAGGLUTINATION**

It has long been known that when blood serum or plasma of one animal is mixed with erythrocytes of an animal of another species, agglutination of the erythrocytes may occur. The process is spoken of as hemagglutination (Heterohemagglutination). The active substance in the serum or plasma is designated as the agglutinin, whereas that in the erythrocyte is the agglutinogen. More recently it was discovered that agglutination of erythrocytes may occur when the serum or plasma and the erythrocytes of individuals of the same species are mixed. This reaction is known as isohemagglutination. It is especially important in human blood and must be taken into account in blood transfusions in humans. The blood of a person (donor) whose erythrocytes are agglutinated by the serum or plasma of a prospective recipient must not be transfused into that individual. Otherwise

agglutination of the erythrocytes of the donor may occur in the blood stream of the recipient. Following agglutination, hemolysis may take place as a secondary effect. Agglutinins in the donor's plasma are relatively harmless, for they are greatly diluted by the blood of the recipient. Pooled plasma or serum is safe to transfuse into individuals of all blood groups partly for this same reason.

Furthermore there is some neutralization of agglutinins within the pool. Isohemagglutinins are euglobulins.

Human bloods have been divided into four main groups based upon the fact that human erythrocytes differ in their agglutinogen content and human plasmas in their agglutinin content. Agglutinogens have been demonstrated in the erythrocytes of practically all the common animals. However, hemagglutinins are naturally present only in low concentration, or they may be lacking. For this reason it is usually safe in animals to make single transfusions involving bloods of different groups. If repeated transfusions are given, however, the recipient may develop isohemagglutinins and isohemolysins sufficient to cause severe transfusion reactions. In fact, single transfusions may cause the development of antibodies in some instances.

**Origin of Erythrocytes**—In the fetus the liver, spleen, and lymph nodes are the organs concerned in blood formation. In mammals throughout postnatal life the bone marrow is, under normal conditions, the only organ of erythropoiesis, as the process of formation of red cells is termed.

In birds the bone marrow is the main site of erythrocyte production, but the spleen forms erythrocytes to a small extent. Under certain pathological conditions in postnatal life the liver, spleen, and lymph nodes may assume again their fetal function of erythropoiesis.

Bone marrow is also the place of formation of granulocytes, it is an important seat of the production of thrombocytes, and it is concerned to a small extent in the formation of lymphocytes. The production of these elements of the blood will be considered later.

In the bone marrow, erythropoiesis goes on continually, and corpuscles are poured into the blood stream at such a rate that the total number in the blood does not fluctuate greatly. According to one view, the erythrocytes are formed extravascularly in the bone marrow. The entrance of the newly formed corpuscle into the capillary has been likened to the penetration, without rupture, of the film of a soap bubble by a needle; no stoma or opening is necessary. According to another view, erythrocytes develop intravascularly. There are, according to this theory, two kinds of capillaries in

bone marrow: collapsed ones, which are erythro- genic, and open ones through which blood flows. The young- erythrocytes are forced into the blood stream by an opening up of the erythrocytic capillaries to the blood current.

### **New words and phrases**

hemagglutination-gemagglunatsiya

agglutination-agglunatsiya

designate-belgilamoq

transfusion-qon quyish

take into-tushunmoq

donor-donor

prospective-mo'ljallangan

secondary-ikkinchi darajali

recipient-qabul qilib oluvchi

dilute-suyultirmoq

neutralization-neytralizatsiya

demonstrate-ibotlamoq

instance-namuna, o'rnak

formation-tashkil qilish

postnatal-tug'ruqdan keyin

fetal-homilalik

assume-tahmin qilmoq

pour into-ichimlik uzatmoq

bubble-ko'pik

force into-majburlamoq

### **Exercise 2. Answer the questions**

1. Say about hemagglutination.
2. Do you know the process of agglutination?
3. Explain about origin of erythrocytes.
4. Where is the place of formation of granulocytes?
5. What is erythropoiesis?

### **Exercise 3. Translate the following sentences and underline terminologies**

1. The process is spoken of as hemagglutination. 2. The active substance in the serum or plasma is designated as the agglutinin, whereas that in the erythrocyte is the agglutininogen. 3. The blood of a person (donor) whose erythrocytes are agglutinated by the serum or plasma of a prospective recipient must not be transfused into that

individual. 4. It is especially important in human blood and must be taken into account in blood transfusions in humans. 5. Agglutinins in the donor's plasma are relatively harmless, for they are greatly diluted by the blood of the recipient. 6. If repeated transfusions are given, however, the recipient may develop isohemagglutinins and isohemolysins sufficient to cause severe transfusion reactions. 7. In birds the bone marrow is the main site of erythrocyte production, but the spleen forms erythrocytes to a small extent. 8. According to one view, the erythrocytes are formed extravascularly in the bone marrow. 9. The entrance of the newly formed corpuscle into the capillary has been likened to the penetration, without rupture, of the film of a soap bubble by a needle; no stoma or opening is necessary. 10. The young-erythrocytes are forced into the blood stream by an opening up of the erythrocytic capillaries to the blood current.

#### **Exercise 4. Fill in the blanks**

1. The active ... in the serum or ... is designated as the agglutinin, whereas that in the ... is the agglutinogen. 2. More recently it was ... that ... of erythrocytes may occur when the ... or ... and the ... of individuals of the same ... are mixed. 3. The ... of a person (donor) whose ... are ... by the serum or ... of a prospective recipient must not be ... into that individual. 4. Agglutinins in the donor's ... are ... harmless, for they are ... diluted by the ... of the recipient. 5. Origin of ...— In the fetus the liver, spleen, and ... nodes are the ... concerned in blood formation. 6. Bone ... is also the place of ... of granulocytes, it is an ... seat of the production of ..., and it is concerned to ... extent in the ... of lymphocytes. 7. According to one ..., the ... are formed ... in the bone marrow. 8. There are, according to this ..., two kinds of ... in bone marrow: collapsed ones, which are ..., and open ones ... which ... flows.

### **LESSON 49**

#### **Exercise 1. Translate the following text using the dictionary**

##### **HEMOGLOBIN AND ITS COMPOUNDS AND DERIVATIVES (I)**

Hemoglobin (ferrohämoglobin), the pigment of the erythrocytes, is a complex, iron-containing, conjugated protein composed of a pigment and a simple protein. The pigment is ferroheme (reduced heme, reduced hematin) and the protein is globin, a histone. Ferroheme makes up about 5 per cent of the hemoglobin molecule. Ferroheme is widely distributed both in the animal and plant kingdoms. It not only combines with globin to form hemoglobin but it can combine with many nitrogenous compounds to form hemo- chromogens. Myoglobin is a combination of ferroheme

and muscle globin. Measurements of the molecular weight of hemoglobin have given the following results: man, cat, pig, 65,000; dog, 66,000; rabbit, 69,000. These values are about four times the minimal molecular weight of 16,400 calculated on the basis of an iron content of about 0.34 per cent and on the assumption that each molecule of hemoglobin contains one atom of iron. The hemoglobin molecule must therefore contain four iron atoms and four heme groups. The latter are believed to be combined with one molecule of globin to form hemoglobin. Differences in the globin molecules probably account for the slight differences in the molecular weights. At least some of the pores of the glomerular membrane in the kidney are large enough to permit the hemoglobin molecule to pass through. Thus if hemoglobin is released in the blood stream, hemoglobinuria is likely to result.

Leukocytes, or white blood cells, are much less numerous than erythrocytes. They are of several kinds and their physiology is incompletely understood. More work has been done on their functions in disease than in health. Numerous studies of their cytology have been made. Leukocytes as normally found in the blood are divided into three main groups: lymphocytes, monocytes, and granulocytes. The granulocytes are characterized by specific granules in their cytoplasm and, according to their staining reactions, are classed as neutrophils, eosinophils, and basophils. Recent opinion holds that all leukocytes exert their main functions, not in the blood stream, but in the tissues. The blood is a means of transport of leukocytes. Lymphocytes, these cells are relatively numerous in the blood of most species of domestic animals. They are formed in lymphoid tissue (lymph nodes and nodules, spleen, etc.) and are in fact the main constituent of this tissue. They are believed to produce antibodies and to fix toxins. They are lost in large numbers by migration to the intestinal and respiratory mucous membranes. They are not phagocytic, that is, they do not have the power of ingesting and digesting particulate matter, such as bacteria and tissue detritus, with which they come in contact. They show ameboid motility.

#### **New words and phrases**

derivate-o'zak, manba  
ferroheme-ferrohema  
hematin-gematin  
nitrogeneous-azotogen  
globin-globin  
assumption-taxmin, faraz

release-ozod qilmoq  
incompletely-chala  
cytology-sitologiya  
nodule-tugun  
constituent-hosil qilmoq  
toxin-toksin  
phagocytic-fagositik  
intestinal-ichakka oid

**Exercise 2. Answer the questions**

1. How much per cent of the hemoglobin molecule makes up ferroheme?
2. Say about leukocytes.
3. Do you know about lymphocytes?
4. Say about measurements of the molecular weight of hemoglobin.
5. What is hemo-chromogens?

**Exercise 3. Translate the following sentences and underline terminologies**

1. The pigment is ferroheme (reduced heme, reduced hematin) and the protein is globin, a histone. 2. Ferroheme is widely distributed both in the animal and plant kingdoms. 3. It not only combines with globin to form hemoglobin but it can combine with many nitrogenous compounds to form hemo- chromogens. 4. Myoglobin is a combination of ferroheme and muscle globin. 5. Measurements of the molecular weight of hemoglobin have given the following results: man, cat, pig, 65,000; dog, 66,000; rabbit, 69,000. 6. The latter are believed to be combined with one molecule of globin to form hemoglobin. 7. Differences in the globin molecules probably account for the slight differences in the molecular weights. 8. These cells are relatively numerous in the blood of most species of domestic animals. 9. They are formed in lymphoid tissue (lymph nodes and nodules, spleen, etc.) and are in fact the main constituent of this tissue. 10. They are not phagocytic, that is, they do not have the power of ingesting and digesting particulate matter, such as bacteria and tissue detritus, with which they come in contact.

**Exercise 4. Fill in the blanks**

1. Hemoglobin the pigment of the ..., is a complex, iron-containing, conjugated ... composed of a ... and ... protein. 2. Ferroheme makes up about ... of the ... molecule. 3. It not only ... with globin to form ... but it can ... with many ... compounds to form .... 4. Differences in the ... ... probably account for the ... differences in the ... weights. 5. Thus if ... is released in the ... stream, ... is likely to

result. 6. They are ... to produce ... and to fix toxins. 7. They are not ..., that is, they do not have the power of ingesting and ... particulate matter, such as ... and tissue ..., with which they come in contact. 8. They are lost in large ... by migration to the ... and respiratory ... membranes. 9. Leukocytes as ... found in the ... are divided into three main groups: ..., ..., and .... 10. Measurements of the ... weight of ... have given the following results: man, cat, pig, ...; dog, ...; rabbit, ....

## LESSON 50

### Exercise 1. *Translate the following text using the dictionary*

#### **HEMOGLOBIN AND ITS COMPOUNDS AND DERIVATIVES(II)**

Monocytes —These cells occur in normal blood only to a limited extent. They are large and possess a single nucleus and a fairly abundant, faintly granular cytoplasm. Motility is well developed. Being actively phagocytic, they are able to ingest foreign particles of almost any sort. Their origin is probably from the cells of the reticuloendothelial system. Granulocytes-Neutrophils are comparatively numerous in the blood of most animals. They have an abundant, finely granular cytoplasm, the granules staining with the so-called neutral dyes. The nucleus of these cells is generally divided into lobes or segments connected by filaments. Such neutrophilic cells are designated as segmented cells. They are the more mature forms. Those cells possessing a nucleus that appears as a curved or coiled band, rodlike or even deeply indented but without segmentation, are known as band cells. They are younger forms. Neutrophils are able to make ameboid movements and actively phagocytic. They are formed in bone marrow from extravascular neutrophilic myelocytes. Eosinophils are large cells containing numerous large cytoplasmic granules that stain with acid dyes. The nuclei are less lobulated than those of neutrophils. They are normally seen only in small numbers. They originate from eosinophilic myelocytes of bone marrow. Basophils have cytoplasmic granules that stain with alkaline dyes. They occur in normal blood only to a small extent. Their function is not known. Phagocytic power is slight or absent. They are believed to be different from mast cells—so frequently found in the neighbourhood of blood capillaries—though they resemble them histologically. Basophils originate from basophilic myelocytes of bone marrow. Evidence has been obtained that a blood plasma factor, possibly an enzyme, is concerned in the expulsion of granular leukocytes from the bone marrow into the blood and into some of the organs (liver, spleen).



Length of Life.—There is little definite information regarding the length of life of leukocytes. However, they are generally believed to be short-lived. The average rate of disappearance of leukocytes from the blood of leukopenic cats which were transfused with blood from normal cats was such as to indicate that all the leukocytes could be replaced one and one-half times daily. This indicates an average length of life of about 16 hours. The lymphocyte output of the thoracic duct has been found to be large enough to replace the lymphocyte content of the blood in 10 to 12 hours in the cat and 11.6 hours in the dog.

The average survival time of mononuclear leukocytes in the blood of irradiated parabiotic rats was found to be 170 minutes, whereas the average survival time of the granulocytes was 23 minutes. The reticulo-endothelial cells of the liver and spleen are probably concerned in removing dead leukocytes or their fragments that escape autolysis. Numbers.—Leukocytes are enumerated per cubic millimeter of blood. Leukocytosis is a pathological increase in the number of any or all of the different classes of leukocytes. Lymphocytosis is rare in domestic animals. Neutrocytosis or neutrophilia is seen in most acute bacterial infections. Leukopenia is a decrease in the number of leukocytes. It may involve one or all of the classes of white cells. Leukocytosis is a pathological increase in the number of any or all of the different classes of leukocytes. 10. Leukopenia is a decrease in the number of leukocytes. It may involve one or all of the classes of white cells.

#### **New words and phrases**

ingest-yutmoq, yutib yubormoq

particle-zarra, bo'lak

so-called-deb atalmish

mature-shishgan yetilgan

curve-egri chiziq

coil-o'ralmoq, o'ram

band-guruh

extravascular-ekstravaskulyar

resemble-o'xshamoq

histologically-gistologik

basophilic-bazofilik

obtain-qo'lga kiritmoq

evidence-dalil

expulsion-quvish

regard-shunday deb hisoblamoq

indicate-ko'rsatmoq

irradiate-nurlatmoq

parabiotic-parabiotik

autolysis-avtoliz

enumerate-sanab bermoq

cubic-kub

acute-qattiq ko'p miqdorda

fragment-parcha

**Exercise 2. Answer the questions**

1. What is monocytes?
2. In which system is given their origin is probably from the cells?
3. Do you know basophyls?
4. Say about neutropholis.
5. Explain about process of leucomenia.

**Exercise 3. Translate the following sentences and underline terminologies**

1. They are large and possess a single nucleus and a fairly abundant, faintly granular cytoplasm. 2. They have an abundant, finely granular cytoplasm, the granules staining with the so-called neutral dyes. 3. The nucleus of these cells is generally divided into lobes or segments connected by filaments. 4. Those cells possessing a nucleus that appears as a curved or coiled band, rodlike or even deeply indented but without segmentation, are known as band cells. 5. The lymphocyte output of the thoracic duct has been found to be large enough to replace the lymphocyte content of the blood in 10 to 12 hours in the cat and 11.6 hours in the dog. 6. The average survival time of mononuclear leukocytes in the blood of irradiated parabiotic rats was found to be 170 minutes, whereas the average survival time of the granulocytes was 23 minutes. 7. The reticulo-endothelial cells of the liver and spleen are probably concerned in removing dead leukocytes or their fragments that escape autolysis. 8. The lymphocyte output of the thoracic duct has been found to be large enough to replace the lymphocyte content of the blood in 10 to 12 hours in the cat and 11.6 hours in the dog. 9. Leukocytosis is a pathological increase in the number of any or all of the different classes of leukocytes. 10. Leukopenia is a decrease in the number of leukocytes. It may involve one or all of the classes of white cells.

**Exercise 4. Fill in the blanks**

1. Monocytes —these ... occur in normal ... only to a limited extent. 2. Motility is

well developed. Being actively ..., they are able to ingest foreign ... of almost any sort. 3. They have ..., finely granular ..., the granules ... with the so-called ... dyes. 4. The nucleus of these ... is generally divided into ... or ... connected by filaments. 5. Those ... possessing a ... that appears as a ... or ... band, rodlike or even deeply indented but without ..., are known ...cells. 6. The ... output of the... duct has been found to be large ... to replace the ... content of the blood in... to... hours in the cat and ... hours in the dog. 7. Leukocytosis is a ... increase in the number of any or all of the ... classes of leukocytes. 8. Leukopenia is a ... in the number of ... It may ... one or all of the ...of ... cells. 9. The average ... time of mononuclear ...in the blood of irradiated ... rats was found to be ... minutes, whereas the average ... time of the ... was ... minutes. 10. Neutrocytosis or ... is seen in most acute ... infections.

## **LESSON 51**

**Exercise 1.** *Translate the following text using the dictionary*

### **THE 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 a 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.

#### **New words and phrases**

histology-gistologiya

hemolymph-gemolimf

splenic-taloq

vasoconstriction-vazokonstiksiya

augment-ko'paytirish

fetus-homila

resume-davom ettirmoq

storage-saqlash joyi

systole-sistol

pulp-meva eti, go'shti

endothelial-endoteliy

abundantly-mo'llik

lack-nam bo'lmoq

beculiar-ajib, ajoyib

venous-venoz

drain-quritmoq  
establish-asos solmoq  
adjustment-almashtirish  
extirpate-tugatmoq  
percentage-foiz  
reservoir-suv ombori  
hemorrhage-ko'p qon ketishi  
anaesthetics-anasteziya  
undergo-boshdan kechirmoq  
diastoll-diastol  
recur-qaytmoq

**Exercise 2. Answer the questions**

1. What is the spleen?
2. Say functions about spleen.
3. What includes to anaesthetics?
4. Which things are is important to the spleen?

**Exercise 3. Translate the following sentences and underline terminologies**

1. However, its histology is more complex than that of lymphoid tissue generally. 2. It has been compared histologically to a large hemolymph node. 3. Capillaries are lacking in the ordinary sense, and blood passes right into the splenic pulp. 4. It is then collected by the venous sinuses, which are drained by veins whose union leads to the formation of the splenic vein. 5. The functions of the spleen are not fully understood, although many facts of importance are known. 6. Splenectomy has been successfully performed not only on the small animals but also on horses, cattle, sheep, goats, and pigs. 7. 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. 8. Erythrocyte count, erythrocyte percentage volume, and hemoglobin content of the blood all show a decrease. 9. 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. 10. In animals of the first class the spleen must be able to concentrate blood coming to it by squeezing out plasma.

**Exercise 4. Fill in the blanks**

1. Capillaries are lacking in the ... sense, and ... passes right into the ... pulp. 2. That

the ... is not ... for life is well established. 3. Splenectomy has been ... performed not only on the ... animals but also on ..., cattle, ..., goats, and pigs. 4. The ... undergoes at least two kinds of ... changes in sizes. 5. In giving up ... in the ... just mentioned, the ... undergoes strong ... accompanied by vasoconstriction. 6. In some ... (horse, dog, cat) the ... coming from the ... during this ... is richer in corpuscles than the blood of the general ..., whereas in others ... contraction augments only the ... volume. 7. In the fetus the ... is concerned in ... cell formation. 8. In the adult it ... to form ..., monocytes, and possibly other ..., and its ... activity of ... can be resumed under certain ... conditions. 9. This is by ... of its high ... of ... cells and its power of making red ... more susceptible to ..., that is, more fragile. 10. By reason of its ... cells it is believed to be ... in antibody ..., and because of the ... of numerous ... it plays a part in the ... of the body to ... infections.

## **LESSON 52**

**Exercise 1.** *Translate the following text using the dictionary*

### **COMPOSITION OF FOODS**

Composition of Foods.—By ordinary chemical analysis foods can be split up and separated into water, proteins (albuminoids), fats or oils, soluble carbohydrates, crude fibre or insoluble carbohydrates, and ash. In addition to these there are vitamins. Water, as an essential need for livestock. All foods contain a certain percentage of water. It is found in greatest amount in roots, succulents, such as cabbages and kale, wet brewers' grains, silage, and pasture grasses, which contain from 75 to 90 per cent. Cereal grains, such as wheat, oats, barley, etc., contain on an average 11 per cent, while newly threshed grain contains slightly more than the mature grain. Cereals which have been harvested too early, or those which have been stored in a damp place, hold more moisture than those properly harvested and stored. Excessive moisture favours the growth of moulds and encourages fermentation. Fresh meadow grass yields from 70 to 80 percent of water, but when it is air-dried and made into hay under favourable circumstances, this is reduced to 12 or 14 per cent. All air-dried foods hold approximately 11 to 14 per cent of water. Thus it is seen foods can be divided into two groups according to their water content: those containing more than 70 per cent are classed as succulent and those which contain less as nonsucculent foods.

The carbohydrates in foods are divisible into two groups, the crude or woody fibre, and the soluble carbohydrates or the nitrogen-free extract. The crude fibre is

that portion of the carbohydrate which is not rendered soluble by alternate boiling in dilute alkali and acid. The crude fibre is the less digestible part of the carbohydrate, and its quantity in the food determines if the food is to be classed as a concentrated food or as a coarse fodder, those which contain less than 15 to 20 per cent of fibre being classed as concentrated, and those which contain more than 20 per cent as coarse foods. A concentrated food is one which contains much nutriment, and a coarse food is one which contains relatively little. For example, oats contain 10 per cent of fibre, and hay and wheat straw 25 per cent and 40 per cent respectively. It may be mentioned here that concentrated foods may be further divided into two groups, nitrogenous and carbonaceous, according to their character. As obtained by ordinary analysis crude fibre is a mixture of celluloses, lignin, cutin, and some pentosans, etc. While it is the cheapest of all food materials, it is nevertheless an indispensable constituent of all properly balanced rations. Cellulose is the material that forms the cell-wall of plants. In its simplest form it is easily digested, but with the growth of the plant cellulose becomes associated with lignin, which gives stiffness to the parts of the plant requiring support, and also cutin, which is a waterproofing material. Cotton, wood, flax, etc., are all modified forms of cellulose.

The soluble carbohydrate or nitrogen-free extract includes a great many substances ranging from the simple sugars or monosaccharides to the much more complex polysaccharides or starches. The carbohydrates are made up of carbon, hydrogen, and oxygen, and, as one of the above names implies, they do not contain any nitrogen. Foods containing much carbohydrate are called carbonaceous foods, such as, for example, the cereal grains, potatoes, molasses, etc. The cereals contain from 60 to 70 per cent of carbohydrate. The simplest of the carbohydrates, such as the simple sugars, are absorbed directly from the gut, while the more complex sugars, and still more complex starches, have to be reduced by processes of digestion to more simple forms before they can be absorbed and be of use to the body. Starch is one of the chief forms in which food is given to animals.

Fat is present in all foods, but the quantity varies greatly; thus in hay there is 3 per cent, in turnips there is 0.2 per cent, in cereals from 2 to 6 per cent, and in linseed as much as 40 per cent, while linseed cake, from which most of the fat has been expressed, contains on an average rather less than 10 per cent. In meals produced from fat rich foods such as cotton seed or linseed, by extraction with a solvent, all the oil except some 1 or 2 per cent is removed. The term 'fat' is usually applied to oil which is solid at a moderate temperature, and 'oil' is so called when it remains fluid

or semi-fluid at a moderate temperature. In animal dietetics the two terms are used without discrimination, and fat is the term most commonly adopted. The fats are compounds of glycerine with various fatty acids such as stearic acid, palmitic, and oleic, the hardness or softness of a fat, such as the body fat of animal depends on the proportion of the above fatty acids, because these melt at different temperatures; e.g. oleic acid melt at 14°C, palmitic at 62°C, and stearic at 69.2°C. This is of great importance to the stock feeder, because if a food is fed, say, to a pig, containing much oleic fat, the fat laid down by the pig will be soft, which is what no bacon curer desires. Similarly, foods affect the butter-fat of cows and according to the manner in which the cow is fed will the butter be soft and oily, or have a medium consistence, or be hard and tallowy. Speaking generally, foods tending to make soft fat are linseed, linseed-cake, rice meal, and maize, while those foods which have a tendency to make hard fat include cotton-cake, coconut cake, barley, and bean meals. The proteins or albuminoids in a food differ from the other constituents we have considered, in that in addition to having carbon, hydrogen, and oxygen in their composition, they also contain nitrogen and usually sulphur and sometimes phosphorus.

#### **New words and phrases**

composition of foods- ovqat tarkibi

carbohydrates-uglevod

livestock-ot-ulov

phosphorus-fosfor

hydrogen-vodorod

solvent - erituvchi

grains – don, urug'

respective- vakil

fermentation - fermentlash

discrimination - diskriminasiya, farqlash

consistency - o'zgarmaslik, barqarorlik

succulent - sersuv, shirador

sulphur - oltingugurt, sulfat

semi-fluid - suyuqsifat

concentrate - diqqatni jamlash

nutriment - oziqlanish

commonly - odatda

cure - tuzatmoq



dietetics- parhezli

cereal - boshqoli ekin

fatty- yog'li

to feed- ovqatlantirmoq

**Exercise 2. Answer the questions**

1. Describe the chemical analysis of foods.
2. How much per cent of air-dried foods hold water?
3. How much per cent of carbohydrate the cereals contain from?
4. What is a certain percentage of all foods contain from?
5. Do you have any pets? How many times a day do you feed them?

**Exercise 3. Translate the following sentences and underline terminologies**

1. It is found in greatest amount in roots, succulents, such as cabbages and kale, wet brewers' grains, silage, and pasture grasses, which contain from 75 to 90 per cent. 2. Cereals which have been harvested too early, or those which have been stored in a damp place, hold more moisture than those properly harvested and stored. 3. Excessive moisture favours the growth of moulds and encourages fermentation. 4. The carbohydrates are made up of carbon, hydrogen, and oxygen, and, as one of the above names implies, they do not contain any nitrogen. 5. In meals produced from fat rich foods such as cotton seed or linseed, by extraction with a solvent, all the oil except some 1 or 2 per cent is removed. 6. In its simplest form it is easily digested, but with the growth of the plant cellulose becomes associated with lignin, which gives stiffness to the parts of the plant requiring support, and also cutin, which is a waterproofing material. 7. The term 'fat' is usually applied to oil which is solid at a moderate temperature, and 'oil' is so called when it remains fluid or semi-fluid at a moderate temperature. 8. Similarly, foods affect the butter-fat of cows and according to the manner in which the cow is fed will the butter be soft and oily, or have a medium consistence, or be hard and tallowy. 9. The proteins or albuminoids in a food differ from the other constituents we have considered, in that in addition to having carbon, hydrogen, and oxygen in their composition, they also contain nitrogen and usually sulphur and sometimes phosphorus.

**Exercise 4. Fill in the blanks**

1. By ordinary ... analysis foods can be split up and ... into water, ..., fats or oils, soluble ..., crude fibre or insoluble ..., and ash. 2. It is found in greatest amount in ..., succulents, such as ... and kale, wet brewers' ..., silage, and pasture ..., which contain from ... to ... per cent. 3. The ... contain from ... to ... per cent of

carbohydrate. 4. The simplest of the ..., such as the simple ..., are absorbed directly from the ..., while the more complex ..., and still more complex ..., have to be reduced by processes of ... to more simple forms before they can be ... and be of use to the body. 5. This is of great ... to the stock feeder, because if a food is fed, say, to a pig, containing much oleic fat, the fat ... down by the pig will be soft, which is what no bacon curer desires. 6. Speaking generally, ... tending to make soft fat are linseed, ..., rice meal, and maize, while those ... which have a tendency to make hard fat include ..., coconut cake, barley, and ... meals. 7. The ... are made up of carbon, ..., and oxygen, and, as one of the above names ..., they do not contain any nitrogen. 8. In its ... form it is easily digested, but with the growth of the plant ... becomes associated with lignin, which gives ... to the parts of the ... requiring support, and also cutin, which is a ... material. 9. In ... dietetics the two terms are used without ..., and fat is the term most ... adopted. 10. The ... are made up of ..., ..., and ..., and, as ... of the above names ..., they do not ... any nitrogen.

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