

**MINISTRY OF EDUCATION AND SCIENCE OF UKRAINE**  
**STATE BIOTECHNOLOGICAL UNIVERSITY**  
**Faculty of Veterinary Medicine**  
**PHARMACOLOGY AND PARASITOLOGY DEPARTMENT**



**WORKBOOK**  
**for laboratory classes of educational discipline «Veterinary Parasitology»**  
**for student \_\_\_ group \_\_\_\_\_ year**  
second master's level in speciality 211 – Veterinary medicine  
**Part III**

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(Surname and Name)

**Lecturer: PhD.** \_\_\_\_\_

Surname

\_\_\_\_\_  
Name, patronymic

Kharkiv – 2022

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Faculty of Veterinary Medicine SBTU  
(protocol number 61 dated 2022/09/08)

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Pharmacology and parasitology department of SBTU  
(protocol number 1 dated 2022/08/25)

**Authors: Nikiforova O.V., Mazanny O.V., Fedorova O.V.**

**Reviewer: associate professor of department of epizootology and veterinary management, Candidate of Veterinary Sciences Savenko M.M.**

**Workbook for laboratory classes of educational discipline «Veterinary Parasitology» for students of IV-V years of second master's level in speciality 211 – Veterinary medicine. /O.V. Nikiforova, O.V. Mazanny, O.V. Fedorova. Kh., 2022. Part III. 81 p.**

**Basic foundation of Veterinary Nematodology and Acarology and Entomology have been stated. The data on the morphology and biology of agents of invasive disease of ruminants, horses, pigs, carnivorous, rabbits, birds and bees have mentioned.**

**For training at higher educational institutions III-IV accreditation level on the specialty 211 – «Veterinary medicine».**

**First edition.**

**Translated and layout created by O.V. Nikiforova, cand. of vet. sci., associate professor of Pharmacology and Parasitology department of SBTU**

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## CONTENTS

№	Topics of lab classes	Page.
1,2	Characteristics of nematodes of suborder <i>Trichurata</i> . Diagnostics and differential diagnosis of animals' trichuroses and trichinelosis..	7
3	Characteristics of nematodes of suborder <i>Spirurata</i> . Diagnostics and differential diagnosis of thelaziosis of cattle and spiruratoses of poultry (tetramerosis, streptocarosis, echinurirosis).....	11
4	Characteristics of nematodes of suborder <i>Filariata</i> . Diagnostics and differential diagnosis of onchocercoses and setarioses of ruminants and horses.	
5	Diagnostics and differential diagnosis of parafilariosis of horses, dirofilariosis of carnivorous.....	16
6	Characteristics of nematodes of suborder Rhabditata. Diagnostics and differential diagnosis of strongyloidoses of young animals.....	23
7	General characteristics of helminthes of Acanthocephala class. Diagnostics and differential diagnosis of macracantho-rhynchosis of pigs, poultry's polymorphosis and filicollosis..... <b>Content module IV. «Veterinary nematology and nematodoses of animals» (part II)</b>	26
8	Characteristics of Arthropoda of subclass Acari. Ticks' taxonomy. Parasitiformes ticks. Morphological identification of Ixodides to the genus and their biological classification.....	31
9	Morphological identification of Argasidae and Dermanyssidae ticks to the genus. Diagnostics and differential diagnosis of acaraposis and varroosis of bees.....	37
10	Acariformes mites. Sarcoptoidoses of animals. Diagnostics and differential diagnosis of sarcoptosis and notoedrosis.....	40
11	Psoroptidoses of animals: diagnostics and differential diagnosis of psoroptoses in sheep, cattle, horse and rabbit.	
12	Psoroptidoses of animals: diagnostics and differential diagnosis of chorioptosis and otodectosis.....	43
13	Trombidiformes mites. Diagnostics and differential diagnosis of poultry' knemidocoptosis and demodecosis of animals.	
	<b>Content module V. «Veterinary acarology and acaroses of animals»</b>	47
	<b>Pictures for the section «Veterinary acarology and acaroses of animals»</b>	51

14	Characteristics of Arthropoda of Class Insecta. Botfly invasions of animals: diagnostics and differential diagnosis of cattle's hypodermosis.....	55
15	Botfly invasions of animals: diagnostics and differential diagnosis of cattle's oestridoses (oestrosis, crivelliosis, cephenomyosis).	
16	Botfly invasions of animals: diagnostics and differential diagnosis of rhinoestrosis and gastrophilosis of soliped.....	63
17, 18	Blood-sucking Diptera insects (Midges): morphological and biological identification of clegs, blackflies, punkies, mosquitoes and sandflies.	
19	Zoophilous flies: morphological and biological identification of family Muscidae, Sarcophagidae, Calliphoridae, Glossinidae.	67
20	Diagnostics of simuliotoxicosis and animals' myiasis (Wohlfahrtiosis, Luciliosis).....	
21 22	Wingless insects –permanent ectoparasites of animals: melophagosis of sheep (keds), Siphunculatoses of animals. Wingless insects – permanent ectoparasites of animals (Mallophagoses and Siphonapteroses of mammals and poultry).	
<i>Content module VI. «Veterinary entomology and entomoses of animals»</i>		75
<b>Pictures for the section «Veterinary entomology and animal entomoses»</b>		80

### RECOMMENDED BOOKS

1. Timothy M. Goater, Cameron P. Goater, Gerald W. Esch. Parasitism. The diversity and ecology of animal parasites. Second edition, Cambridge, University Press, 2001, 2014, 524 p.
2. Gregory v. Lamann. Veterinary parasitology. Nova biomedical Press, Inc. New York, 2010, 323 p.
3. G.M.Urquhart, J.Armour, J.L.Duncan at all. Veterinary parasitology. The faculty of veterinary medicine, the University of Glasgow, Scotland, 2nd edition 1996, 307 p.
4. Dwight D. Bowman Charles M. Hendrix David S. Lindsay Stephen C. Barr. Feline Clinical Parasitology. Iowa State University Press. 2002. 469 c.

### METHODOLOGY OF DISCIPLINE «VETERINARY PARASITOLOGY»

Preparing for each class, the student should know:

1. Definition of each disease.
2. Place of infectious agents in the animal classification.
3. Morphological and biological peculiarities of pathogens and characteristics of their eggs or larvae. To know how they are different from other parasites.
4. Complex life diagnostics (features of epizootology, pathogenesis, clinical signs, special (laboratory) diagnostics), differential diagnosis.
5. Post-mortem diagnostics of invasions, taking into account the site and type of zooparasites, the intensity of invasion and the nature of the pathoanatomical changes.
6. Measures to control invasions: a). medicines and schemes of their use; b). features and main ways of prevention.

### REQUIREMENTS OF THE PHARMACOLOGY and PARASITOLOGY DEPARTMENT TO STUDENTS

1. Have and wear clean overalls – white gown and hat.
2. Have with you a workbook for laboratory classes on parasitology with completed homework.
3. Have the material provided for the home preparation (see Methodology of discipline).
4. The missed classes will be worked out during next week after the student has started classes – on the day of the duty of the teachers assigned to this group.
5. In time, pass the modules according to the work plan and resit the module during the next week if you receive negative assessment.

**The duty of students is a systematic and deep mastery of knowledge, practical skills, professional skills, improving the general cultural level. (Article 52 of the Law of Ukraine "On Education" dated 23 May 1991. № 1060-XI)**

### **SAFETY MEASURES IN CLASSES AT PARASITOLOGY DEPARTMENT**

1. Elementary medical ethics or a culture of behavior and work in the workplace.
2. Appear to the classes in clean technical clothing (white gown, hat), because the Department of Parasitology is the department of a group of infectious diseases, including: zoonanthroponosis (toxoplasmosis, trichomonosis, echinococcosis, fasciollosis, toxocarosis, trichinellosis, etc.), accidental scattering of the invasive onset is possible when receiving sick animals or demonstrating material.
3. You should wash your hands after class, whether or not there has been contact with a sick animal, test material (it is advisable to limit food intake in the department).
4. Gently treat virulent and poisonous substances, including acids and alkalis.
5. To follow the fire safety rules, since there may be flammable substances such as alcohols, ether, benzene, xylene, etc. in the classroom.
6. To follow the rules of electrical safety, carefully handle electrical appliances.
7. Before the treatment (cure) of animals, especially small one's (dogs and cats) – listen to workplace safety training.
8. Delivering parasitological material to the department's laboratory, it must be preserved (alcohols, Barbogallo liquid, 10% formaldehyde (organs)) and carefully packed, preventing scattering of invasive onset in the environment.

**TOPIC:** Characteristics of nematodes of suborder *Trichurata*. Diagnostics and differential diagnosis of animals' trichuroses and trichinelosis.

**Class location – classroom, laboratory, museum of the department.**

**Purpose of the lesson:** To study the morphological and biological characteristics of pathogens from suborder *Trichurata*: pigs (*Trichuris suis*), ruminant (*T. ovis*, *T. skrjabini*), carnivorous (*T. canis*, *T. vulpis*), trichinelosis of animals (*Trichinella spiralis*, *T. pseudospiralis*). Their place in classification of parasitic worms. To master methods of life-time and post-mortem diagnosis and differential diagnosis. To get acquainted with anthelmintic preparations and with the peculiarities of their use in different types of animals. To study the eggs and larval stages of these parasites and draw them.

**Task:** To study the morphological features of pathogens of these families using macro- and micro preparations, to know the peculiarities of their development. To master features of diagnostics and differential diagnosis of these diseases. To study the samples of anthelmintic preparations, their use for therapeutic and preventive purposes. To master practically basic methods of laboratory diagnostics of a group of nematodous diseases of animals.

Independently prepare for classes using recommended books (1–4), lecture material and electronic files from the discipline «Parasitology and invasive diseases of animals» at the «Portal of educational information resources of MOODLE».

**Auditory work.** To study and make a drawing or mark in pictures the basic diagnostic features of pathogens of these diseases using the museum material (macro preparations), temporary and permanent micro preparations. Carry out clinical and parasitological examination of animals, make a diagnostics and differential diagnosis, appoint treatment. Get acquainted with the arsenal of medicines recommended for control this group of diseases.

**Task performance:**

1. The place of pathogens of animals in the world animals system (classification):

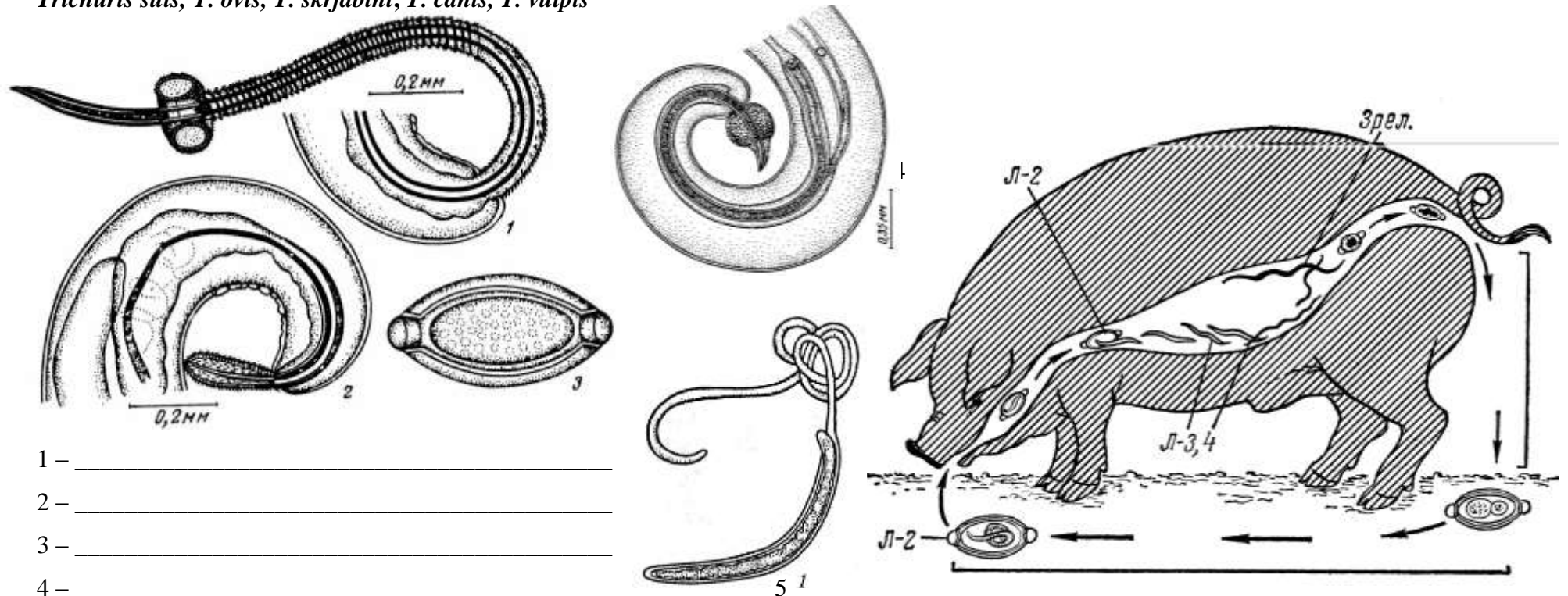
Phylum \_\_\_\_\_ Class \_\_\_\_\_ Order \_\_\_\_\_ Suborder \_\_\_\_\_

Family \_\_\_\_\_ Family \_\_\_\_\_

Genus \_\_\_\_\_ Genus \_\_\_\_\_

Definition: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
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2. Morphological characteristics of pathogens of pigs, ruminant and carnivorous.  
*Trichuris suis*, *T. ovis*, *T. skrjabini*, *T. canis*, *T. vulpis*



- 1 – \_\_\_\_\_
- 2 – \_\_\_\_\_
- 3 – \_\_\_\_\_
- 4 – \_\_\_\_\_
- 5 – \_\_\_\_\_

Life cycle of Trichuris of pigs

Definition: \_\_\_\_\_

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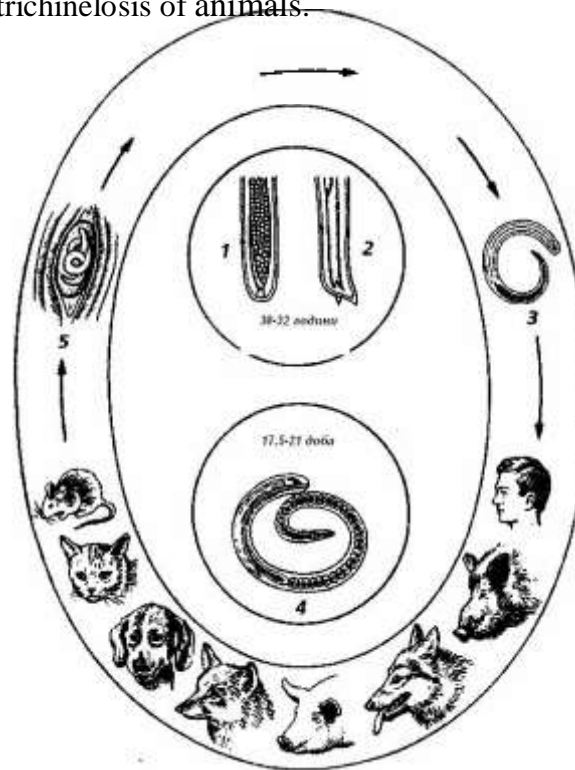
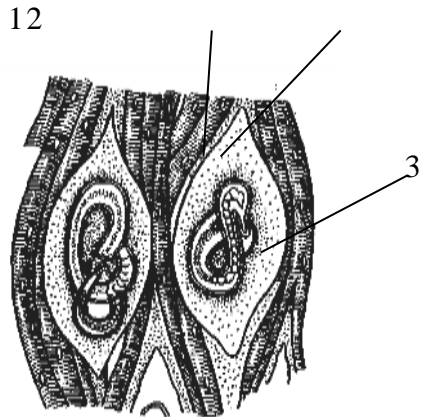
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3. Morphological characteristics of pathogens of trichinelosis of animals.

*Trichinella* – larval stage

- 1 – \_\_\_\_\_
- 2 – \_\_\_\_\_
- 3 – \_\_\_\_\_



*Trichinella*

- a – \_\_\_\_\_
- б – \_\_\_\_\_
- B – \_\_\_\_\_

**Life cycle of *Trichinella*:**

- 1 – tail of female; 2 – tail of male;
- 3 – larva I stage; 4 – invasive larva; 5 – larva in capsules in muscles.

4. Sources and ways of invasion of animals by trichuroses and trichinelosis of animals:

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5. Features of life-time and post-mortem diagnostics, differential diagnosis of trichuroses and trichinelosis of animals:

Clinical signs \_\_\_\_\_

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Pathoanatomical changes \_\_\_\_\_

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Special laboratory diagnostics \_\_\_\_\_

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6. Measures of control and ways of prevention of trichuroses and trichinellosis. Therapeutic drugs.

Treatment \_\_\_\_\_

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Prevention \_\_\_\_\_

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**Material and technical supply.** Microscopes, magnifying glass, permanent macro preparations, temporary and permanent micro preparations, Intermediate hosts. Tables, schemes, invasive animals or freshly obtained faeces from them. Samples of drugs.

« \_\_\_\_ » \_\_\_\_\_ **20 p.**      **Signatures: Student** \_\_\_\_\_      **Lecturer** \_\_\_\_\_

**TOPIC:** Characteristics of nematodes of suborder *Spirurata*. Diagnostics and differential diagnosis of thelaziosis of cattle and spiruratoses of poultry (tetramerosis, streptocarosis, echinuriosis).

**Class location – classroom, laboratory, museum of the department.**

**Purpose of the lesson:** To study the morphological and biological characteristics of pathogens of nematodes of suborder *Spirurata* – thelaziosis of cattle (*Thelazia rhodesi*, *Th. gulosa*, *Th. skrjabini*) and spiruratoses of poultry (tetramerosis (*Tetrameres fissispina*), streptocarosis (*Streptocara crassicauda*), echinuriosis (*Echinuria uncinata*). Their place in classification of parasitic worms. To master methods of life-time and post-mortem diagnosis and differential diagnosis. To get acquainted with anthelmintic preparations and with the peculiarities of their use in different types of animals. To study the eggs and larval stages of these parasites and draw them.

**Task:** To study the morphological features of pathogens of these families using macro- and micropreparations, to know the peculiarities of their development. To master features of diagnostics and differential diagnosis of these diseases. To study the samples of anthelmintic preparations, their use for therapeutic and preventive purposes. To master practically basic methods of laboratory diagnostics of a group of nematodous diseases of animals.

Independently prepare for classes using recommended books (1–4), lecture material and electronic files from the discipline «Veterinary Parasitology» at the «Portal of educational information resources of Kharkiv State ZooVeterinary Academy! (MOODLE)».

**Auditory work.** To study and make a drawing or mark in pictures the basic diagnostic features of pathogens of these diseases using the museum material (macropreparations), temporary and permanent micropreparations. Carry out clinical and parasitological examination of animals, make a diagnostics and differential diagnosis, appoint treatment. Get acquainted with the arsenal of medicines recommended for control this group of diseases.

**Task performance:**

1. The place of pathogens of animals in the world animals system (classification):

Phylum \_\_\_\_\_ Class \_\_\_\_\_ Order \_\_\_\_\_ Suborder \_\_\_\_\_

Family \_\_\_\_\_ Family \_\_\_\_\_ Family \_\_\_\_\_

Genus \_\_\_\_\_ Genus \_\_\_\_\_ Genus \_\_\_\_\_

Genus \_\_\_\_\_

**Definition:** \_\_\_\_\_

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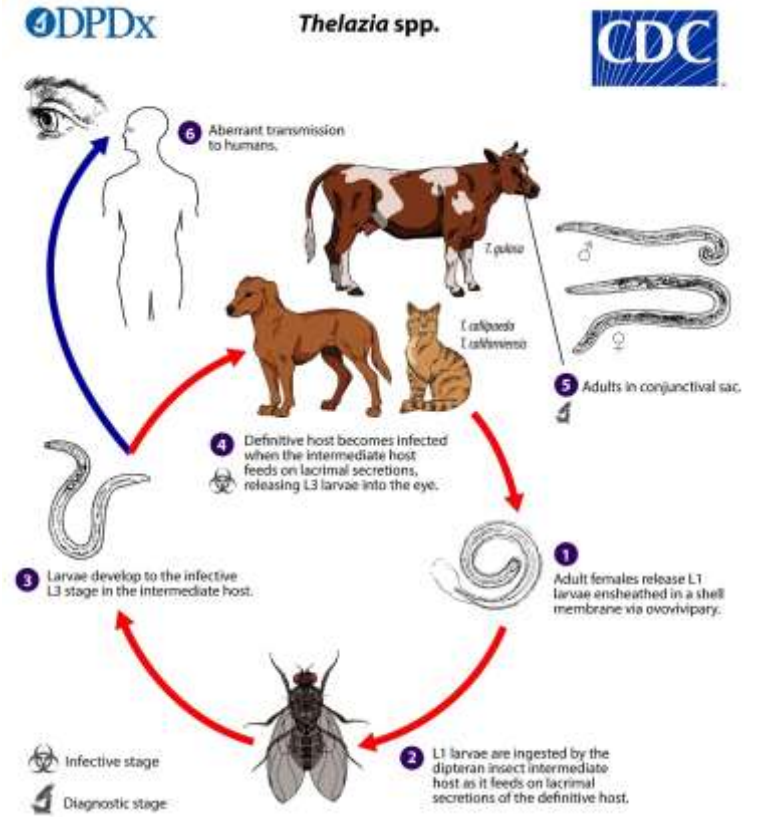
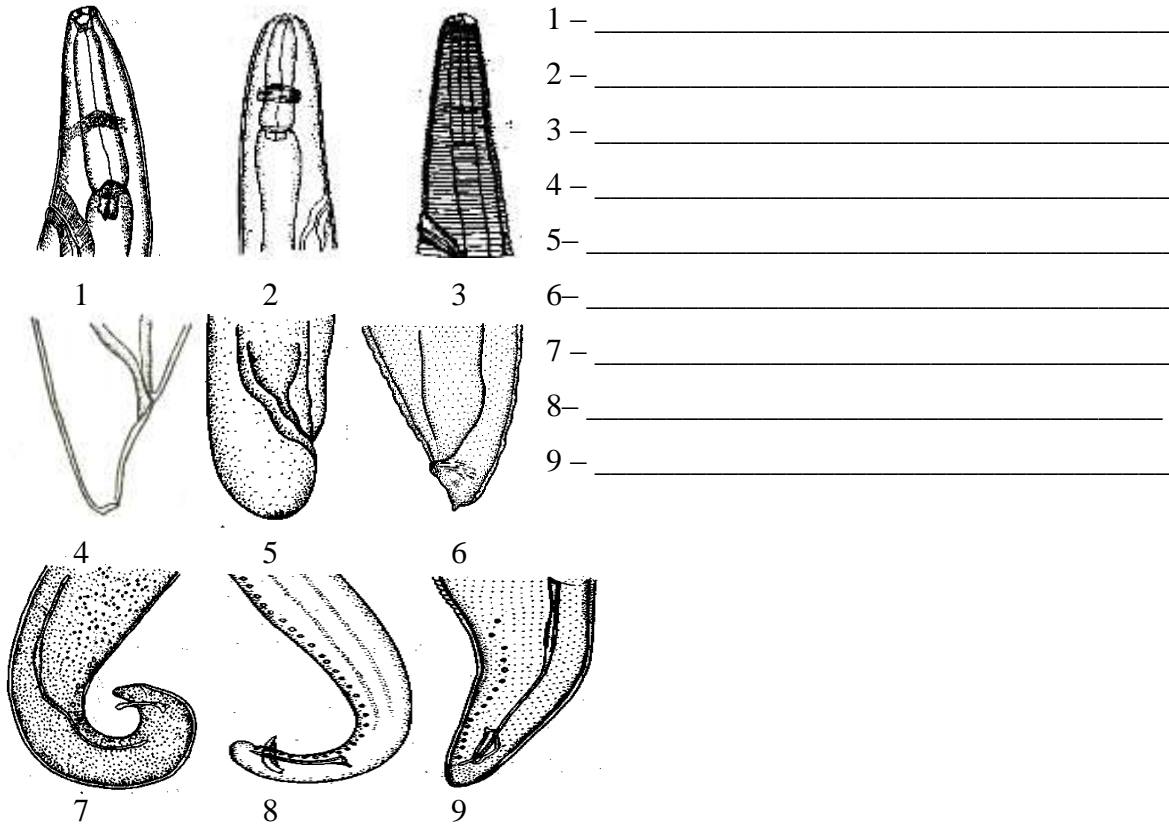
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2. Morphological characteristics of pathogens of thelaziosis of cattle:

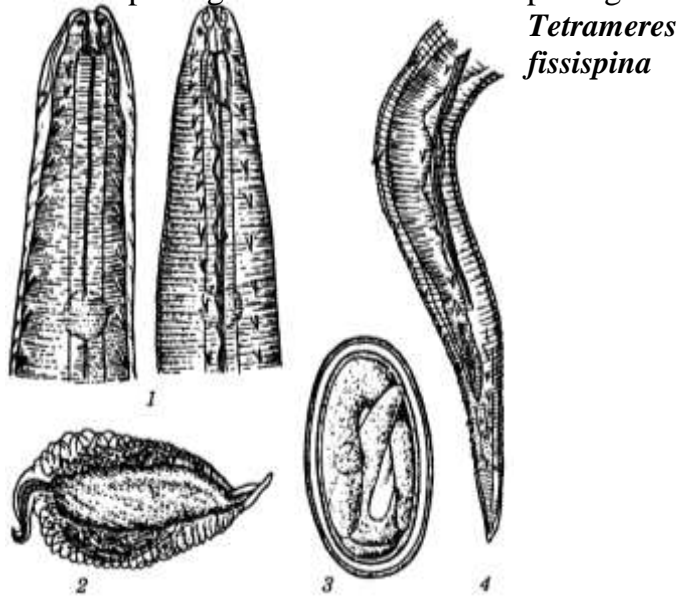


**Life cycle of Thelazias**

(<https://www.cdc.gov/dpdx/thelaziasis/index.html>)

Definition: \_\_\_\_\_  
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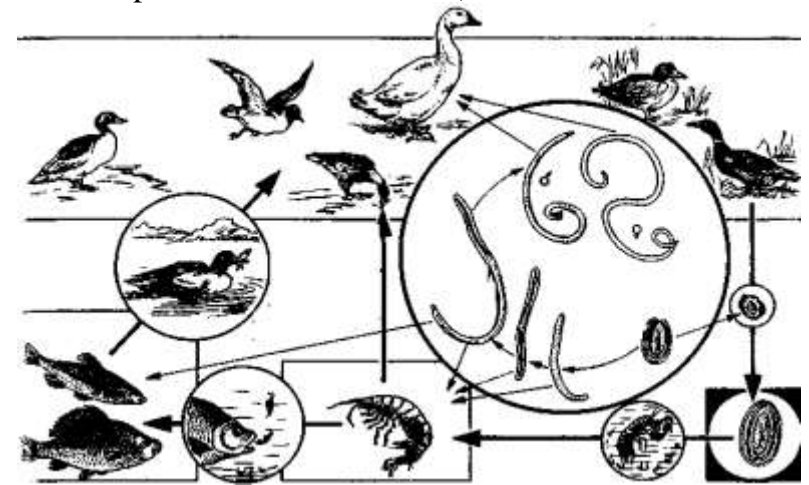
3. Morphological characteristics of pathogens of spiruratoses of poultry (tetramerosis, streptocarosis, echinuriosis):



- 1 - \_\_\_\_\_
- 2 - \_\_\_\_\_
- 3 - \_\_\_\_\_
- 4 - \_\_\_\_\_

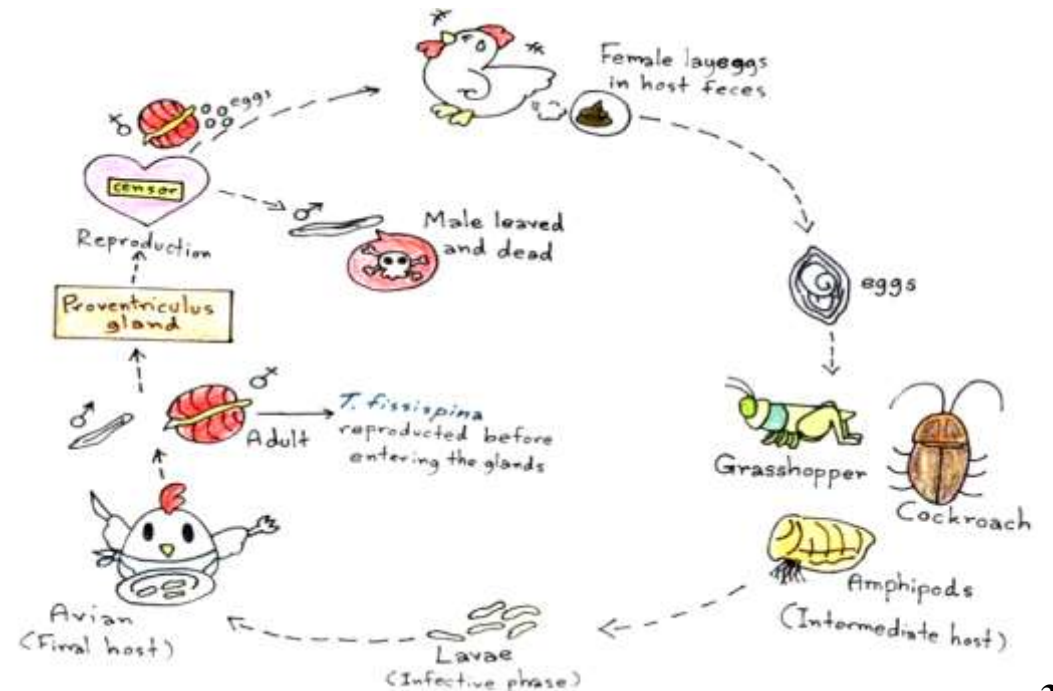
**Life cycle *Tetrameres fissispina***

(<https://vet.kku.ac.th/pathology/somboon/Nemat-Horse-Poultry/TetrameresPPT.pdf>):

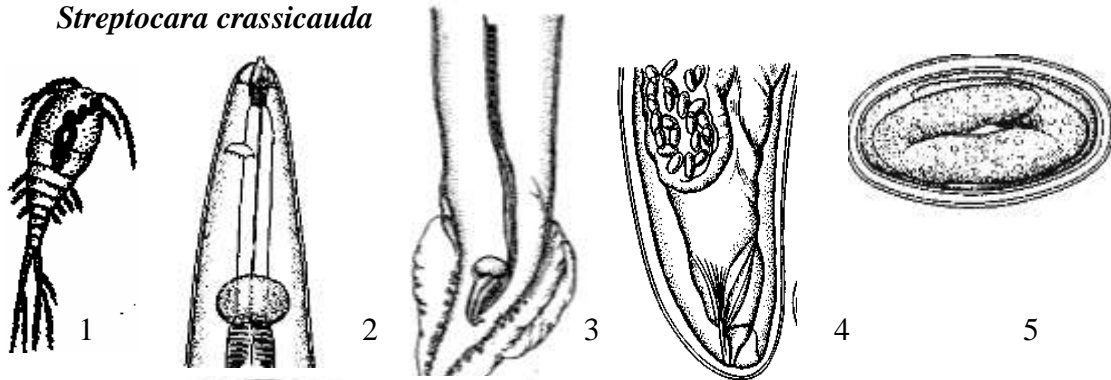


**Life cycle *Streptocara crassicauda*:**

- 1 – definitive host; 2 – egg; 3 – larva I stage; 4 – larva II stage;
- 5 – larva III stage; 6 – intermediate host; 7 – reservoir host.

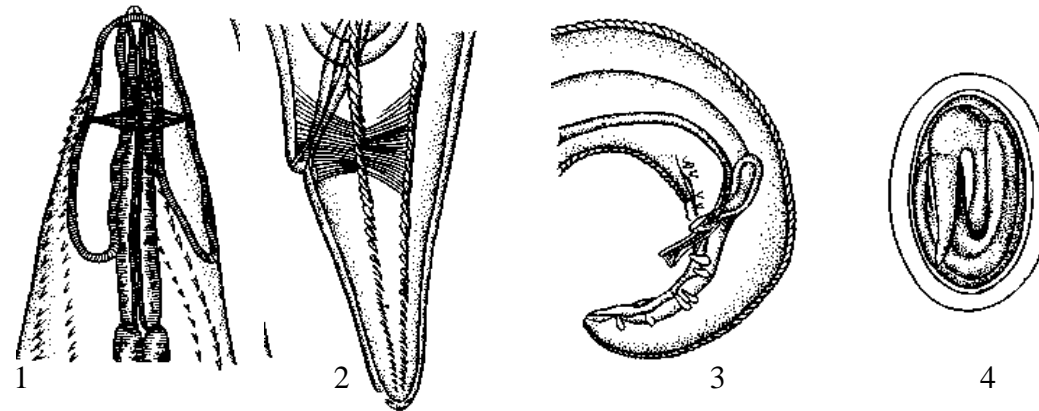
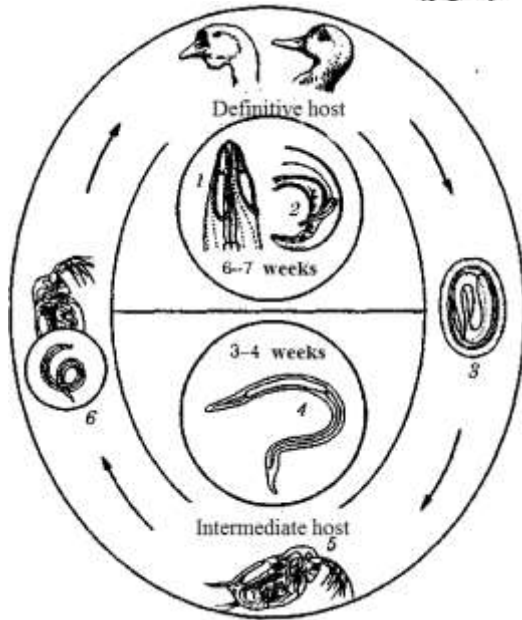


*Streptocara crassicauda*



- 1 - \_\_\_\_\_
- 2 - \_\_\_\_\_
- 3 - \_\_\_\_\_
- 4 - \_\_\_\_\_
- 5 - \_\_\_\_\_

*Echinuria uncinata*



- 1 - \_\_\_\_\_
- 2 - \_\_\_\_\_
- 3 - \_\_\_\_\_
- 4 - \_\_\_\_\_

**Life cycle *Echinuria uncinata*:**

1 – head of Echinuria, 2 – tail of male; 3 – egg;  
 4 – invasive larva; 5 – daphnia; 6 – larva of parasite in the daphnia’s body.

4. Sources and ways of invasion of animals by thelaziosis, spiruratoses of poultry (tetramerosis, streptocarosis, echinuriosis):

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5. Features of life-time and post-mortem diagnostics, differential diagnosis of thelaziosis of cattle and spiruratoses of poultry (tetramerosis, streptocarosis, echinuriosis):

Clinical signs \_\_\_\_\_  
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\_\_\_\_\_  
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Pathoanatomical changes \_\_\_\_\_  
\_\_\_\_\_  
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Special laboratory diagnostics \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

6. Measures of control and ways of prevention. Therapeutic drugs.

Treatment \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Prevention \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**Material and technical supply.** Microscopes, magnifying glass, permanent macro preparations, temporary and permanent micro preparations, Intermediate hosts. Tables, schemes, invasive animals or freshly obtained faces from them. Samples of drugs.

« \_\_\_\_ » \_\_\_\_\_ **20 p.**      **Signatures: Student** \_\_\_\_\_      **Lecturer** \_\_\_\_\_

**TOPIC:** Characteristics of nematodes of suborder *Filariata*. Diagnostics and differential diagnosis of onchocercoses and setarioses of ruminants and horses, parafilariosis of horses, dirofilariosis of carnivorous

**Class location – classroom, laboratory, museum of the department.**

**Purpose of the lesson:** To study the morphological and biological characteristics of pathogens of nematodes of onchocercoses and setarioses of ruminants and horses (*Onchocerca gutturosa*, *O. lienalis*, *O. cervicalis*, *O. reticulata*, *Setaria labiatopapillosa*, *S. cervi*, *S. digitata*, *S. equina*), parafilariosis of horses(*Parafilaria multipapillosa*), dirofilariosis of carnivorous (*Dirofilaria immitis*, *D. repens*). Their place in classification of parasitic worms. To master methods of life-time and post-mortem diagnosis and differential diagnosis. To get acquainted with anthelmintic preparations and with the peculiarities of their use in different types of animals. To study the larval stages of these parasites and draw them.

**Task:** To study the morphological features of pathogens of these families using macro- and micro preparations, to know the peculiarities of their development. To master features of diagnostics and differential diagnosis of these diseases. To study the samples of anthelmintic preparations, their use for therapeutic and preventive purposes. To master practically basic methods of laboratory diagnostics of a group of nematodous diseases of animals.

Independently prepare for classes using recommended books (1–4), lecture material and electronic files from the discipline «Parasitology and invasive diseases of animals» at the «Portal of educational information resources of MOODLE».

**Auditory work.** To study and make a drawing or mark in pictures the basic diagnostic features of pathogens of these diseases using the museum material (macro preparations), temporary and permanent micro preparations. Carry out clinical and parasitological examination of animals, make a diagnostics and differential diagnosis, and appoint treatment. Get acquainted with the arsenal of medicines recommended for control this group of diseases.

**Task performance:**

1. The place of pathogens of animals in the world animals system (classification):

Phylum \_\_\_\_\_ Class \_\_\_\_\_ Order \_\_\_\_\_ Suborder \_\_\_\_\_

Family \_\_\_\_\_ Family \_\_\_\_\_ Family \_\_\_\_\_

Genus \_\_\_\_\_ Genus \_\_\_\_\_ Genus \_\_\_\_\_ Genus \_\_\_\_\_

Definition: \_\_\_\_\_

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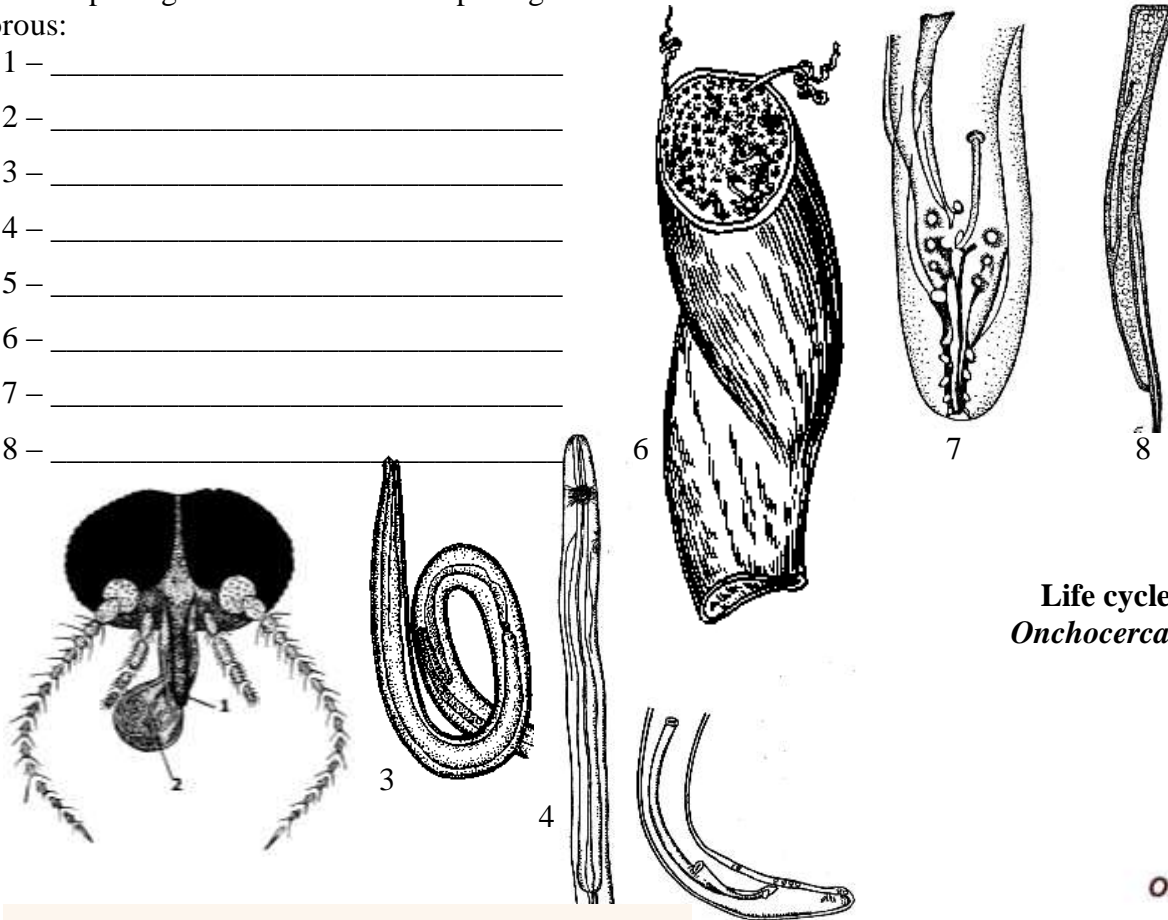
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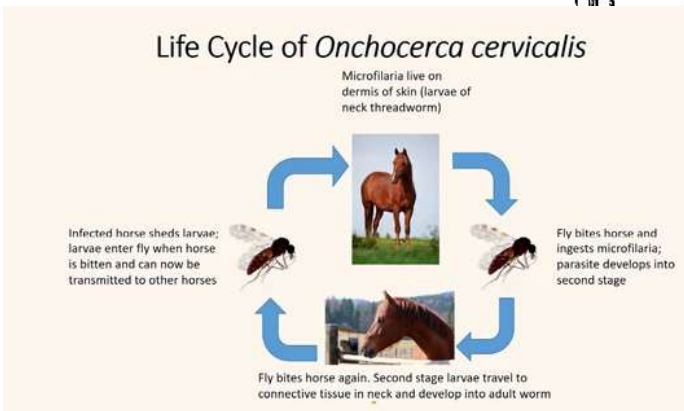
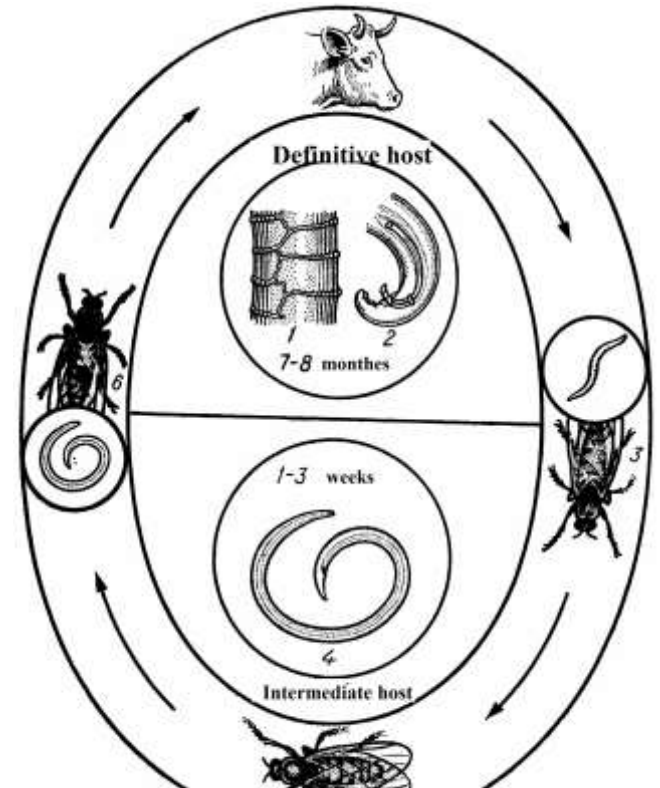


2. Morphological characteristics of pathogens onchocercoses and setarioses of ruminants and horses, parafilariosis of horses, dirofilariosis of carnivorous:

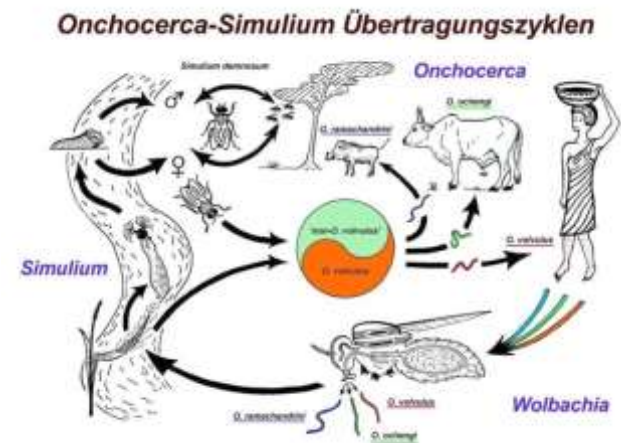
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- 8 - \_\_\_\_\_



Life cycle of *Onchocerca* spp



5



Definition: \_\_\_\_\_

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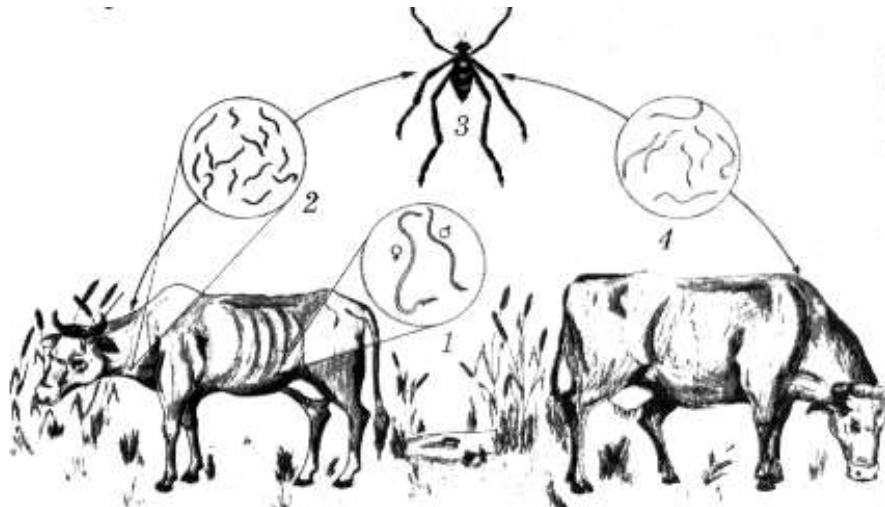
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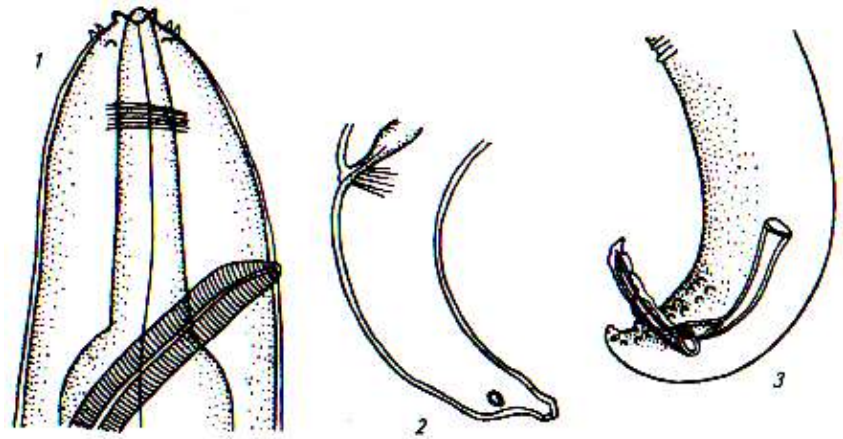
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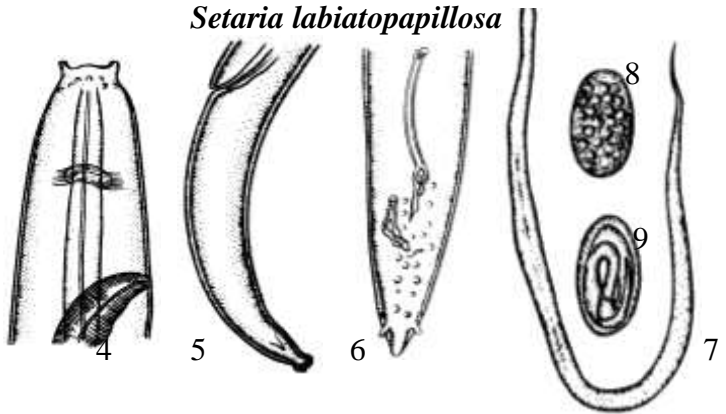


Life cycle *Setaria* spp      *Setaria equina*



- 1 - \_\_\_\_\_
- 2 - \_\_\_\_\_
- 3 - \_\_\_\_\_

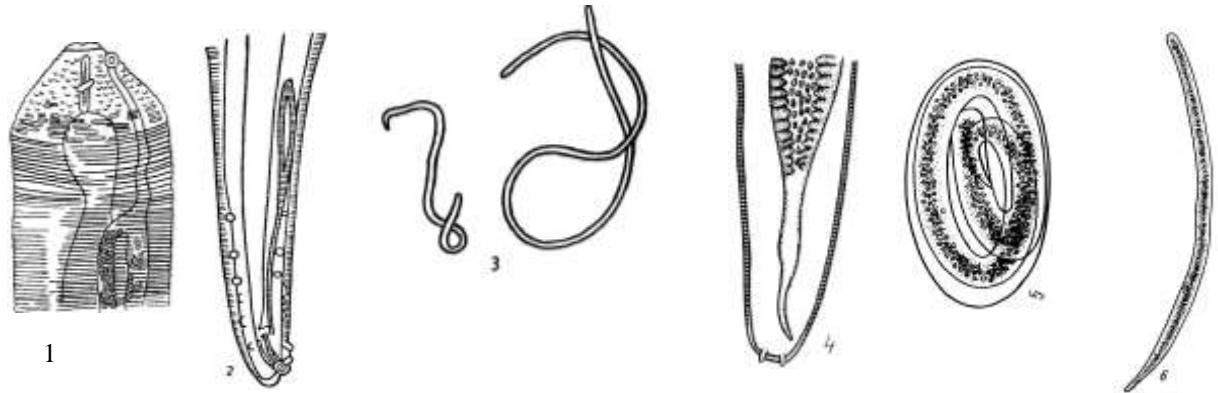
*Setaria labiatopapillosa*



- 4 - \_\_\_\_\_
- 5 - \_\_\_\_\_
- 6 - \_\_\_\_\_
- 7 - \_\_\_\_\_
- 8 - \_\_\_\_\_
- 9 - \_\_\_\_\_

*Parafilaria multipapillosa*

- 1 - \_\_\_\_\_
- 2 - \_\_\_\_\_
- 3 - \_\_\_\_\_
- 4 - \_\_\_\_\_
- 5 - \_\_\_\_\_
- 6 - \_\_\_\_\_



Definition: \_\_\_\_\_

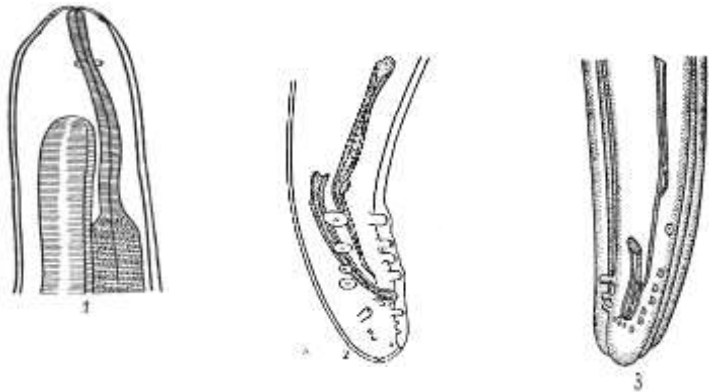
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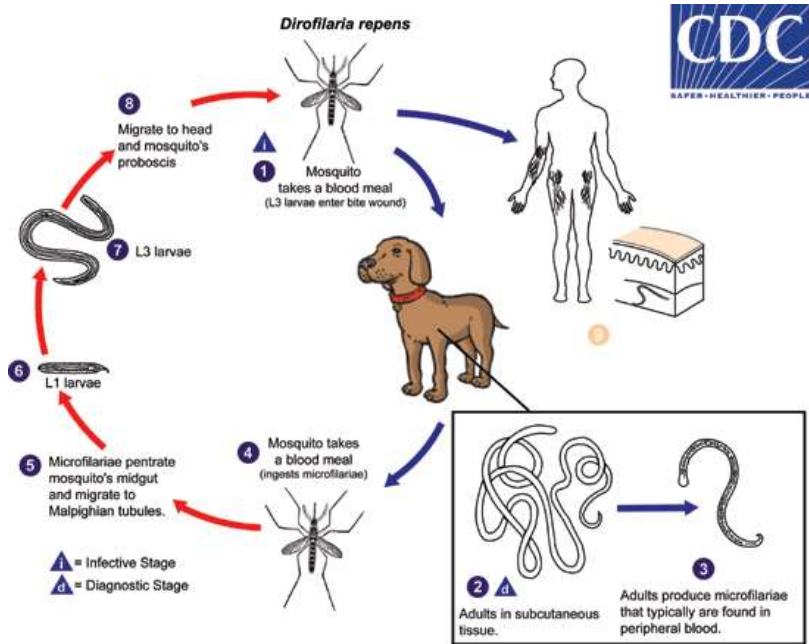
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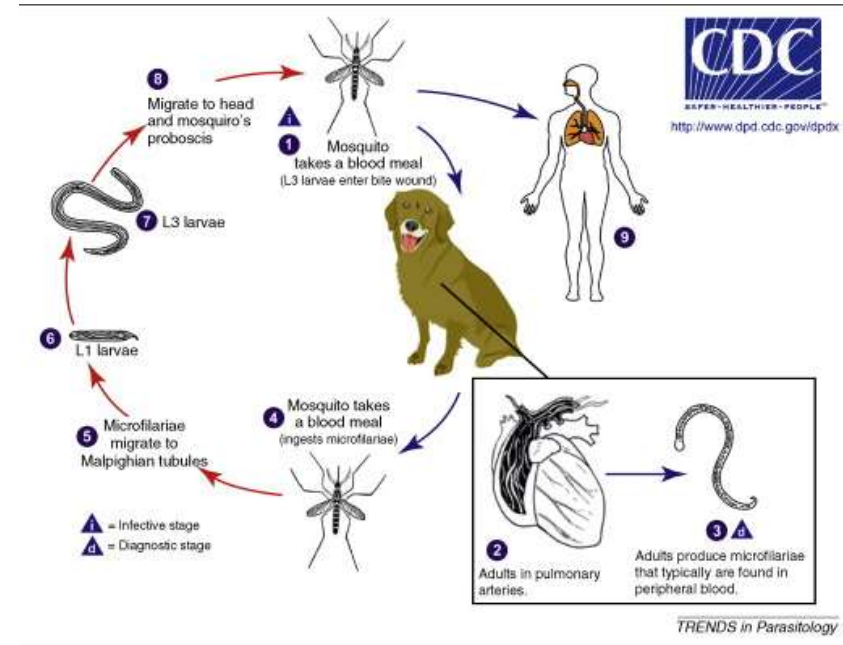
**The end parts of the body of imago heartworms**

- 1 - \_\_\_\_\_
- 2 - \_\_\_\_\_
- 3 - \_\_\_\_\_



**Life cycle of *Dirofilaria repens***

([https://www.cdc.gov/parasites/dirofilariasis/biology\\_d\\_repens.html](https://www.cdc.gov/parasites/dirofilariasis/biology_d_repens.html))



**Life cycle of *Dirofilaria immitis***

(<https://mtviewvet.net/heartworm-life-cycle-in-dogs-and-humans/>)

Definition: \_\_\_\_\_

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3. Sources and ways of invasion of animals by onchocercoses and setarioses of ruminants and horses, parafilariosis of horses, dirofilariosis of carnivorous: \_\_\_\_\_

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4. Features of life-time and post-mortem diagnostics, differential diagnosis of onchocercoses and setarioses of ruminants and horses, parafilariosis of horses, dirofilariosis of carnivorous:

Clinical signs \_\_\_\_\_

Pathoanatomical changes \_\_\_\_\_

Special laboratory diagnostics \_\_\_\_\_

\_\_\_\_\_  
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\_\_\_\_\_  
\_\_\_\_\_  
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5. Measures of control and ways of prevention. Therapeutic drugs.

Treatment \_\_\_\_\_

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\_\_\_\_\_  
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Prevention \_\_\_\_\_

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**Material and technical supply.** Microscopes, magnifying glass, permanent macro preparations, temporary and permanent micro preparations, Intermediate hosts. Tables, schemes, invasive animals or freshly obtained faeces from them. Samples of drugs.

« \_\_\_\_ » \_\_\_\_\_ **20 p.**      **Signatures: Student** \_\_\_\_\_      **Lecturer** \_\_\_\_\_

**TOPIC:** Characteristics of nematodes of suborder Rhabditata. Diagnostics and differential diagnosis of strongyloidoses of young animals

**Class location – classroom, laboratory, museum of the department.**

**Purpose of the lesson:** To study the morphological and biological characteristics of pathogens of nematodes of suborder Rhabditata (*Strongyloides papillosus*, *S. westeri*, *S. ransomi*, *S. vulpis*). Their place in classification of parasitic worms. To master methods of life-time and post-mortem diagnosis and differential diagnosis. To get acquainted with anthelmintic preparations and with the peculiarities of their use in different types of animals. To study the eggs and larval stages of these parasites and draw them.

**Task:** To study the morphological features of pathogens of these families using macro- and micro preparations, to know the peculiarities of their development. To master features of diagnostics and differential diagnosis of these diseases. To study the samples of anthelmintic preparations, their use for therapeutic and preventive purposes. To master practically basic methods of laboratory diagnostics of a group of nematodous diseases of animals.

Independently prepare for classes using recommended books (1–4), lecture material and electronic files from the discipline «Parasitology and invasive diseases of animals» at the «Portal of educational information resources of MOODLE».

**Auditory work.** To study and make a drawing or mark in pictures the basic diagnostic features of pathogens of these diseases using the museum material (macro preparations), temporary and permanent micro preparations. Carry out clinical and parasitological examination of animals, make a diagnostics and differential diagnosis, and appoint treatment. Get acquainted with the arsenal of medicines recommended for control this group of diseases.

Task performance:

1. The place of pathogens of animals in the world animals system (classification):

Phylum _____	Definition: _____
Class _____	_____
Order _____	_____
Suborder _____	_____
Family _____	_____
Genus _____	_____

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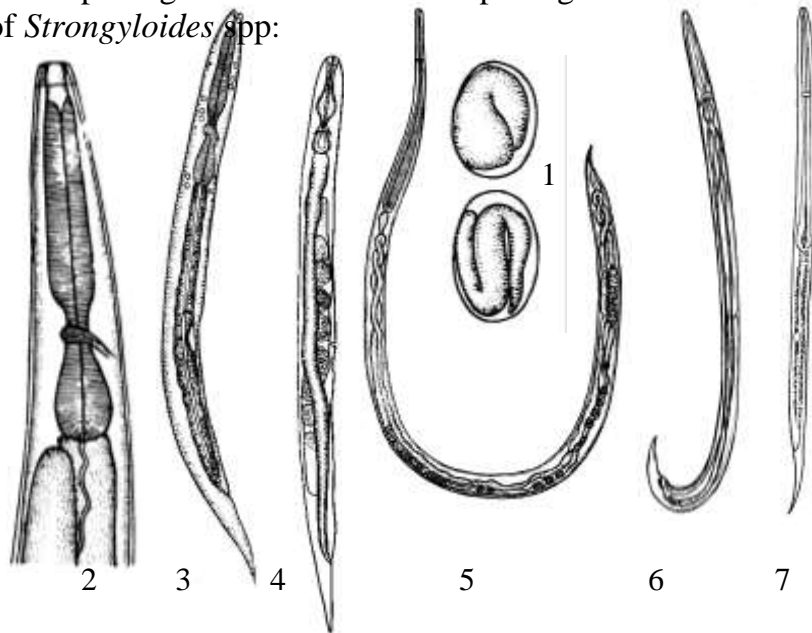


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2. Morphological characteristics of pathogens of *Strongyloides* spp:



- 1 - \_\_\_\_\_
- 2 - \_\_\_\_\_
- 3 - \_\_\_\_\_
- 4 - \_\_\_\_\_
- 5 - \_\_\_\_\_
- 6 - \_\_\_\_\_
- 7 - \_\_\_\_\_

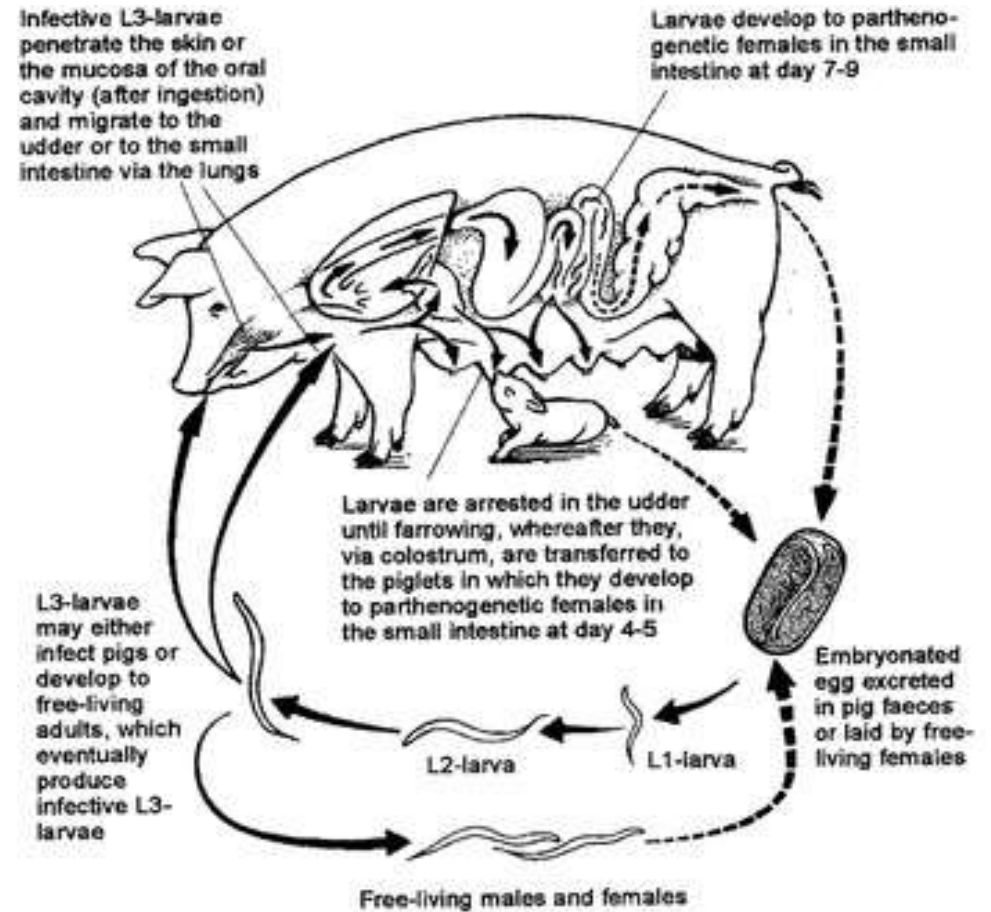


Illustration by Wm P Hamilton CMI

**Life cycle *Strongyloides* spp** (<https://www.cambridge.org/core/journals/parasitology/article/strongyloides-spp-infections-of-veterinary-importance/0E052A0C75B34441289883C1A4DDBC51/core-reader>):

3. Sources and ways of invasion of animals by strongyloidoses of young animals:

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4. Features of life-time and post-mortem diagnostics, differential diagnosis of strongyloidoses of young animals:

Clinical signs \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Pathoanatomical changes \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Special laboratory diagnostics \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

5. Measures of control and ways of prevention. Therapeutic drugs.

Treatment \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Prevention \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**Material and technical supply.** Microscopes, magnifying glass, permanent macro preparations, temporary and permanent micro preparations, Intermediate hosts. Tables, schemes, invasive animals or freshly obtained faeces from them. Samples of drugs.

«\_\_\_\_» \_\_\_\_\_ **20 p.**      **Signatures: Student** \_\_\_\_\_ **Lecturer** \_\_\_\_\_

**TOPIC:** General characteristics of helminthes of Acanthocephala class. Diagnostics and differential diagnosis of macracanthorhynchosis of pigs, poultry’s polymorphosis and filicollosis.

**Class location – classroom, laboratory, museum of the department.**

**Purpose of the lesson:** To study the morphological and biological characteristics of pathogens of Acanthocephala class – macracanthorhynchosis of pigs (*Macracanthorhynchus hirudinaceus*), poultry’s polymorphosis (*Polymorphus magnus*, *P. minutus*) and filicollosis (*Filicollis anatis*). Their place in classification of parasitic worms. To master methods of life-time and post-mortem diagnosis and differential diagnosis. To get acquainted with anthelmintic preparations and with the peculiarities of their use in different types of animals. To study the eggs and larval stages of these parasites and draw them.

**Task:** To study the morphological features of pathogens of these families using macro- and micro preparations, to know the peculiarities of their development. To master features of diagnostics and differential diagnosis of these diseases. To study the samples of anthelmintic preparations, their use for therapeutic and preventive purposes. To master practically basic methods of laboratory diagnostics of a group of Acanthocephalatoses diseases of animals.

Independently prepare for classes using recommended books (1–4), lecture material and electronic files from the discipline «Parasitology and invasive diseases of animals» at the «Portal of educational information resources of MOODLE».

**Auditory work.** To study and make a drawing or mark in pictures the basic diagnostic features of pathogens of these diseases using the museum material (macro preparations), temporary and permanent micro preparations. Carry out clinical and parasitological examination of animals, make a diagnostics and differential diagnosis, and appoint treatment. Get acquainted with the arsenal of medicines recommended for control this group of diseases.

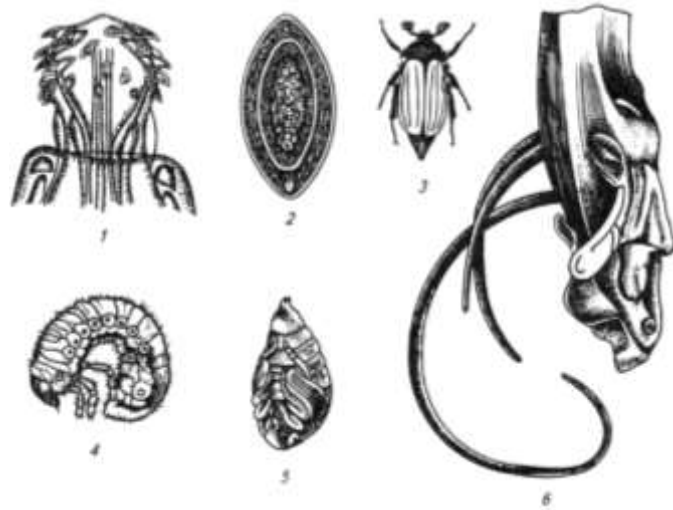
Task performance:

1. The place of pathogens of macracanthorhynchosis in the world animals system (classification):

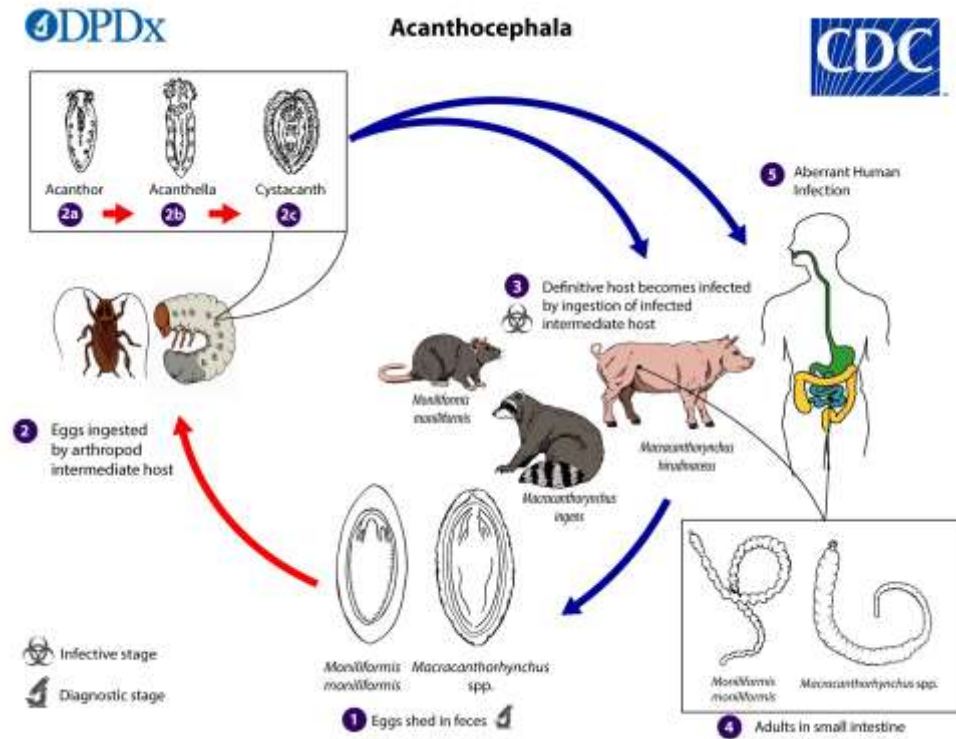
Phylum \_\_\_\_\_ Class \_\_\_\_\_ Order \_\_\_\_\_  
Family \_\_\_\_\_ Genus \_\_\_\_\_

Definition: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

2. Morphological characteristics of pathogens of macracanthorhynchosis of pigs:  
*Macracanthorhynchus hirudinaceus*



- 1 – \_\_\_\_\_
- 2 – \_\_\_\_\_
- 3 – \_\_\_\_\_
- 4 – \_\_\_\_\_
- 5 – \_\_\_\_\_
- 6 – \_\_\_\_\_



**Life cycle *Macracanthorhynchus hirudinaceus***

(<https://www.cdc.gov/dpdx/acanthocephaliasis/index.html>)

3. Sources and ways of invasion of animals by *Macracanthorhynchus hirudinaceus*:

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4. Features of life-time and post-mortem diagnostics, differential diagnosis of macracanthorhynchosis in pigs:

Clinical signs \_\_\_\_\_

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Pathoanatomical changes \_\_\_\_\_

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Special laboratory diagnostics \_\_\_\_\_

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5. Measures of control and ways of prevention. Therapeutic drugs.

Treatment \_\_\_\_\_

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Prevention \_\_\_\_\_

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6. The place of pathogens of *Polymorphosis and Filicollis* in the world animals system (classification):

Phylum \_\_\_\_\_

Order \_\_\_\_\_

Order \_\_\_\_\_

Class \_\_\_\_\_

Family \_\_\_\_\_

Family \_\_\_\_\_

Genus \_\_\_\_\_

Genus \_\_\_\_\_

Definition: \_\_\_\_\_

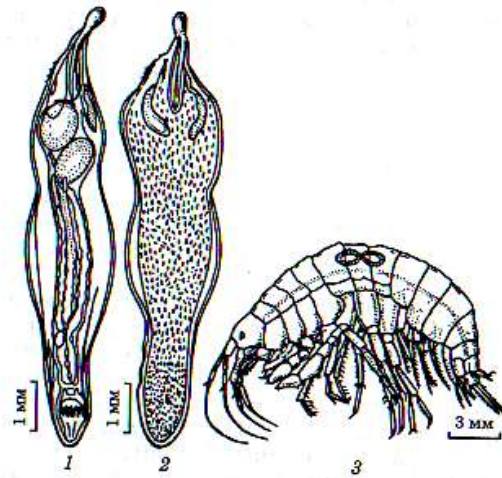
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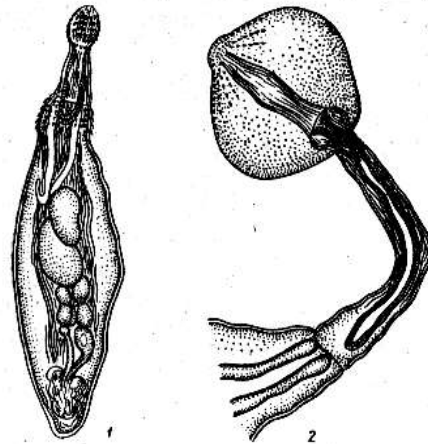
7. Morphological characteristics of pathogens of Acanthocephaloses of poultry:

*Polymorphus magnus*



- 1 - \_\_\_\_\_
- 2 - \_\_\_\_\_
- 3 - \_\_\_\_\_

*Filicollis anatis*



- 1 - \_\_\_\_\_
- 2 - \_\_\_\_\_

8. Sources and ways of invasion of animals by polymorphosis and filicollis:

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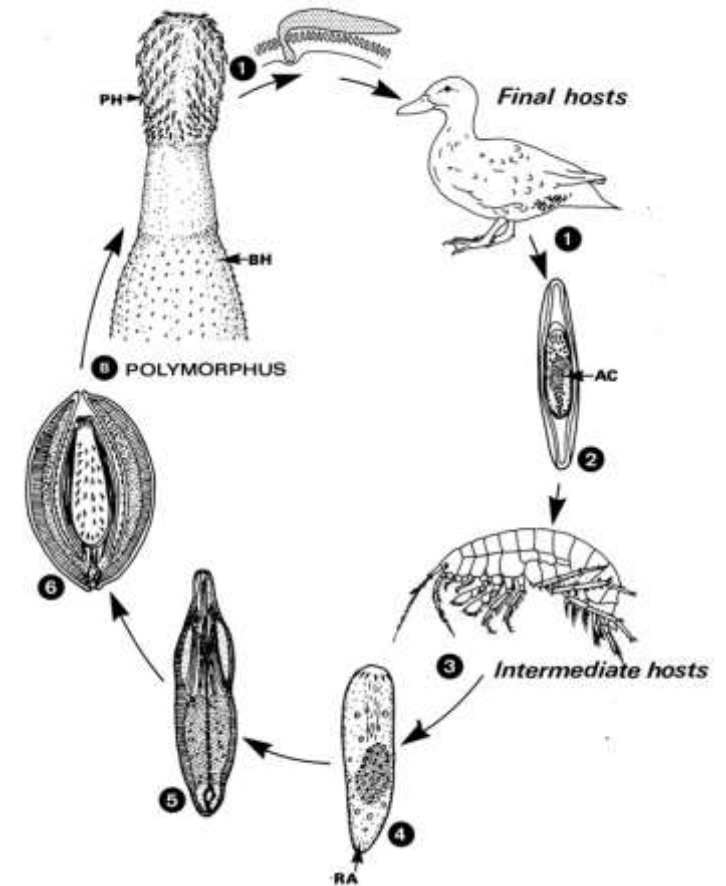
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Life cycle of *F. anatis*

([https://link.springer.com/referenceworkentry/10.1007%2F3-540-29834-7\\_8](https://link.springer.com/referenceworkentry/10.1007%2F3-540-29834-7_8))



9. Features of life-time and post-mortem diagnostics, differential diagnosis of differential diagnostics Acanthocephaloses in poultry:

Clinical signs \_\_\_\_\_

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Pathoanatomical changes \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Special laboratory diagnostics \_\_\_\_\_  
\_\_\_\_\_  
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10. Measures of control and ways of prevention. Therapeutic drugs.

Treatment \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Prevention \_\_\_\_\_  
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\_\_\_\_\_

**Material and technical supply.** Microscopes, magnifying glass, permanent macro preparations, temporary and permanent micro preparations, Intermediate hosts. Tables, schemes, invasive animals or freshly obtained faeces from them. Samples of drugs.

« \_\_\_\_\_ » \_\_\_\_\_ **20 p.**      **Signatures: Student** \_\_\_\_\_      **Lecturer** \_\_\_\_\_

**TOPIC:** Characteristics of Arthropoda of subclass Acari. Ticks’ taxonomy. Parasitiformes ticks. Morphological identification of Ixodides to the genus and their biological classification.

**Class location – classroom, laboratory, museum of the department.**

**Purpose of the lesson:** To study the morphological and biological and ecological features of Ixodidae ticks, determine their place in the world animal’s classification. According to morphological features learn to identify and differentiate Ixodidae ticks to the genus. Medical and veterinary importance of Ixodidae ticks. To get acquainted with modern acaricides and with the peculiarities of their use in different types of animals.

**Task:** To study anatomical and diagnostic signs of structure of parasitiformes ticks of the family *Ixodidae* using permanent macro- and micropreparations. To learn to determine stages of their life cycle (egg, larva, nymph, imago) and sex. Mark the morphological structures of the parasite on its graphic image.

Independently prepare for classes using recommended books (1–4), lecture material and electronic files from the discipline «Parasitology and invasive diseases of animals» at the «Portal of educational information resources of MOODLE».

**Auditory work.** To study the morphological features of Ixodidae ticks using the museum material (permanent macropreparations, temporary and permanent micropreparations) and to make a drawing or mark in pictures the basic diagnostic features of them. Independently differentiate ticks to the genus. Get acquainted with samples of modern acaricides and schemes of their use for control this group of parasites.

Task performance:

1. The place of Ixodidae ticks in the world animals’ system (classification):

Phylum \_\_\_\_\_

Family \_\_\_\_\_

Class \_\_\_\_\_

Genus \_\_\_\_\_

Genus \_\_\_\_\_

Subclass \_\_\_\_\_

Genus \_\_\_\_\_

Genus \_\_\_\_\_

Order \_\_\_\_\_

Genus \_\_\_\_\_

Genus \_\_\_\_\_

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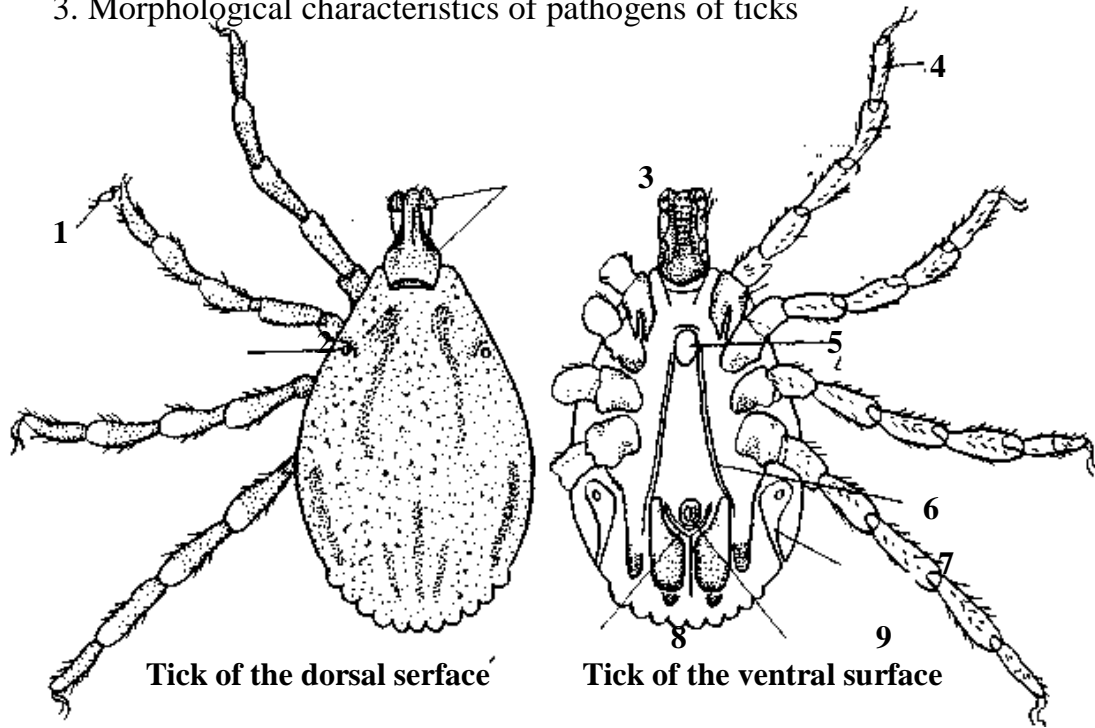
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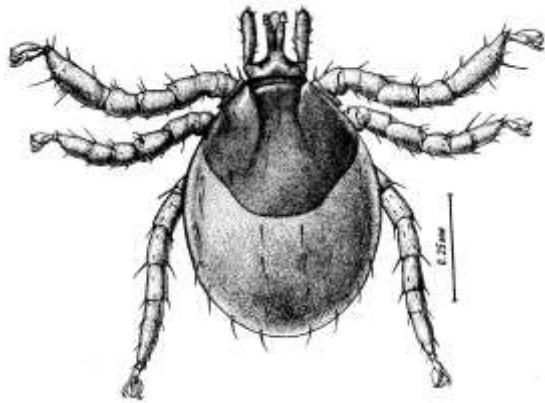
3. Morphological characteristics of pathogens of ticks



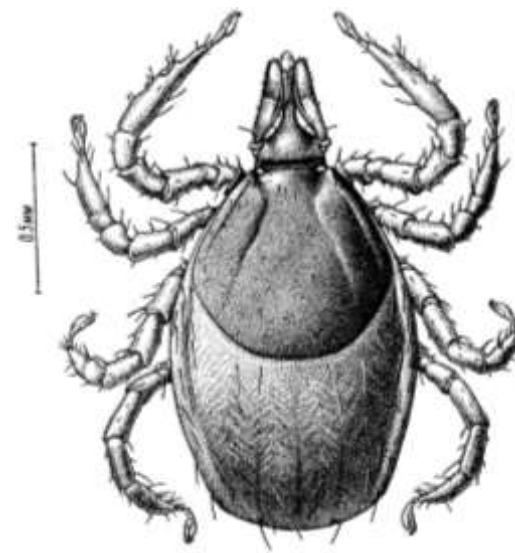
- 1 - \_\_\_\_\_
- 2 - \_\_\_\_\_
- 3 - \_\_\_\_\_
- 4 - \_\_\_\_\_
- 5 - \_\_\_\_\_
- 6 - \_\_\_\_\_
- 7 - \_\_\_\_\_
- 8 - \_\_\_\_\_
- 9 - \_\_\_\_\_

Tick of the dorsal surface

Tick of the ventral surface



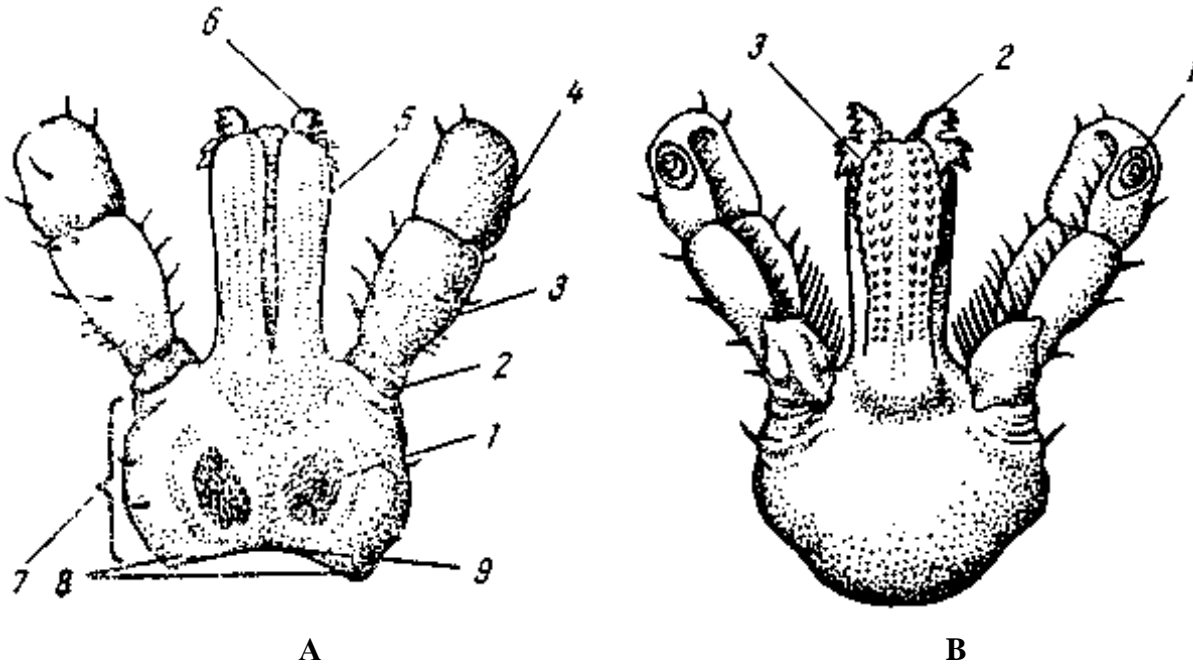
Larva



Nymph



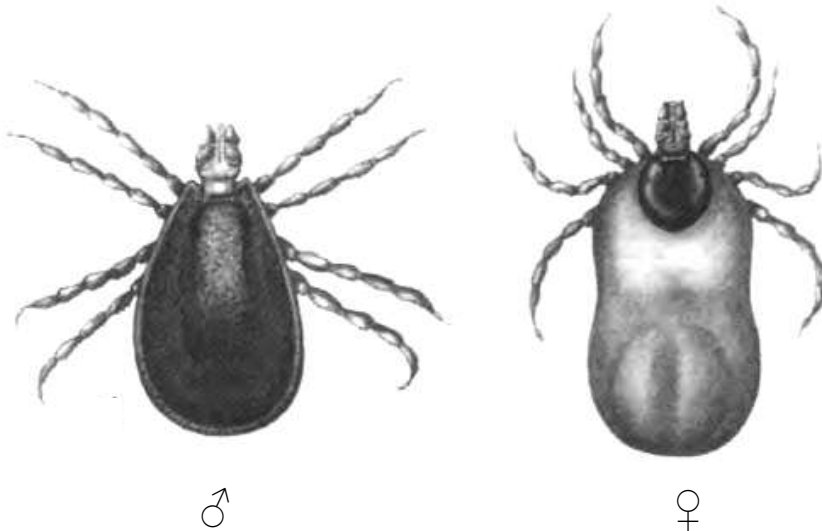
### Mouthparts of Ixodidae ticks:



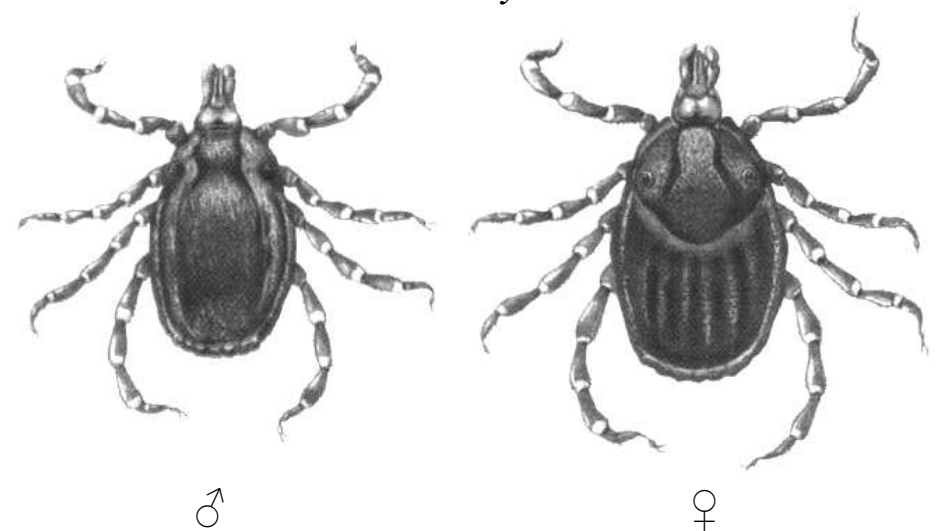
A - from the dorsal surface: 1 - pore fields; 2, 3 and 4 - joints of palps; 5 - chelicera case; 6 - chelicerae hooks; 7 - basis capituli; 8 - cornua; 9 - the posterior edge of the base of the basis capituli;

B - from the ventral surface: 1 - the fourth joint of the palps; 2 - chelicerae hooks; 3 - hypostome

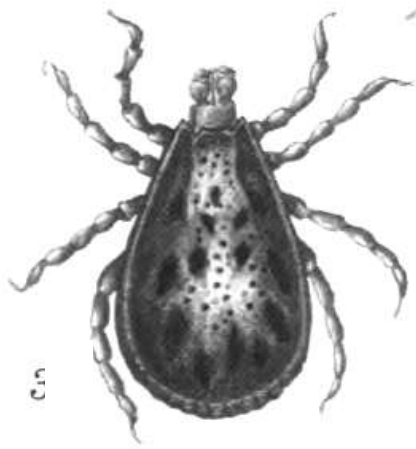
### Genus *Ixodes*



### Genus *Hyalomma*



**Genus *Dermacentor***



♂

♂



♀

**Genus *Haemaphysalis***



♂



♀

**Genus *Rhipicephalus***

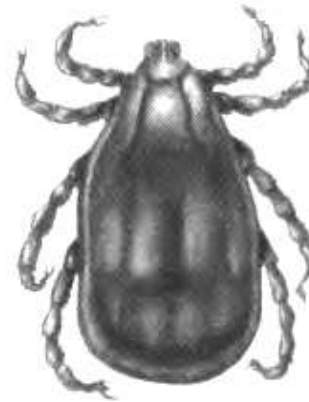


♂



♀

**Genus *Boophilus***



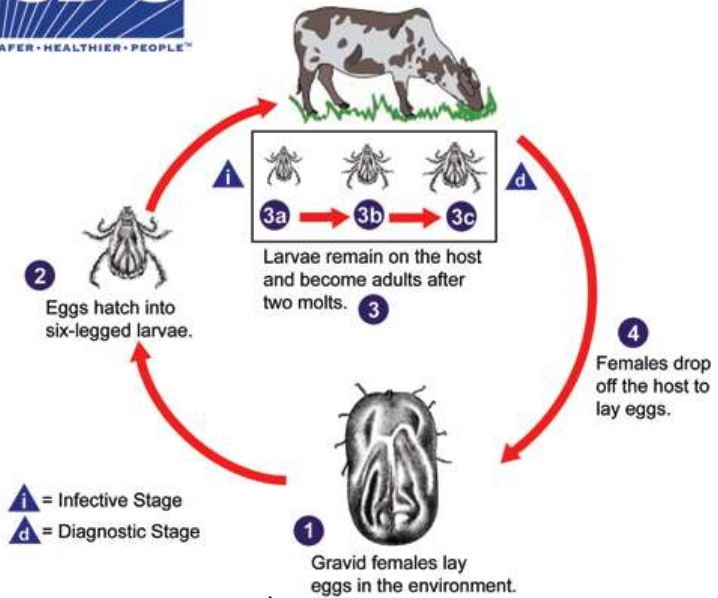
♂



♀

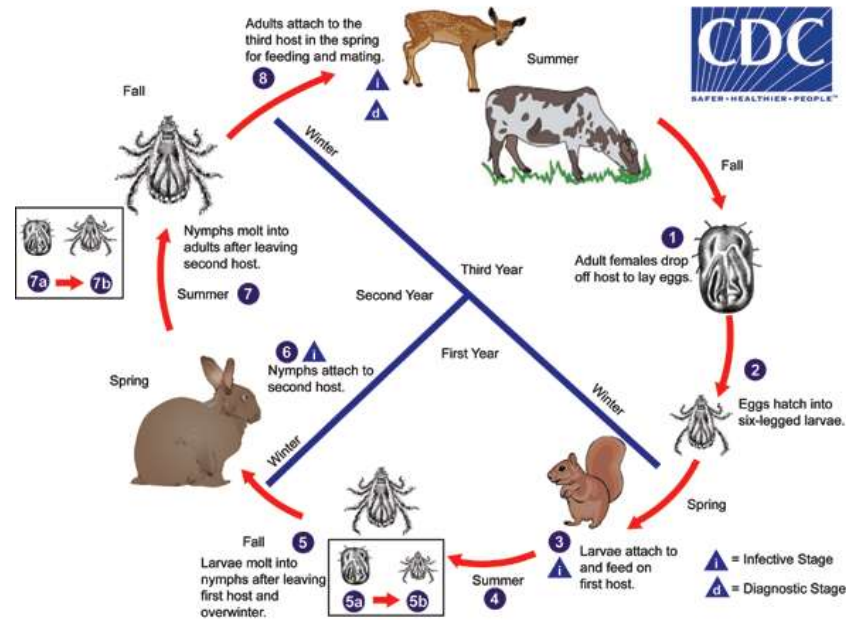
Life cycle of Ixodidae ticks depending on the peculiarities of development and nutrition (L – larva, N – Nymph, I – imago)

(<https://www.cdc.gov/dpdx/ticks/index.html>)

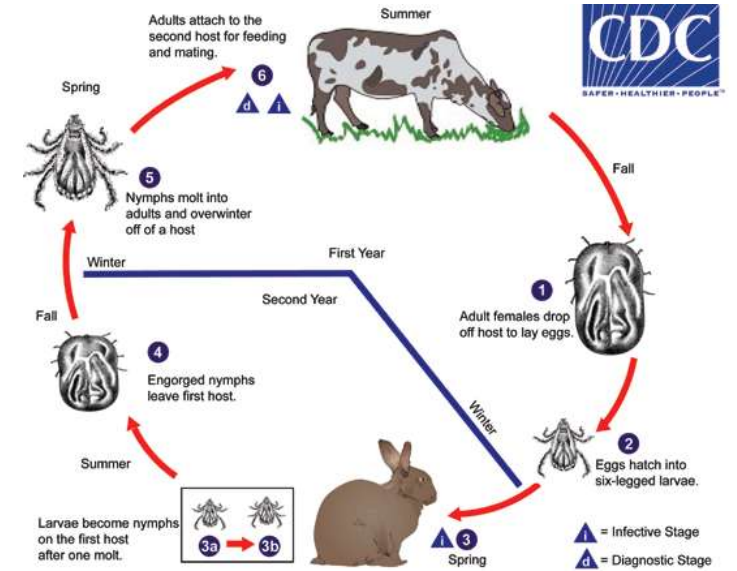


One-host life cycle

Three-host life cycle



Two-host life cycle



3. Sources and ways of invasion of animals by Ixodidae ticks.

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4. Harmfulness and medical and veterinary importance of Ixodide ticks

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5. Measures of control and ways of prevention of Ixodidae ticks. Acaricides and schemes of their application.

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**Material and technical supply.** Microscopes, magnifying glass, permanent macro preparations, temporary and permanent micro preparations, Intermediate hosts. Tables, schemes, sick animals. Samples of acaricides.

« \_\_\_ » \_\_\_\_\_ **20 p.**      **Signatures: Student** \_\_\_\_\_      **Lecturer** \_\_\_\_\_

**TOPIC:** Characteristics of Arthropoda of subclass Acari. Ticks' taxonomy. Parasitiformes ticks. Morphological identification of Argasidae and Dermanyssidae ticks to the genus and their biological classification.

**Class location – classroom, laboratory, museum of the department.**

**Purpose of the lesson:** To study the morphological and biological and ecological features of Ixodidae ticks, Argasidae and Dermanyssidae ticks determine their place in the world animal's classification. According to morphological features learn to identify and differentiate Ixodidae ticks and Argasidae and Dermanyssidae ticks to the genus. Medical and veterinary importance of Parasitiformes ticks. To get acquainted with modern acaricides and with the peculiarities of their use in different types of animals.

**Task:** To study anatomical and diagnostic signs of structure of parasitiformes ticks of the family Ixodidae, Argasidae and Dermanyssidae ticks using permanent macro- and micropreparations. To learn to determine stages of their life cycle (egg, larva, nymph, imago) and sex. Mark the morphological structures of the parasite on its graphic image.

Independently prepare for classes using recommended books (1–4), lecture material and electronic files from the discipline «Parasitology and invasive diseases of animals» at the «Portal of educational information resources of MOODLE».

**Auditory work.** To study the morphological features of Ixodidae, Argasidae and Dermanyssidae ticks ticks using the museum material (permanent macropreparations, temporary and permanent micropreparations) and to make a drawing or mark in pictures the basic diagnostic features of them. Independently differentiate ticks to the genus. Get acquainted with samples of modern acaricides and schemes of their use for control this group of parasites.

**Task performance:**

1. The place Argasidae and Dermanyssidae ticks in the world animals system (classification):

Phylum \_\_\_\_\_ Class \_\_\_\_\_ Subclass \_\_\_\_\_ Order \_\_\_\_\_

Family \_\_\_\_\_ Family \_\_\_\_\_

Genus \_\_\_\_\_ Genus \_\_\_\_\_ Genus \_\_\_\_\_

2. Sources and ways of invasion of animals by Argasidae and Dermanyssidae ticks:

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3. Morphological characteristics of pathogens of Argasidae and Dermanyssidae ticks:

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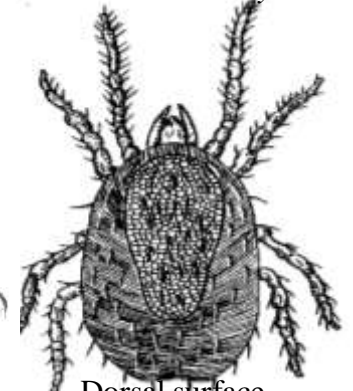
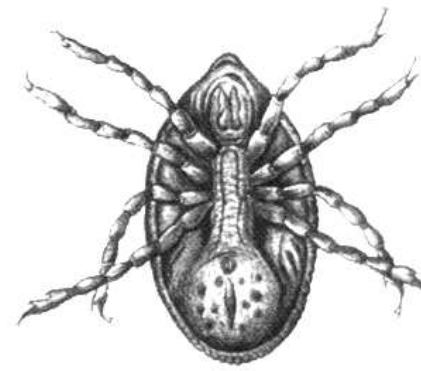
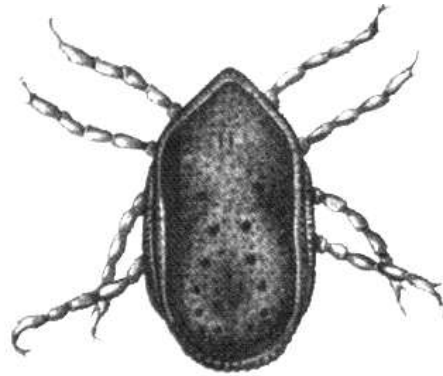
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4. Morphological characteristics of pathogens of Argasidae and Dermanyssidae ticks

Genus *Argas*

Genus *Alveonatus*

Genus *Dermanyss*



Dorsal surface

Ventral surface

Dorsal surface

Ventral surface

Dorsal surface

5. Diagnosis peculiarities for Argasidae and Dermanyssidae ticks:

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6. Measures to control animals' argassids and dermanyssids and ways of prevention. Acaricides and schemes of their application.

Material and technical supply. Microscopes, magnifying glass, permanent macro preparations, temporary and permanent micro preparations, Intermediate hosts. Tables, schemes, sick animals. Samples of acaricides.

« \_\_\_ » \_\_\_\_\_ **20 p.**      **Signatures: Student** \_\_\_\_\_      **Lecturer** \_\_\_\_\_

**TOPIC:** Acariformes mites. Sarcoptoidoses of animals. Diagnostics and differential diagnosis of sarcoptosis and notoedrosis.

**Class location – classroom, laboratory, museum of the department.**

**Purpose of the lesson:** To study morphological-biological and ecological features of pathogens of pigs' sarcoptosis (*Sarcoptes sius*, *S. palvula*), ruminant (*S. bovis*, *S. ovis*, *S. caprae*), horse (*S. equi*), carnivorous (*S. canis*, *S. vulpis*), notoedrosis of rabbit and carnivorous (*Notoedres cuniculi*, *N. cati*). Determine their place in the system of the animal world. According to morphological features learn to identify and differentiate sarcoptid mites to the genus. Medical and veterinary significance of acariformes mites of this family. Get acquainted with modern acaricides and the peculiarities of their use in the treatment and prevention of animals.

**Task:** To study the anatomical structure of sarcoptoid mites on permanent micro- and macro-preparations and to learn to differentiate the stages of their development - egg, larva, nymph, adult. Mark the morphological structures of parasites on its graphic image. Master the methods of lifelong diagnosis and differentiate from diseases with a similar course.

Independently prepare for classes using recommended books (1–4), lecture material and electronic files from the discipline «Parasitology and invasive diseases of animals» at the «Portal of educational information resources of MOODLE».

**Auditory work.** To study and make a drawing or mark in pictures the basic diagnostic features of pathogens of these diseases using the museum material (macropreparations), temporary and permanent micropreparations. Carry out clinical and parasitological examination of animals, make a diagnostics and differential diagnosis, and appoint treatment. Get acquainted with the arsenal of medicines recommended for control this group of diseases.

Task performance:

1. The place of pathogens of animals in the world animals system (classification):

Phylum \_\_\_\_\_ Order \_\_\_\_\_ Family \_\_\_\_\_

Class \_\_\_\_\_ Suborder \_\_\_\_\_ Genus \_\_\_\_\_

SubClass \_\_\_\_\_ SuperFamily \_\_\_\_\_ Genus \_\_\_\_\_

Definition: \_\_\_\_\_

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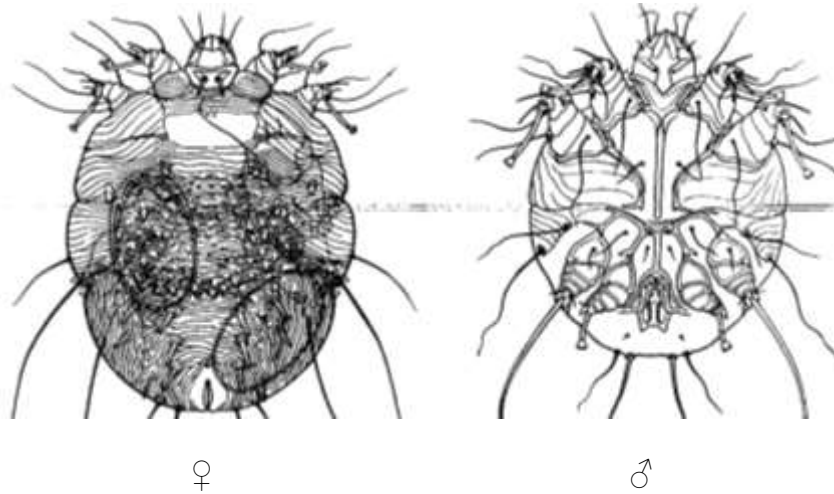
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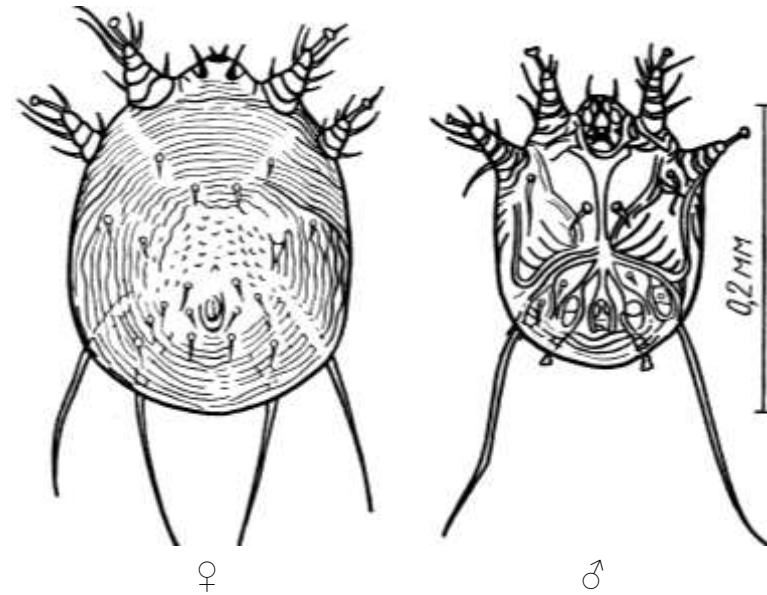
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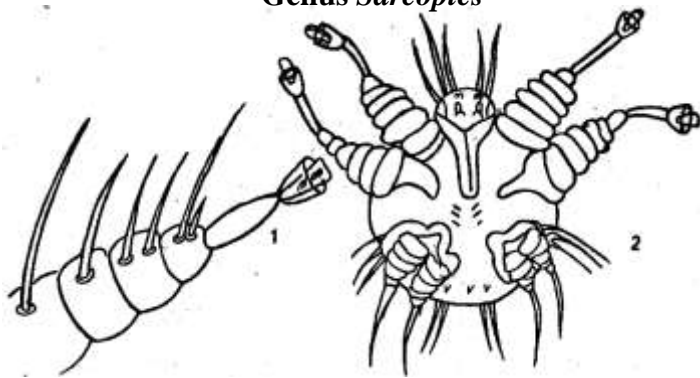
2. Morphological characteristics of pathogens of animals' Sarcoptosis:



**Genus *Sarcoptes***



**Genus *Notoedres***



1 - \_\_\_\_\_

2 - \_\_\_\_\_



**Female of genus *Sarcoptes* in subcutaneous layer of the skin**

3. Morphological characteristics of pathogens of Sarcoptosis:

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4. Sources and ways of invasion of animals by mites of genus Sarcoptes and Notoedres:

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5. Clinical signs of sarcoptoses:

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6. Features of life-time and post-mortem diagnostics, differential diagnosis of animals' sarcoptoses:

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7. Measures of control and ways of prevention. Therapeutic drugs:

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**Material and technical supply.** Microscopes, magnifying glass, permanent macro preparations, temporary and permanent micro preparations, Intermediate hosts. Tables, schemes, sick animals. Samples of acaricides.

« \_\_\_\_ » \_\_\_\_\_ **20** p.      **Signatures: Student** \_\_\_\_\_      **Lecturer** \_\_\_\_\_

**TOPIC:** Psoroptidoses of animals: diagnostics and differential diagnosis of psoroptosis, chorioptosis and otodectosis of animals.

**Class location – classroom, laboratory, museum of the department.**

**Purpose of the lesson:** To study the morphological and biological characteristics of pathogens of psoroptosis of animals (*Psoroptes ovis*, *P. bovis*, *P. equi*, *P. cuniculi*), (*Chorioptes ovis*, *Ch. bovis*, *Ch. equi*, *Ch. cuniculi*) and otodectoses of carnivorous (*Otodectes canis*, *O. vulpis*, *O. cati*). Their place in classification. Get acquainted with modern acaricides and the peculiarities of their use in the treatment and prevention of animals.

**Task:** To study the morphological features of pathogens of these families using macro- and micropreparations, to know the peculiarities of their development. To master features of diagnostics and differential diagnosis of these diseases. To study the samples of acaricidal preparations, their use for therapeutic and preventive purposes. To master practically basic methods of laboratory diagnostics of a group of acaroses diseases of animals.

Independently prepare for classes using recommended books (1–4), lecture material and electronic files from the discipline «Parasitology and invasive diseases of animals» at the «Portal of educational information resources of MOODLE».

**Auditory work.** To study and make a drawing or mark in pictures the basic diagnostic features of pathogens of these diseases using the museum material (macropreparations), temporary and permanent micropreparations. Carry out clinical and parasitological examination of animals, make a diagnostics and differential diagnosis, appoint treatment. Get acquainted with the arsenal of medicines recommended for control this group of diseases.

Task performance:

1. 1. The place of pathogens of animals in the world animals system (classification):

Phylum _____	Order _____	Family _____
Class _____	Suborder _____	Genus _____
SubClass _____	SuperFamily _____	Genus _____

Definition: \_\_\_\_\_

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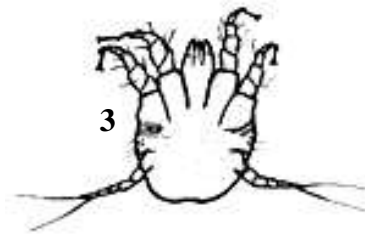
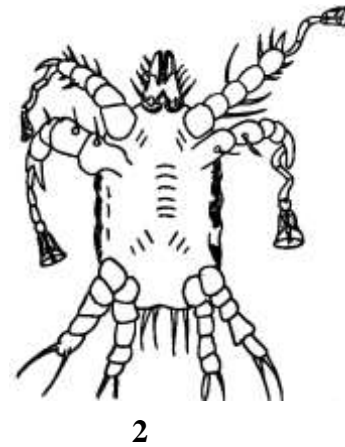
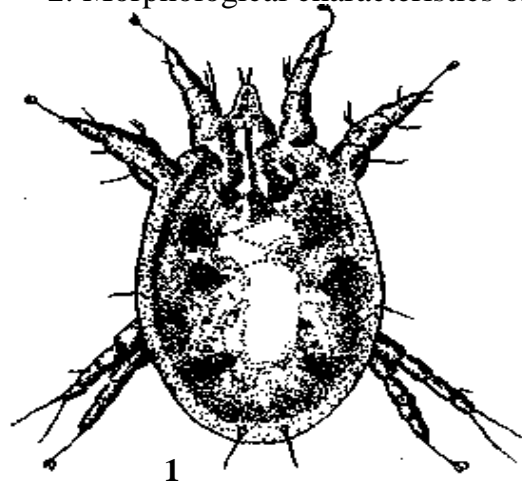
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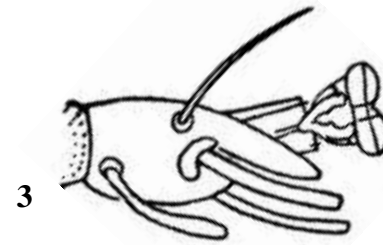
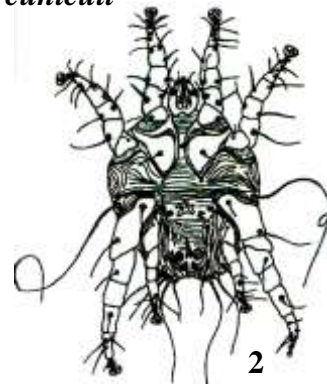
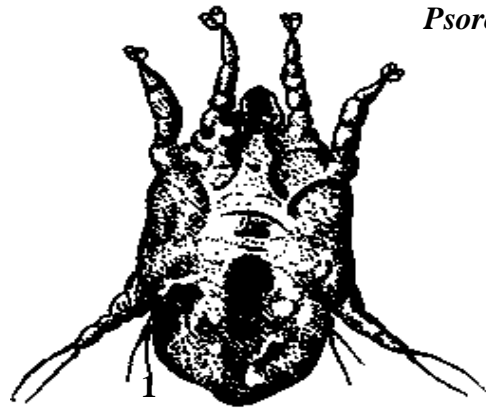
\_\_\_\_\_

2. Morphological characteristics of pathogens of ticks – psoroptoses and otodectosis of carnivorous:



- 1 - \_\_\_\_\_
- 2 - \_\_\_\_\_
- 3 - \_\_\_\_\_
- 4 - \_\_\_\_\_
- 5 - \_\_\_\_\_

*Psoroptes cuniculi*



- 1 - \_\_\_\_\_
- 2 - \_\_\_\_\_
- 3 - \_\_\_\_\_

*Otodectes cynotis*

3. Morphological characteristics of pathogens of psoroptoses and otodectosis:

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4. Sources and ways of invasion of animals by animals' psoropteses and otodecteses:

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5. Clinical signs of psoroptoses and otodectosis:

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6. Features of life-time and post-mortem diagnostics, differential diagnosis of i differential diagnostics of psoroptoses and otodectosis animals:

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7. Measures of control and ways of prevention. Therapeutic drugs for psoroptoses and otodectosis of animals.

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**Material and technical supply.** Microscopes, magnifying glass, permanent macro preparations, temporary and permanent micro preparations, Intermediate hosts. Tables, schemes, sick animals. Samples of acaricides.

« \_\_\_\_\_ » **20** p.      **Signatures: Student** \_\_\_\_\_      **Lecturer** \_\_\_\_\_

## LABORATORY CLASS № 13

« \_\_\_\_ » \_\_\_\_\_ 202\_\_ .

**TOPIC:** Trombidiformes mites. Diagnostics and differential diagnosis of poultry' knemidocoptosis and demodecosis of animals.

**Content module V. «Veterinary acarology and acaroses of animals»**

**Class location – classroom, laboratory, museum of the department.**

**Purpose of the lesson:** To study the morphological and biological characteristics of pathogens of demodecosis of animals (*Demodex bovis*, *D. canis*, *D. phylloides*, *D. ovis*, *D. equi*, *D. cati*, *D. caprae*) and knemidocoptosis of poultry (*Knemidocoptes mutans*, *Kn. gallinae*). Their place in classification. Get acquainted with modern acaricides and the peculiarities of their use in the treatment and prevention of animals.

**Task:** To study the morphological features of pathogens of these families using macro- and micropreparations, to know the peculiarities of their development. To master features of diagnostics and differential diagnosis of these diseases. To study the samples of acaricidal preparations, their use for therapeutic and preventive purposes. To master practically basic methods of laboratory diagnostics of a group of acaroses diseases of animals.

Independently prepare for classes using recommended books (1–4), lecture material and electronic files from the discipline «Parasitology and invasive diseases of animals» at the «Portal of educational information resources of MOODLE».

**Auditory work.** To study and make a drawing or mark in pictures the basic diagnostic features of pathogens of these diseases using the museum material (macropreparations), temporary and permanent micropreparations. Carry out clinical and parasitological examination of animals, make a diagnostics and differential diagnosis, appoint treatment. Get acquainted with the arsenal of medicines recommended for control this group of diseases.

Task performance:

1. 1. The place of pathogens of animals in the world animals system (classification):

Phylum \_\_\_\_\_ Suborder \_\_\_\_\_ Suborder \_\_\_\_\_

Class \_\_\_\_\_ Family \_\_\_\_\_ Family \_\_\_\_\_

SubClass \_\_\_\_\_ Genus \_\_\_\_\_ Genus \_\_\_\_\_

Order \_\_\_\_\_

Definition: \_\_\_\_\_

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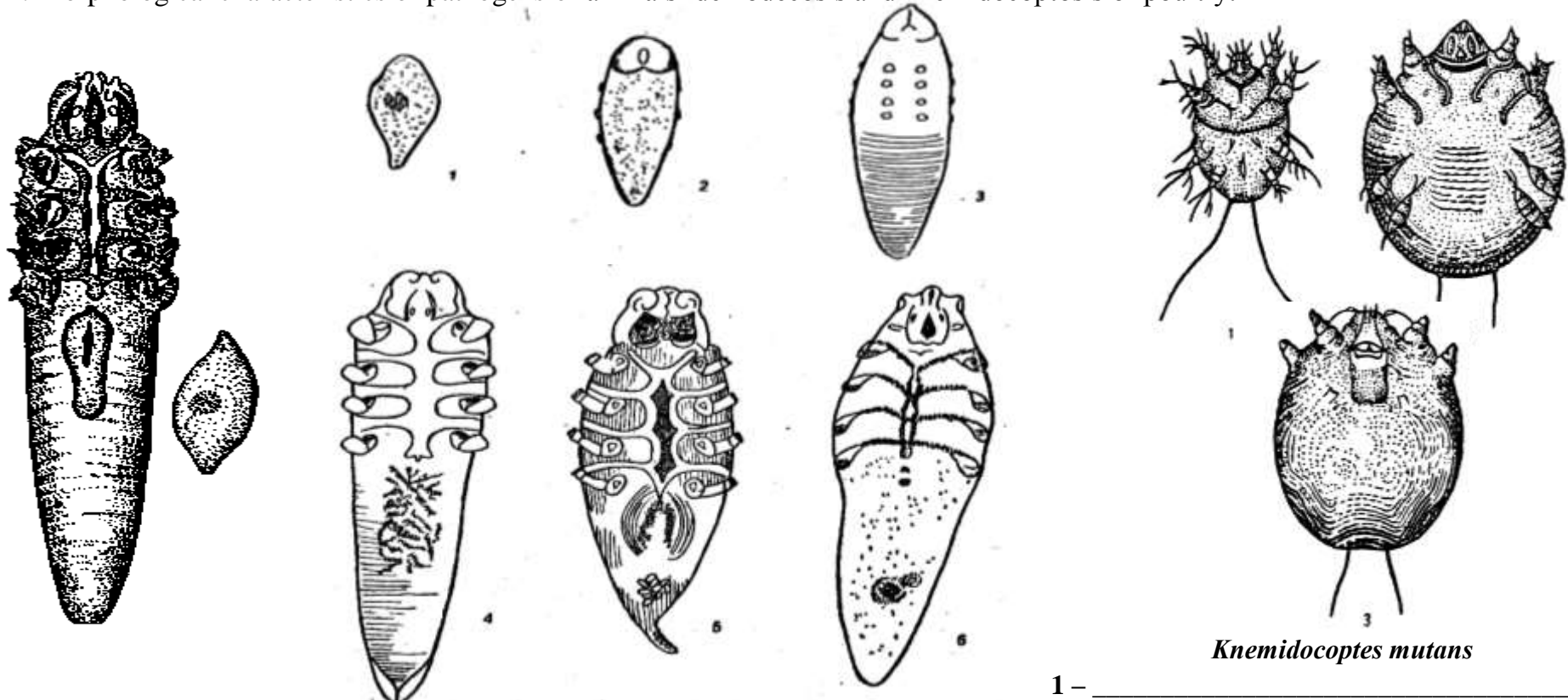


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2. Morphological characteristics of pathogens of animals' demodectosis and knemidocoptosis of poultry:



Demodex of animals: 1 – egg; 2 – larva; 3 – nymph; 4 – dog's demodex;  
5 – pig's demodex; 6 – bovine demodex

- 1 – \_\_\_\_\_
- 2 – \_\_\_\_\_
- 3 – \_\_\_\_\_

*Knemidocoptes mutans*

3. Sources and ways of invasion of animals by knemidocoptes and demodex:

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6. Features of life-time and post-mortem diagnostics, differential diagnosis of differential diagnostics knemidocoptosis and demodecosis:

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7. Measures of control and ways of prevention. Therapeutic drugs.

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**Material and technical supply.** Microscopes, magnifying glass, permanent macro preparations, temporary and permanent micro preparations, Intermediate hosts. Tables, schemes, sick animals. Samples of acaricides.

«\_\_\_\_» \_\_\_\_\_ **20** p.      **Signatures: Student** \_\_\_\_\_      **Lecturer** \_\_\_\_\_

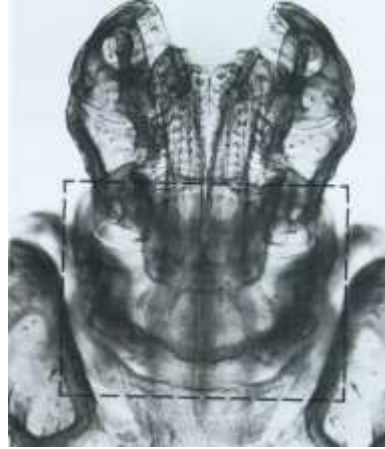
Pictures for the section «Veterinary acarology and acaroses of animals»



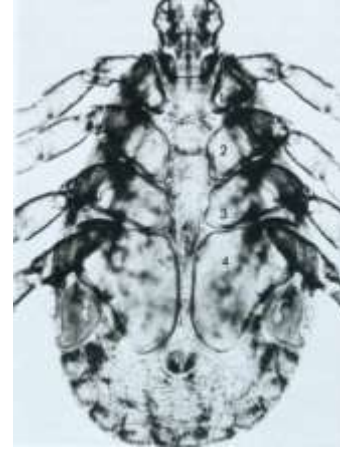
1. Mouthparts of *Boophilus calcaratus*.



2. Mouthparts of *Hyalomma scupense*.



3. Mouthparts of *Dermacentor marginatus*.



4. Male *D. marginatus* ventral surface.



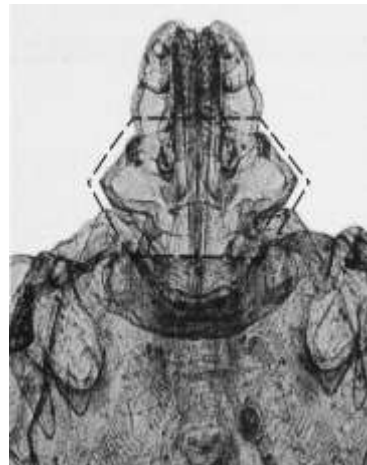
5. Male *D. marginatus* dorsal surface.



6. Male *Rhipicephalus bursa* ventral surface.



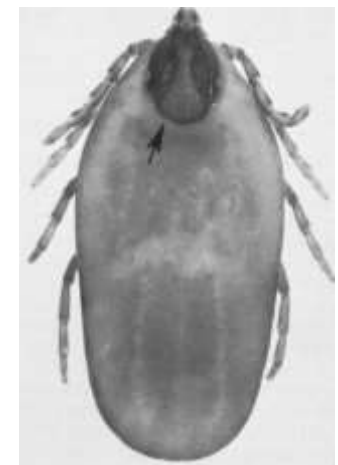
7. Larva *Rh. bursa*.



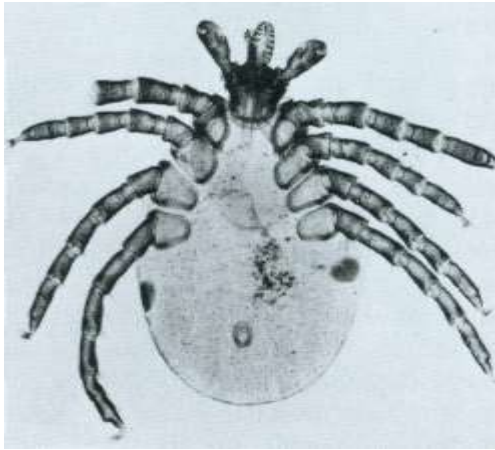
8. Mouthparts of *Rh. bursa*.



9. *Rh. bursa* male.



10. *Rh. bursa* female.



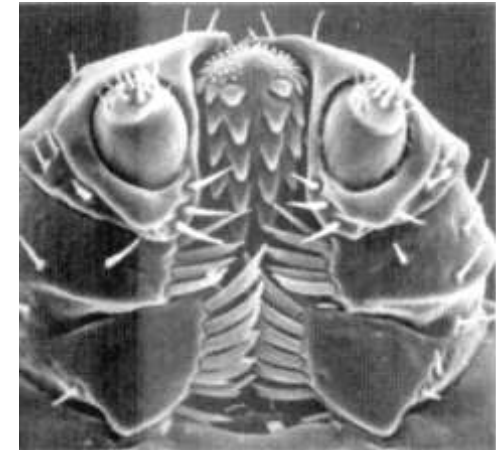
11. Nymph *Ixodes ricinus*.



12. Female *I. ricinus*  
ventral surface.



13. Female *I. ricinus*.



14. Mouthparts of ventral surface.

Photo by: Nikiforova O.V.



15. Foot with a pad and claws of  
*D. reticulatus*

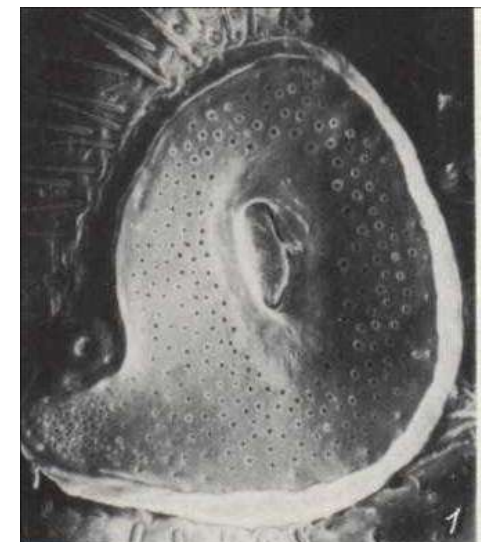
Photo by: Nikiforova O.V.



16. Capitulum of nymph *Ixodes ricinus*



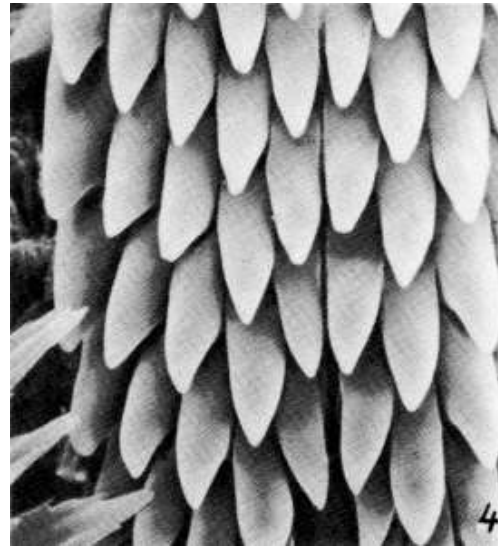
17. Peritreme of female *Rh. bursa*



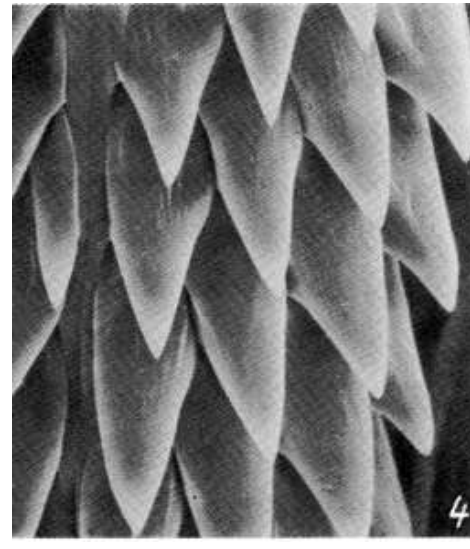
18. Peritreme of male *Rh. bursa*



19. Hypostome and palp of *Haemaphysalis punctata*



20. Recurved teeth in the middle part of hypostome *Haem. punctata*



21. Recurved teeth in the middle part of hypostome of *Haem. sulcata*



22. Capitulum of nymph of *Rhipicephalus*



23. The front part of the body *Rhipicephalus*.



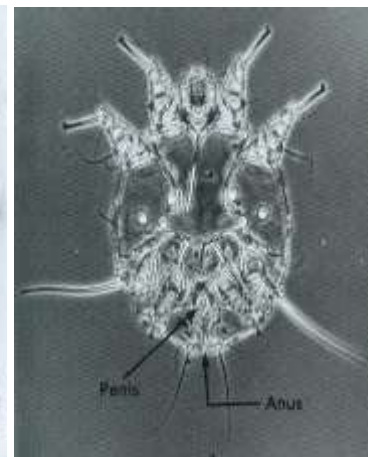
24. *Haemaphysalis otophila*.



25. *Argas persicus*.



26. *Argas persicus*.



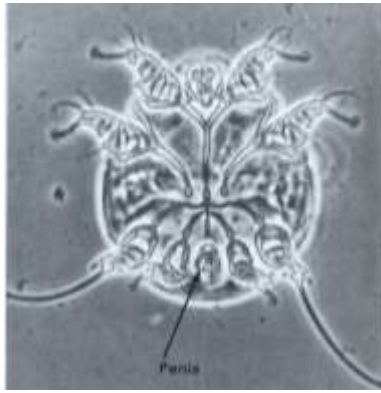
27. Male *Sarcoptes suis*.



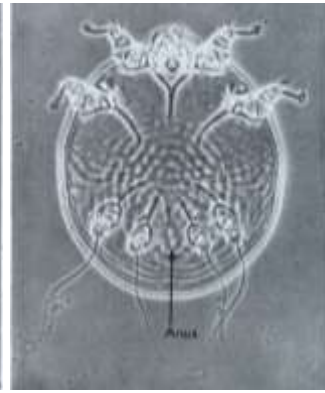
28. Female *S. suis*.



29. *S. suis*.



30. Male *Notoedres cati*.



31. Female *N. cati*.



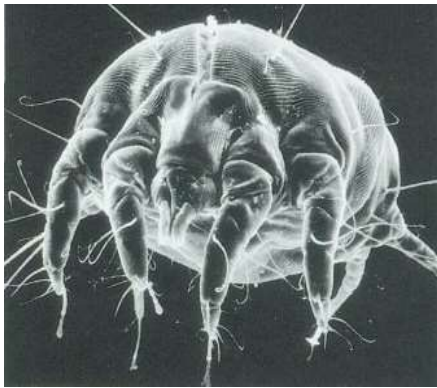
32. Male *Psoroptes ovis* dorsal surface.



33. Female *P. ovis* lateral surface.



34. Leg of *P. ovis*.



35. *P. ovis*.



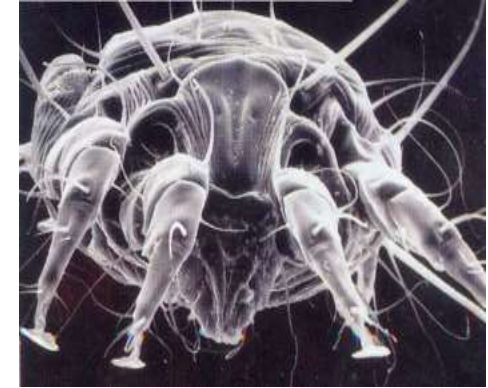
36. Male *Chorioptes ovis*



37. Female *Ch. ovis*.



38. Leg of *Ch. ovis*



39. *Ch. bovis*.



40. Male *Otodectes cynotis*.



41. Female *O. cynotis*.



42. Leg of *O. cynotis*.



43. *Demodex canis*.



44. *D. cati*.



45. Female *Knemidocoptes gallinae*.

**TOPIC:** Characteristics of Arthropoda of Class Insecta. Botfly invasions of animals: diagnostics and differential diagnosis of cattle's hypodermosis. Botfly invasions of animals: diagnostics and differential diagnosis of and gastrophilosis of soliped

**Class location – classroom, laboratory, museum of the department.**

**Purpose of the lesson:** To study the morphological and biological characteristics of insects, their place in classification of parasitic arthropods. Get acquainted with the features of insects that have medical and veterinary significance. To study the morphological features of different stages of pathogens of cattle hypodermosis (*Hypoderma bovis*, *H. lineatum*) and gastrophilosis of horses (*Gastrophilus pecorum*, *Gastrophilus intestinalis*, *Gastrophilus veterinus*, *Gastrophilus haemorrhoidalis*). Master the methods of in vivo diagnosis and differential diagnosis of cattle hypodermosis and gastrophilosis of horses. Get acquainted with the arsenal of insecticides and their use.

**Task:** To study the morphological characteristics, know the features of the biology of insects. To study and define on the given schemes the basic (diagnostic) morphological characteristics of hypoderms and gastrophiluses, to know features of their biology. Master the methods of lifelong diagnosis and differentiate from diseases with a similar course. Get acquainted with the samples of insecticides and features of application in the treatment and prevention treatments.

Independently prepare for classes using recommended books (1–4), lecture material and electronic files from the discipline «Parasitology and invasive diseases of animals» at the «Portal of educational information resources of MOODLE».

**Auditory work.** On the museum material - permanent macropreparations, as well as temporary or permanent micropreparations to study the morphological features of insects, namely the causative agents of ruminant hypodermosis and gastrophilosis of horses, to mark them on the diagrams. Get acquainted with the samples of insecticides and the peculiarities of their use in these diseases in cattle and sheep and horses.

Task performance:

1. Morphological characteristics of pathogens of botfly invasions

Phylum _____	Class _____	Subclass _____
Subclass _____	Order _____	Order _____
Suborder _____	Suborder _____	Family _____
Family _____	Family _____	Family _____
Family _____	Family _____	Order _____
Family _____	Family _____	Family _____
Family _____	Family _____	Family _____
Family _____	Suborder _____	Family _____
Family _____	Family _____	Order _____
Family _____		Family _____
		Family _____
	Order _____	Order _____





3. The place of pathogens of animals' hypodermosis in the world animals system (classification):

Phylum \_\_\_\_\_

Class \_\_\_\_\_

Order \_\_\_\_\_

Family \_\_\_\_\_

Subclass \_\_\_\_\_

Suborder \_\_\_\_\_

Genus \_\_\_\_\_

Definition: \_\_\_\_\_

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4. Sources and ways of invasion of animals by ruminant hypodermosis.

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5. Morphological peculiarities of hypodermas:

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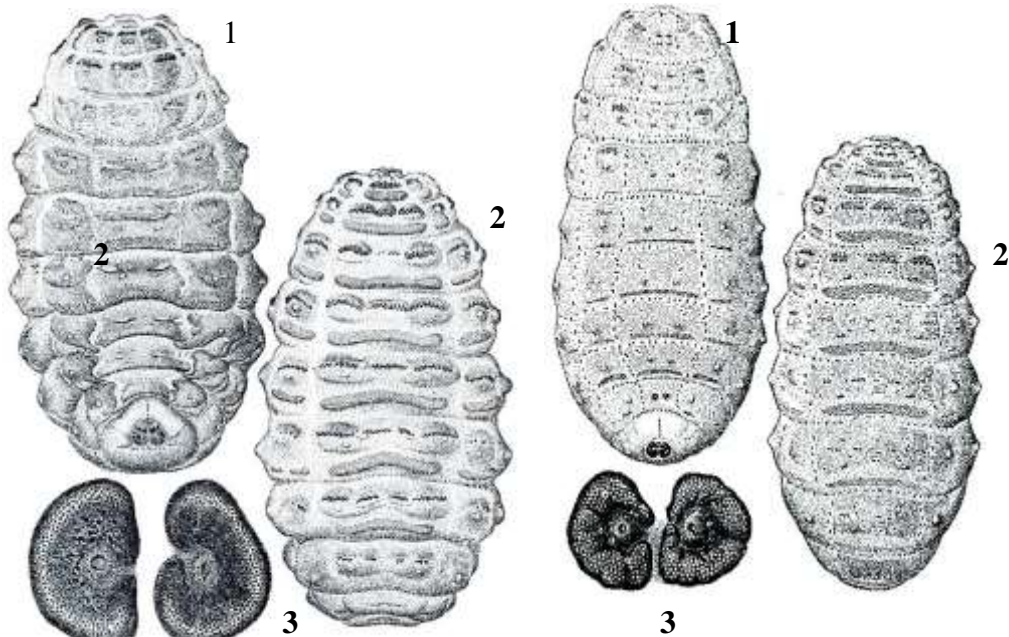
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6. Morphological characteristics of pathogens of cattle's hypodermosis:

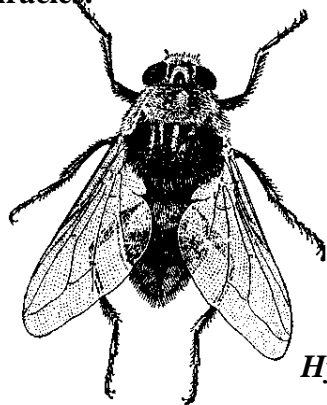


Larvae III stage:

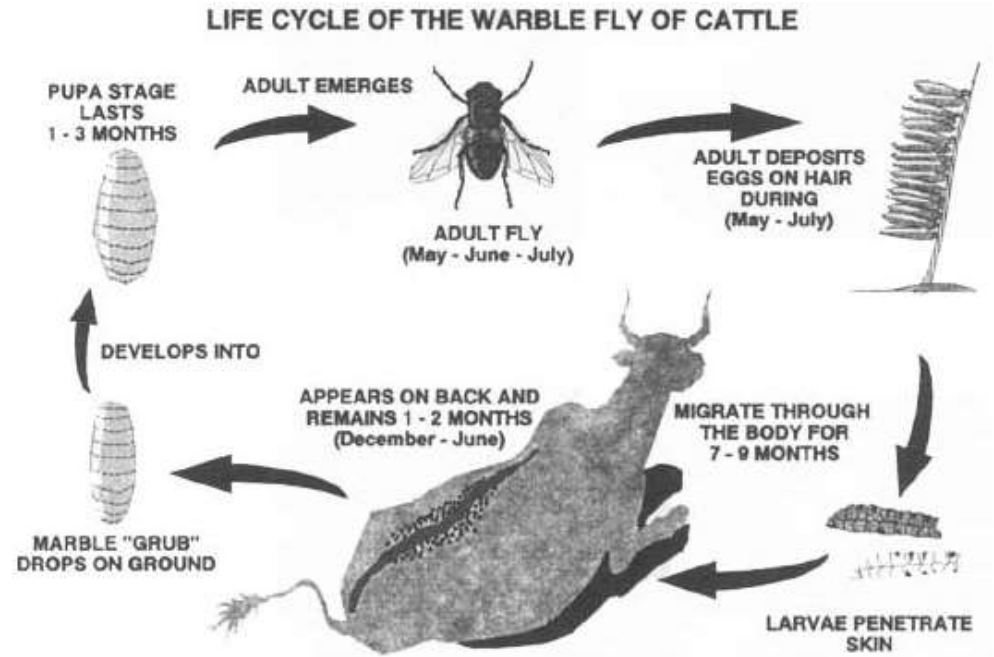
*Hypoderma bovis*:

*Hypoderma lineatum*

1 – general view from the back; 2 - general view from the abdominal side;  
3 - spiracles.



Adults  
*Hypoderma bovis*



Life cycle of genus *Hypoderma*

- 1 – \_\_\_\_\_
- 2 – \_\_\_\_\_
- 3 – \_\_\_\_\_
- 4 – \_\_\_\_\_
- 5 – \_\_\_\_\_
- 6 – \_\_\_\_\_
- 7 – \_\_\_\_\_

7. Clinical signs of hypodermosis:

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8. Features of life-time and post-mortem diagnostics, differential diagnosis of cattle hypodermosis:

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9. Measures of control and ways of prevention. Therapeutic drugs. Insecticides and schemes of their use in this disease.

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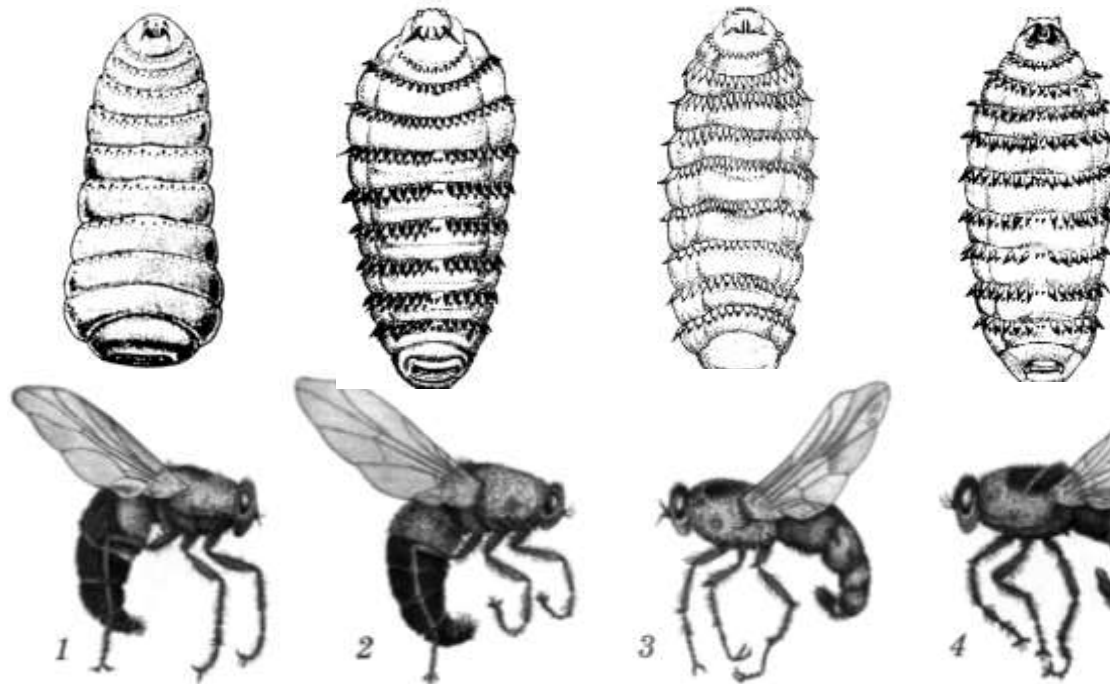
10. The place of pathogens of animals' gastrophilosis in the world animals system (classification):

Phylum \_\_\_\_\_

Class \_\_\_\_\_ Order \_\_\_\_\_ Family \_\_\_\_\_

Підклас \_\_\_\_\_ Suborder \_\_\_\_\_ Genus \_\_\_\_\_

11. Morphological characteristics of pathogens gastrophilosis:

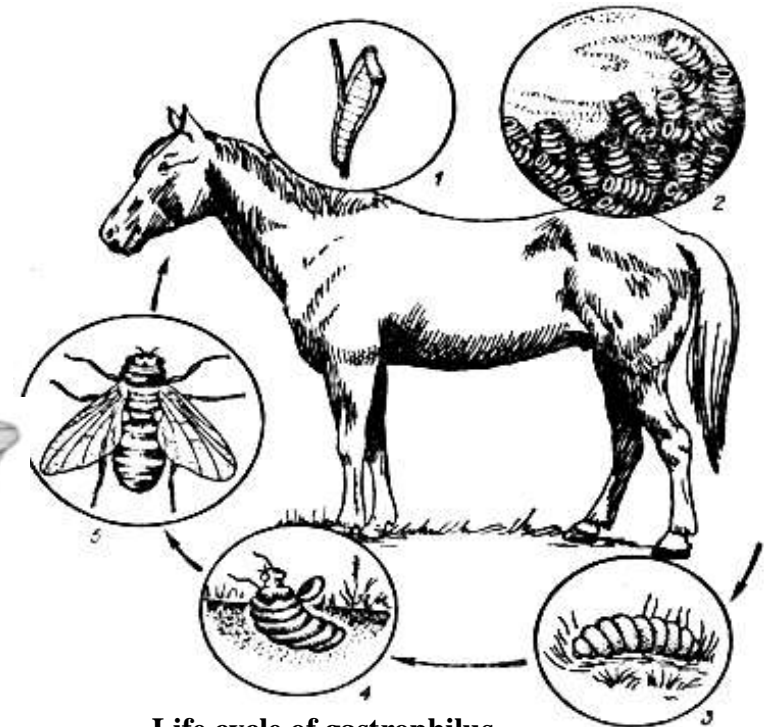


*Gastrophilus pecorum*

*Gastrophilus intestinalis*

*Gastrophilus veterinus*

*Gastrophilus haemorrhoidalis*



Life cycle of gastrophilus

1 – egg; 2 – larva III in stomach; 3 – larva III in the nature; 4 – pupa; 5 – adult.

Definition: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_



14. Clinical signs gastrophilosis of horse:

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6. Features of diagnosis of gastrophilosisof horse:

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7. Measures of control and ways of prevention. Therapeutic drugs.

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**Material and technical supply.** Microscopes, magnifying glass, permanent macro preparations, temporary and permanent micro preparations, Intermediate hosts. Tables, schemes, sick animals. Samples of insecticides.

« \_\_\_\_ » \_\_\_\_\_ **20** p.      **Signatures: Student** \_\_\_\_\_      **Lecturer** \_\_\_\_\_

**TOPIC:** Botfly invasions of animals: diagnostics and differential diagnosis of cattle’s oestridoses and rhinoestrosis of horses.

**Class location – classroom, laboratory, museum of the department.**

**Purpose of the lesson:** To study the morphological and biological characteristics of insects, their place in classification of parasitic arthropods. Get acquainted with the features of insects that have medical and veterinary significance. To study the morphological features of different stages of pathogens of oestrosis of sheep (*Oestrus ovis*) and rhinoestrosis of solipeds (*Rhinoestrus purpureus*, *Rhinoestrus latifrons*). Master the methods of in vivo diagnosis and differential diagnosis of cattle hypodermosis and gastrophilosis of horses. Get acquainted with the arsenal of insecticides and their use.

**Task:** To study the morphological characteristics, know the features of the biology of insects. To study and define on the given schemes the basic (diagnostic) morphological characteristics of oestrosis and rhinoestrosis, to know features of their biology. Master the methods of lifelong diagnosis and differentiate from diseases with a similar course. Get acquainted with the samples of insecticides and features of application in the treatment and prevention treatments.

Independently prepare for classes using recommended books (1–4), lecture material and electronic files from the discipline «Parasitology and invasive diseases of animals» at the «Portal of educational information resources of MOODLE».

**Auditory work.** On the museum material - permanent macropreparations, as well as temporary or permanent micropreparations to study the morphological features of insects, namely the causative agents of oestrosis of sheep and rhinoestrosis of solipeds, to mark them on the diagrams. Get acquainted with the samples of insecticides and the peculiarities of their use in these diseases in cattle and sheep and horses.

Task performance::

1. The place of pathogens of oestrosis and rhinoestrosis of animals in the world animals system (classification):

Phylum _____	Order _____	Family _____
Class _____	Suborder _____	Genus _____
Subclass _____		Genus _____

Definition: \_\_\_\_\_

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2. Sources and ways of invasion of animals by oestrosis of sheep and rhinoestrosis of solipeds.

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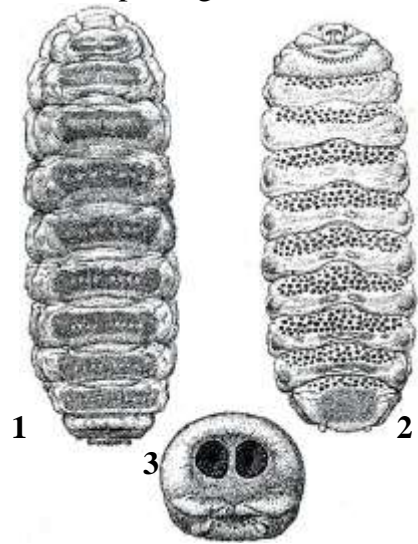


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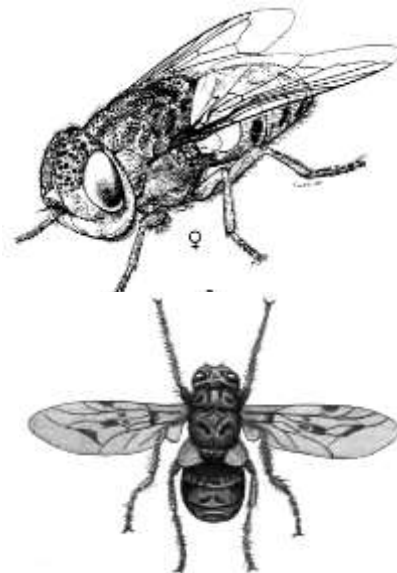
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3. Morphological characteristics of pathogens of oestrosis of sheep and rhinoestrosis of horse:

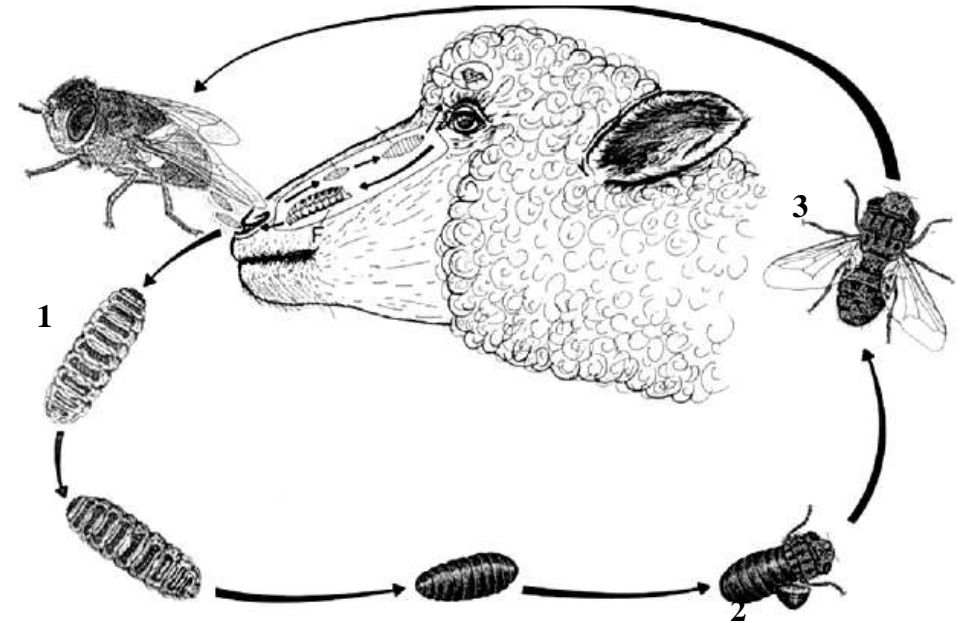


Larva III stage *Oestrus ovis*

- 1 – \_\_\_\_\_
- 2 – \_\_\_\_\_
- 3 – \_\_\_\_\_



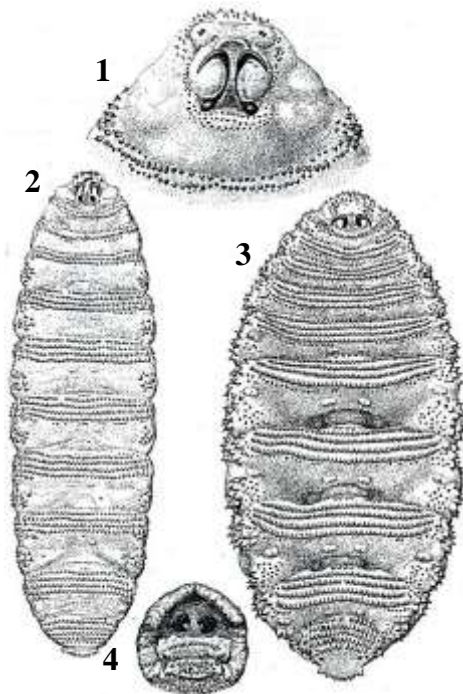
Imago *Oestrus ovis*



Life cycle of oestrosis

- 1 – \_\_\_\_\_
- 2 – \_\_\_\_\_
- 3 – \_\_\_\_\_





Larva III stage  
*Rhinoestrus purpureus*

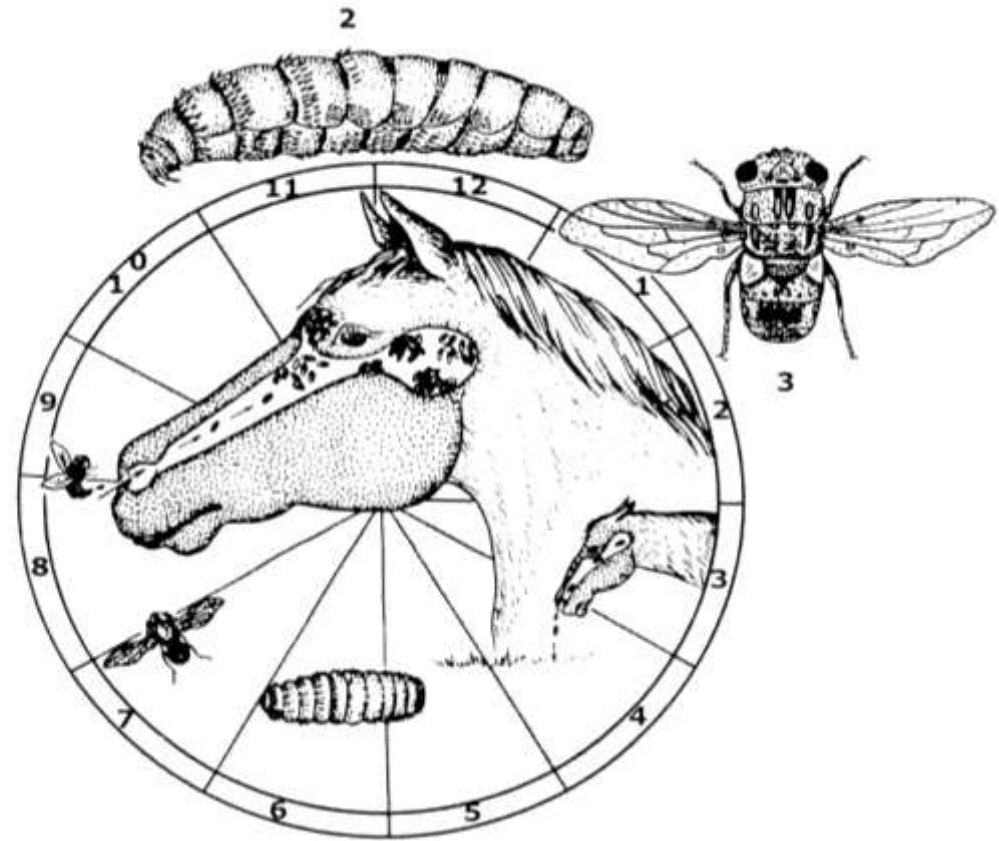
- 1 - \_\_\_\_\_
- 2 - \_\_\_\_\_
- 3 - \_\_\_\_\_
- 4 - \_\_\_\_\_



*Rhinoestrus purpureus*



*Rhinoestrus latifrons*



Life cycle rhinoestrosis

- 1 - \_\_\_\_\_
- 2 - \_\_\_\_\_
- 3 - \_\_\_\_\_

4. Features of insect morphology:

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5. Clinical signs of oestrosis of sheep and rhinoestrosis of solipeds:

Horizontal lines for writing the answer to question 5.

6. Features of diagnosis of estrosis in sheep and rhinitis in equidae:

Horizontal lines for writing the answer to question 6.

7. Measures of control and ways of prevention. Therapeutic drugs. Insecticides and schemes of their application at the given diseases.

Horizontal lines for writing the answer to question 7.

Material and technical supply. Microscopes, magnifying glass, permanent macro preparations, temporary and permanent micro preparations, Intermediate hosts. Tables, schemes, sick animals. Samples of insecticides.

« \_\_\_ » \_\_\_\_\_ 20 p. Signatures: Student \_\_\_\_\_ Lecturer \_\_\_\_\_

**TOPIC:** Blood-sucking Diptera insects (Midges): morphological and biological identification of clegs, blackflies, punkies, mosquitoes and sandflies. Zoophilous flies: morphological and biological identification of family Muscidae, Sarcophagidae, Calliphoridae, Glossinidae. Diagnostics of Wohlfahrtiosis of animals.

**Class location – classroom, laboratory, museum of the department.**

**Purpose of the lesson:** To study the morphological characteristics, to know the features of the biology of insects blood-sucking Diptera insects (Midges): clegs, blackflies, punkies, mosquitoes and sandflies and zoophilous flies: morphological and biological identification of family Muscidae, Sarcophagidae, Calliphoridae, Glossinidae. Diagnostics of Wohlfahrtiosis of animals. To study the features of their biology and ecology. Determine their place in the Classification of Insects. Get acquainted with the arsenal of insecticides and their use.

**Task:** To study with the help of macro- and micropreparations morphological signs of clegs, blackflies, punkies, mosquitoes and sandflies. Get acquainted with the features of the biology of the components of Midges. To differentiate the components of Midges to family and genus. Get acquainted with samples of insecticides, their use for therapeutic and prophylactic purposes.

Independently prepare for classes using recommended books (1–4), lecture material and electronic files from the discipline «Parasitology and invasive diseases of animals» at the «Portal of educational information resources of MOODLE».

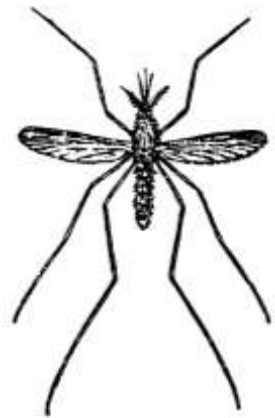
**Auditory work.** On the museum material - permanent micropreparations, as well as temporary or permanent macropreparations to study the morphological features of clegs, blackflies, punkies, mosquitoes and sandflies, to mark them on the diagrams. Get acquainted with the samples of insecticides and the peculiarities of their use in these species of animals.

Task performance:

1. The place of pathogens of Midges in the world animals system (classification):

Phylum _____	Class _____	SubClass _____	Order _____
Suborder _____		Suborder _____	
<b>Clegs</b>	<b>Blood-sucking flies</b>	<b>Punkies</b>	<b>Mosquitoes</b>
Family _____	Family _____	Family _____	Family _____
Genus _____	Genus _____	Genus _____	Genus _____
Genus _____	Genus _____	Genus _____	Genus _____
Genus _____	Genus _____	Genus _____	Genus _____
Genus _____	<b>Keds</b>	<b>Sandflies</b>	<b>Blackflies</b>
Genus _____	Suborder _____	Family _____	Family _____
	Family _____	Subfamily _____	Genus _____
	Genus _____	Genus _____	Genus _____

2. Morphological features of blood-sucking two-winged insects:



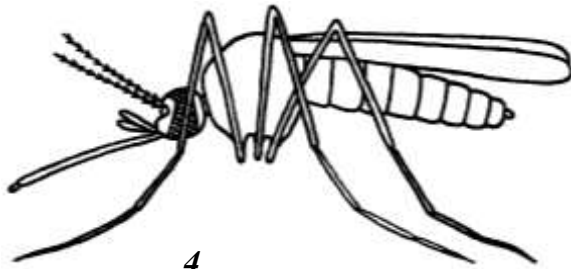
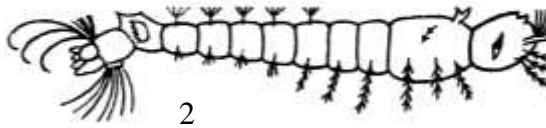
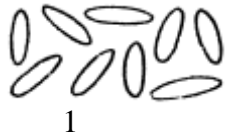
*Aedes caspius*



*Culex pipiens*

Imago of Mosquitoes

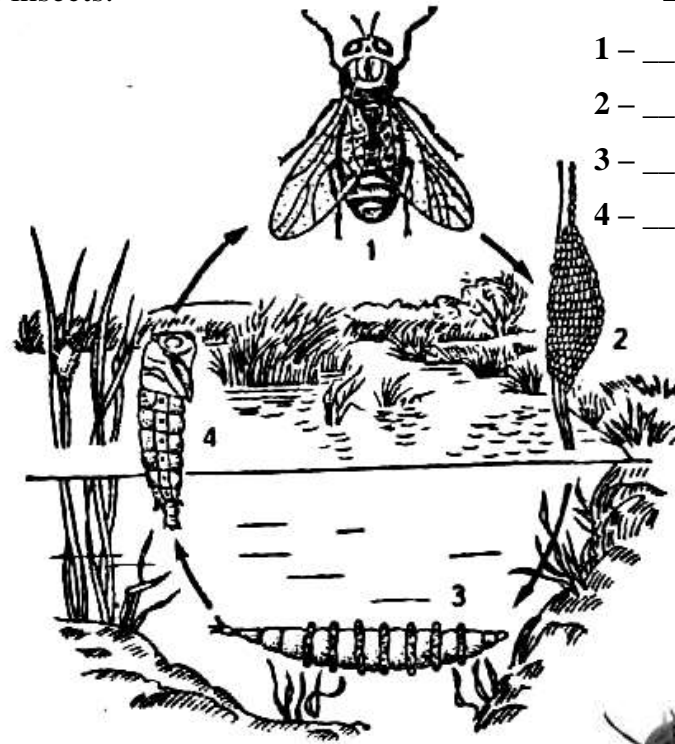
Life cycle Mosquitoes



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- 1- \_\_\_\_\_
- 2- \_\_\_\_\_
- 3- \_\_\_\_\_
- 4- \_\_\_\_\_



Life cycle clegs:

- 1- \_\_\_\_\_
- 2- \_\_\_\_\_
- 3- \_\_\_\_\_
- 4- \_\_\_\_\_



Genus *Tabanus*



Genus *Hybomitra*



Genus *Haematopota*



Genus *Atylotus*



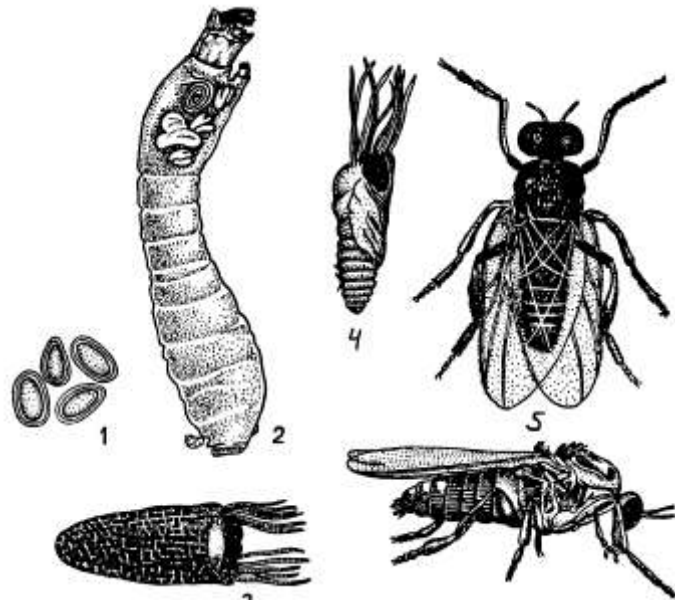
Genus *Chrysops*



*Stomoxys calcitrans*

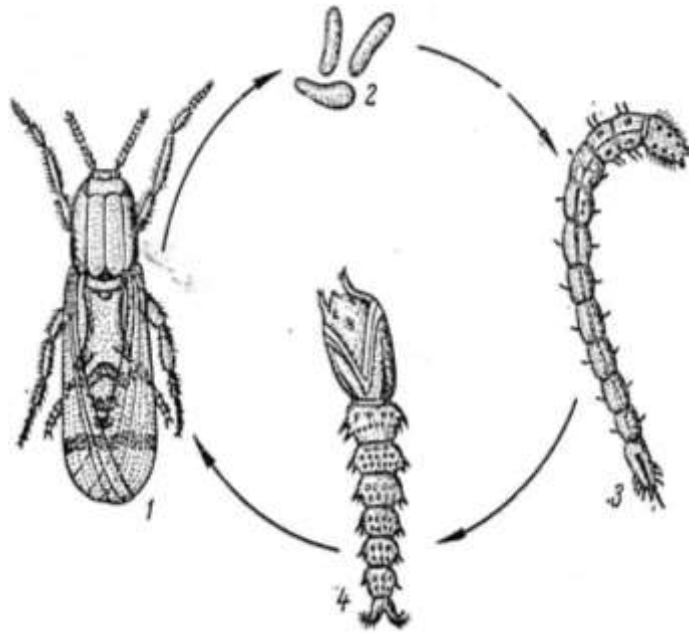


*Haematobia irritans*



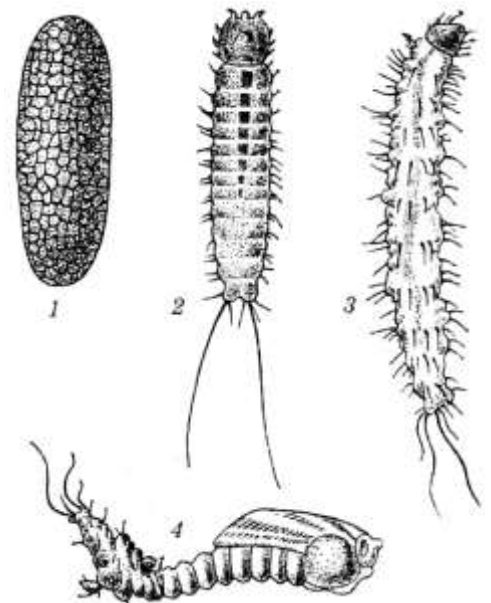
Life cycle Blackflies

- 1 - \_\_\_\_\_
- 2 - \_\_\_\_\_
- 3 - \_\_\_\_\_
- 4 - \_\_\_\_\_
- 5 - \_\_\_\_\_



Life cycle Punkies

- 1 - \_\_\_\_\_
- 2 - \_\_\_\_\_
- 3 - \_\_\_\_\_
- 4 - \_\_\_\_\_



Life cycle Sandflies

- 1 - \_\_\_\_\_
- 2 - \_\_\_\_\_
- 3 - \_\_\_\_\_
- 4 - \_\_\_\_\_



Keds

*Hippobosca equina*



*Melophagus ovinus*

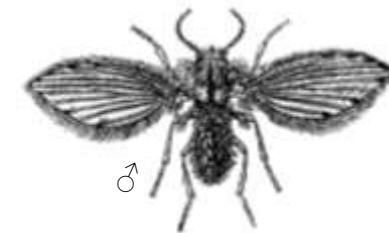


Imago Punkies

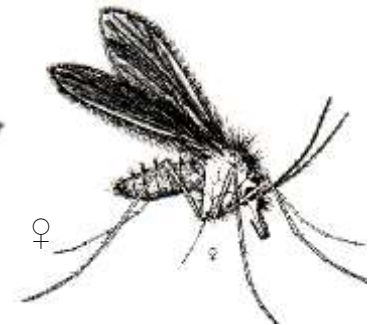
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Larva Sandflies



5. The place of pathogens of Zoophilous flies in the world animals system (classification):

Phylum _____	Class _____	SubClass _____
Order _____	Suborder _____	
Family _____	Family _____	Family _____
Genus _____	Genus _____	Genus _____
Genus _____	Genus _____	Genus _____
Genus _____	Genus _____	

Definition: \_\_\_\_\_

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6. Morphological features of insects:

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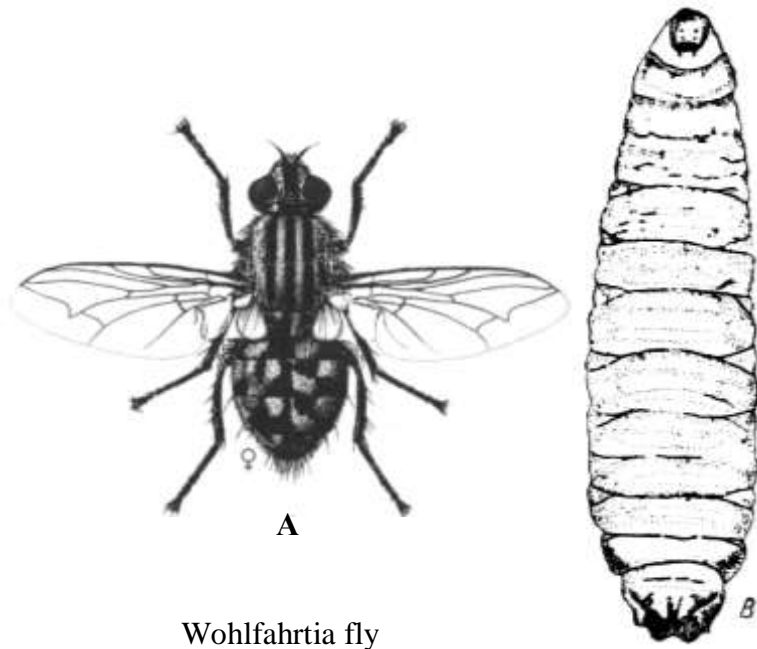
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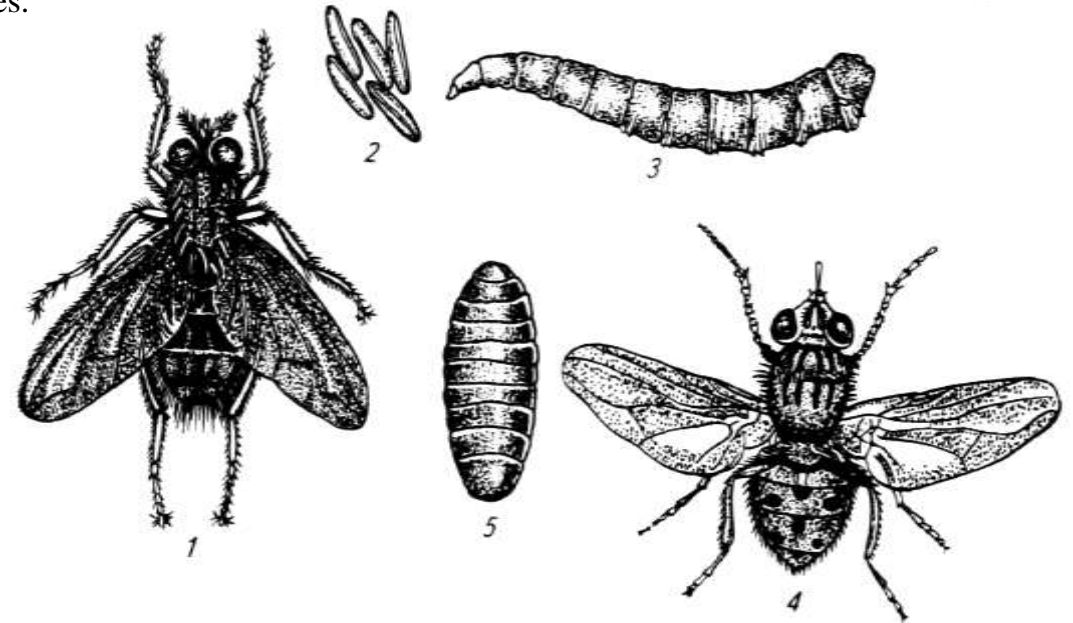
7. Morphological characteristics of main species of zoophilic flies.



Wohlfahrtia fly

A - \_\_\_\_\_

B - \_\_\_\_\_



Stages of development of flies

1 - \_\_\_\_\_

2 - \_\_\_\_\_

3 - \_\_\_\_\_

4 - \_\_\_\_\_

5 - \_\_\_\_\_

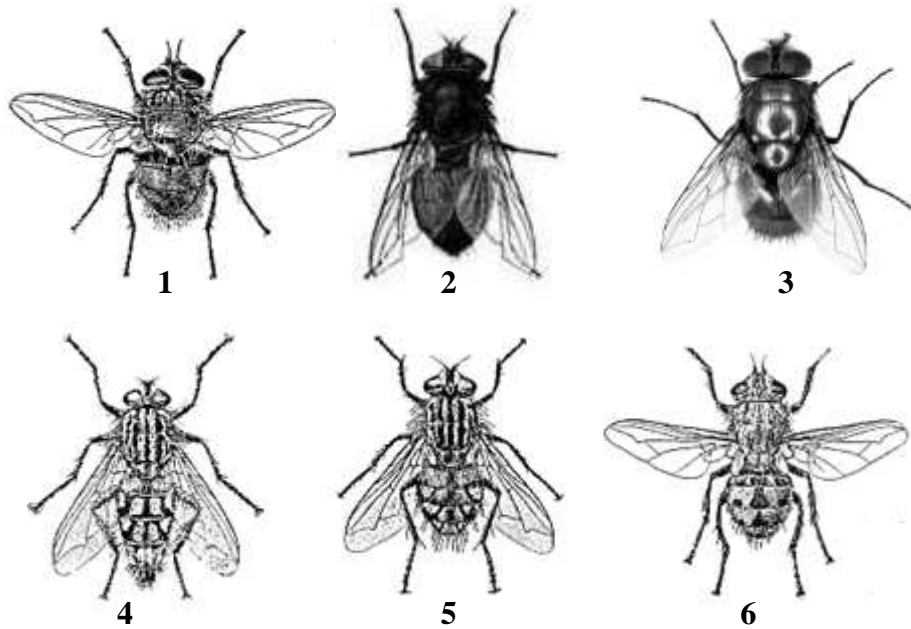


*Muscina stabulans*



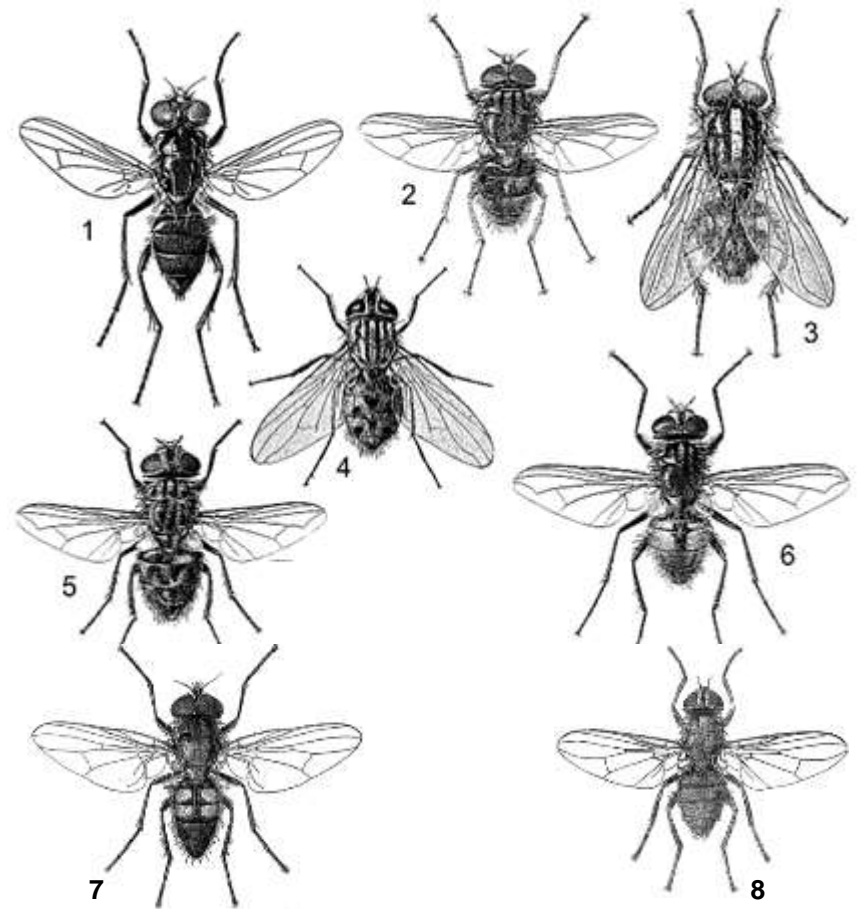
*Musca autumnalis*





**Representatives of families *Calliphoridae*, *Sarcophagidae*:**

*Calliphoridae*: 1 - *Calliphora vicina*, 2 - *Protophormia terraenovae*, 3 - *Lucilia sericata*, *Sarcophagidae*: 4 - *Sarcophaga subvicina*, 5 - *Parasarcophaga scoparia*, 6 - *Wohlfahrtia magnifica*, 7 - *Tephromyia grisea*.



**Representatives of families *Muscidae*:**

1 - *Ophyra leucostoma*, 2 - *Muscina stabulans*, 3 - *Morellia simplex*, 4 - *Stomoxys calcitrans*, 5 - *Musca autumnalis*, 6 - *Musca domestica*, 7 - *Fania canicularis*, 8 - *Lyperosia titillans*.

8. Medico-veterinary significance of flies.

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9. Features of lifelong diagnosis of Wohlfahrtiosis:

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10. Measures of control and ways of prevention. Therapeutic drugs.

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Material and technical supply. Microscopes, magnifying glass, permanent macro preparations, temporary and permanent micro preparations, Intermediate hosts. Tables, schemes, sick animals. Samples of insecticides.

« \_\_\_ » \_\_\_\_\_ 20 p.      Signatures: Student \_\_\_\_\_      Lecturer \_\_\_\_\_

**LABORATORY CLASS № 20, 21, 22**

«\_\_\_\_\_» \_\_\_\_\_ 202\_\_.

**TOPIC:** Wingless insects –permanent ectoparasites of animals: melophagosis of sheep (keds), Siphunculatoses, Mallophagoses, Siphonapteroses of animals.

**Class location – classroom, laboratory, museum of the department**

**Purpose of the lesson:** To study the structure and basic morphological features of biting lice, mallophages, fleas and blood-sucking lice. Determine their place in the Classification of Insects. Master the methods of diagnosis of this group of entomoses. Get acquainted with the arsenal of insecticides and their use.

**Task:** To study with the help of macro- and micropreparations morphological signs of wingless insects of permanent and temporary ectoparasites animals. Get acquainted with the features of their biology. Master the features of diagnosis and differential diagnosis of these diseases.

Independently prepare for classes using recommended books (1–4), lecture material and electronic files from the discipline «Parasitology and invasive diseases of animals» at the «Portal of educational information resources of MOODLE».

**Auditory work.** On the museum material - permanent micropreparations, as well as temporary or permanent micropreparations to study the morphological features of wingless insects of permanent and temporary parasites animals, to mark them on the diagrams. Get acquainted with the samples of insecticides and the peculiarities of their use in these species of animals

Task performance:

1. The place of pathogens of Wingless insects in the world animals system (classification):

Phylum \_\_\_\_\_ Class \_\_\_\_\_ Subclass \_\_\_\_\_

**Mallophagoses**

Order \_\_\_\_\_

Family \_\_\_\_\_

Family \_\_\_\_\_

Family \_\_\_\_\_

Genus \_\_\_\_\_

Genus \_\_\_\_\_

Genus \_\_\_\_\_

Genus \_\_\_\_\_

Genus \_\_\_\_\_

Genus \_\_\_\_\_

**Siphonapteroses**

Order \_\_\_\_\_

Family \_\_\_\_\_

Family \_\_\_\_\_

Family \_\_\_\_\_

Family \_\_\_\_\_

**Siphunculatoses**

Order \_\_\_\_\_

Family \_\_\_\_\_

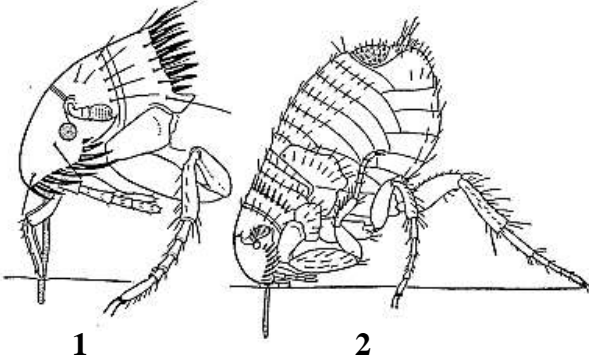
Family \_\_\_\_\_

Family \_\_\_\_\_

Definition: \_\_\_\_\_  
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3. Morphological characteristics of Wingless parasitic insects:

**Fleas**



*Pulex irritans*



*Ctenocephalides  
canis*

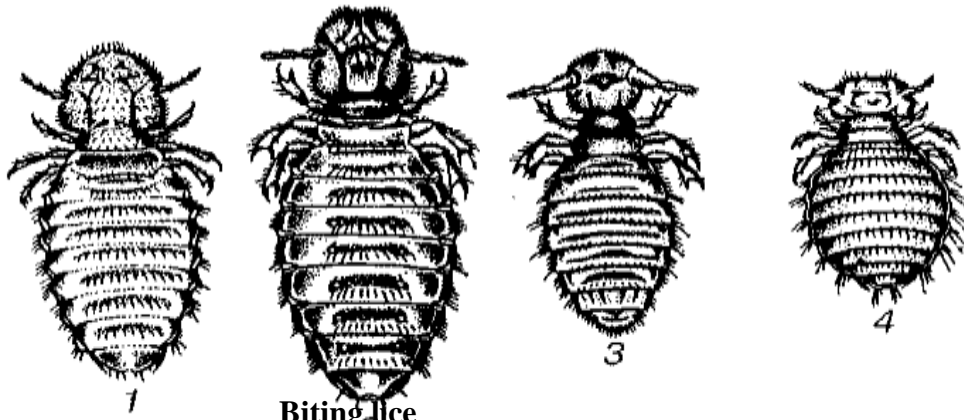


*Ctenocephalides  
felis*



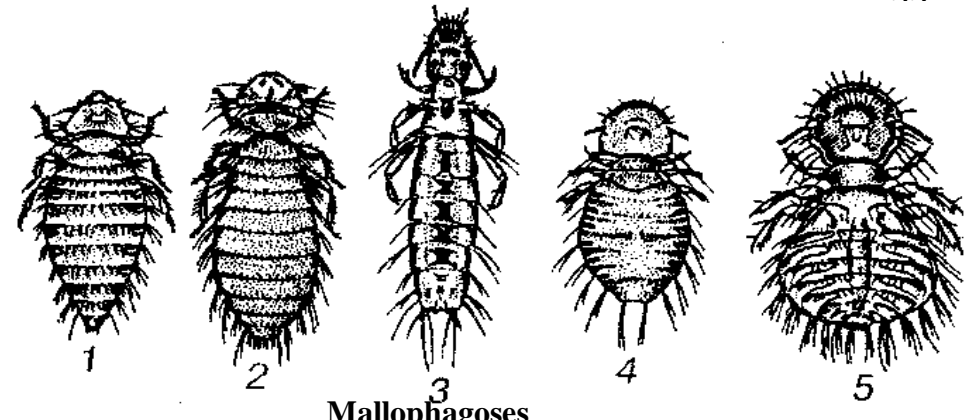
*Echidnophaga  
gallinacea*

1 – \_\_\_\_\_  
2 – \_\_\_\_\_



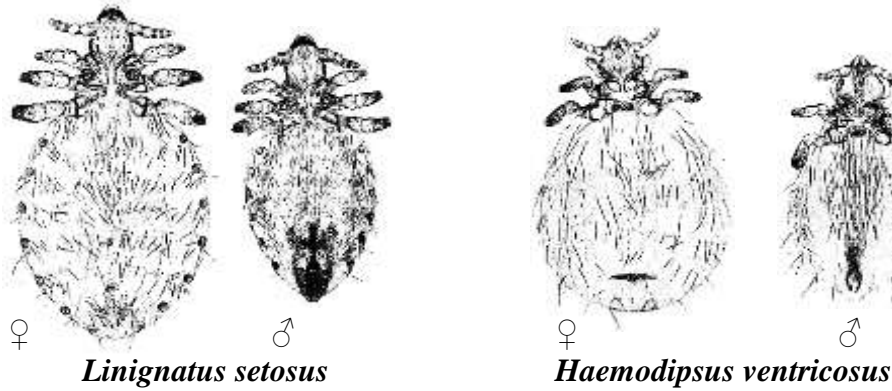
**Biting lice**

1 – *Bovicola bovis*; 2 – *B. equi*; 3 – *B. ovis*; 4 – *Trichodectes canis*.



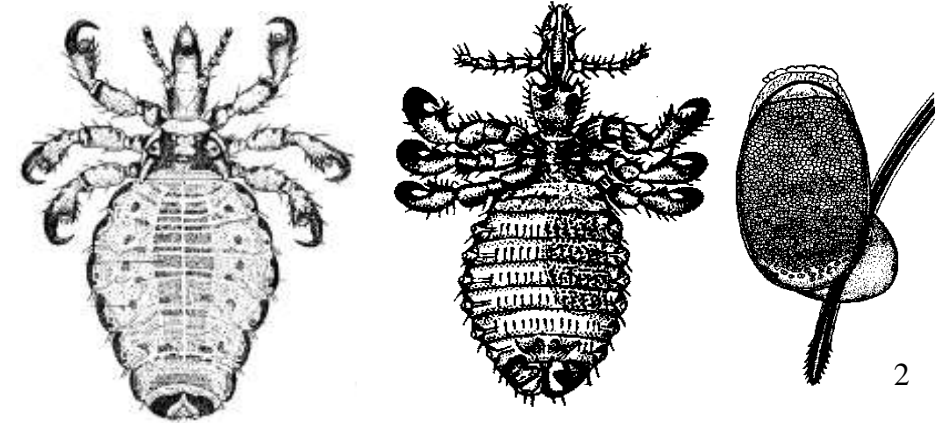
**Mallophagoses**

1 – *Menopon gallinae*; 2 – *Menacanthus stramineus*;  
3 – *Lipeurus caponis*; 4 – *Goniocotes hologaster*; 5 – *G. gigas*.



*Linognathus setosus*

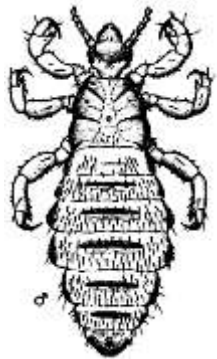
*Haemodipsus ventricosus*



**Blood-sucking lice (*Haematopinus asini*)**

*Haematopinus suis*

1 – \_\_\_\_\_  
2 – \_\_\_\_\_



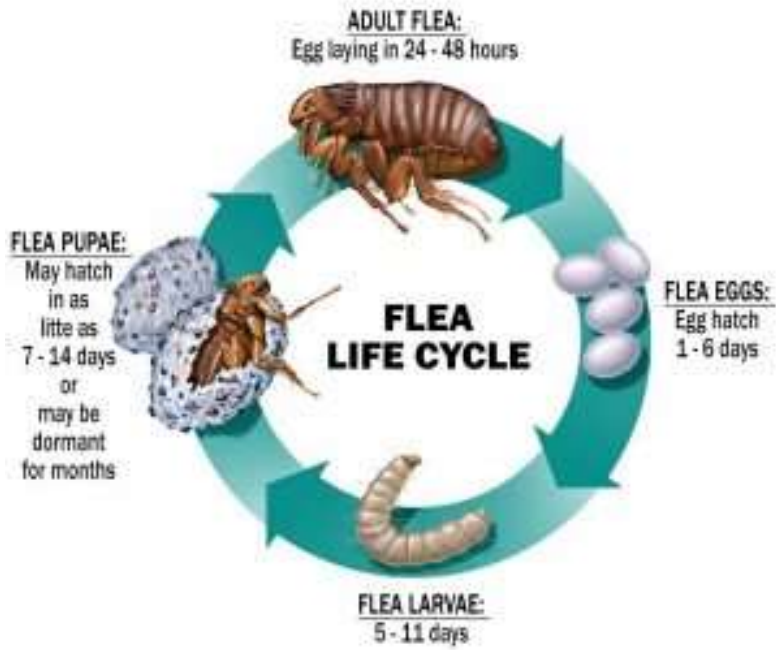
*Pediculus capitis*



*Pthirus pubis*

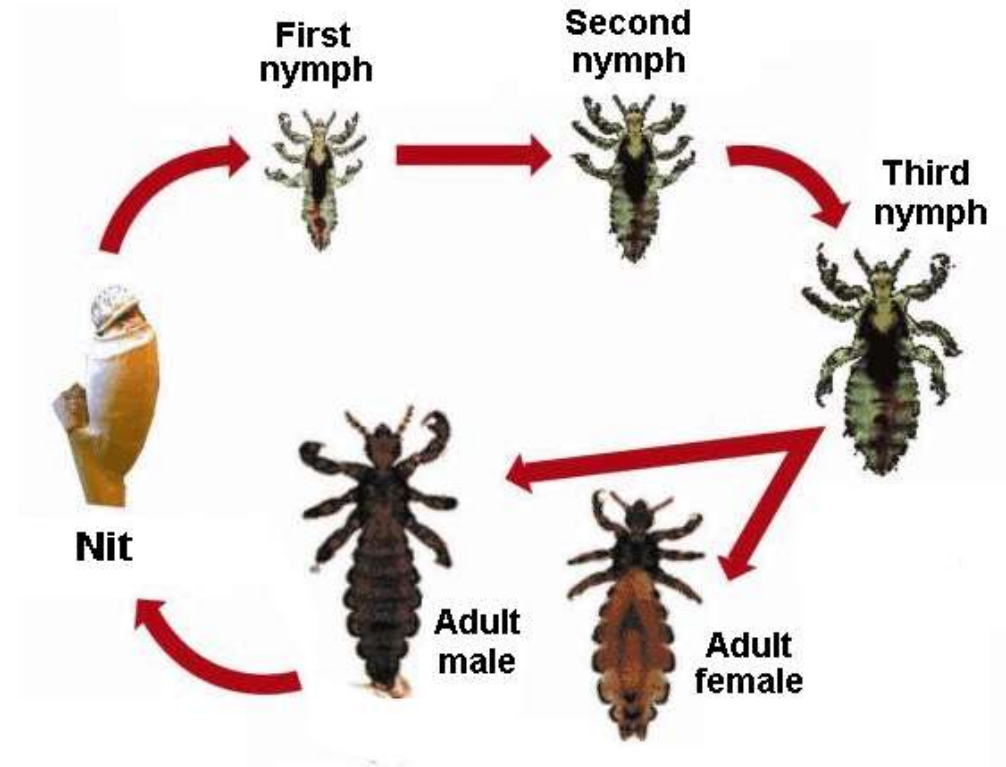


*Pediculus corporis (P. vestimenti)*



**Life cycle of fleas**

(<https://www.betterpetsandgardens.com.au/pet-care/dogs/health-and-first-aid/treating-ticks-and-fleas/flea-lifecycle-2/>)



**Life cycle of lice**

(<https://www.theayurveda.org/ayurveda/herbal-medicine/herbal-remedies-to-cure-hair-lice-naturally/attachment/stages-of-lice-growth>)

4. Epizootological features and veterinary significance of biting lice, mallophages, fleas and blood-sucking lice.

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5. Sources and ways of invasion of animals by biting lice, mallophages, fleas and blood-sucking lice.

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6. Features of in-vivo diagnostics of Mallophagoses, Siphunculatoses i Siphonapteroses of animals:

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7. Measures of control and ways of prevention. Therapeutic drugs..

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**Material and technical supply.** Microscopes, magnifying glass, permanent macro preparations, temporary and permanent micro preparations, Intermediate hosts. Tables, schemes, sick animals. Samples of insecticides.

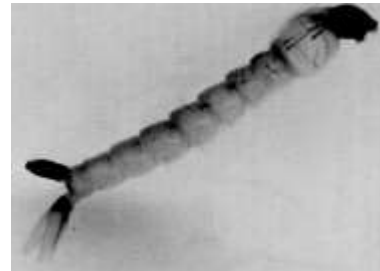
« \_\_\_\_ » \_\_\_\_\_ **20 p.**      **Signatures: Student** \_\_\_\_\_      **Lecturer** \_\_\_\_\_

Pictures for the section «Veterinary entomology and animal entomoses»



1. Imago *Hypoderma*. 2. Larva *Hypoderma bovis* 3. *Oestrus ovis*.

4. Larvae *Gastrophilus intestinalis* 5. Mouthparts of *Tabanus* 6. Clegs.



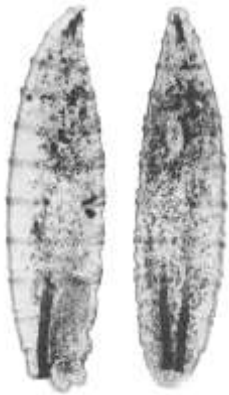
7. Mosquitos.

8. Blackfly.

9. Larva sandfly.

10. Pupa of sandfly.

11. Sandfly of *Phlebotomus*.



12. Larvae III of fly family *Calliphoridae*

13. Head of fly of *Musca domestica*.



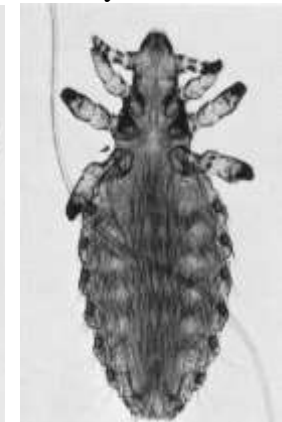
14. *Lipoptena cervi*.



15. *Melophagus ovinus*.

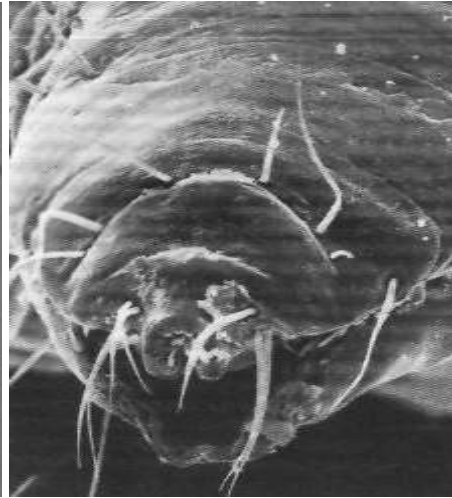
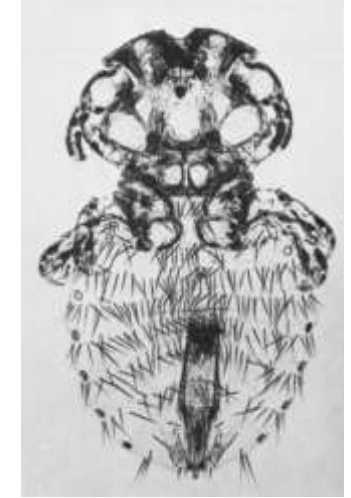
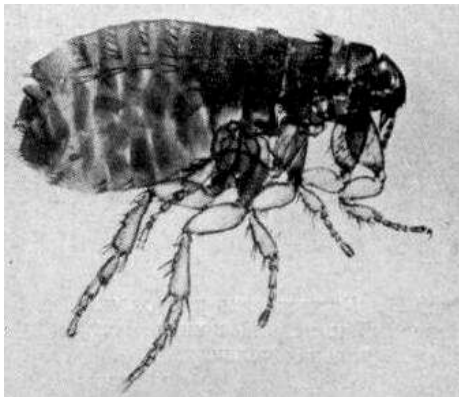
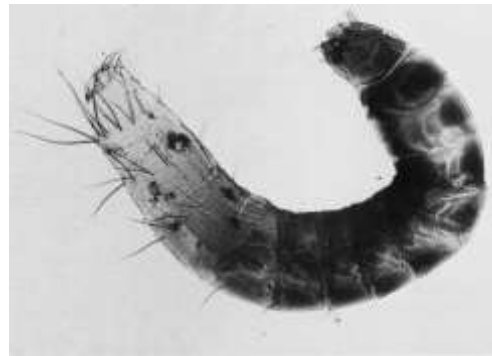
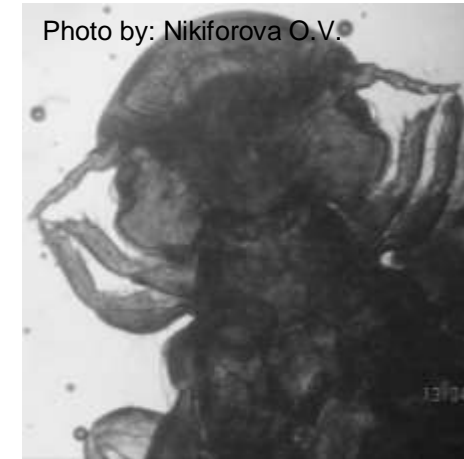


16. *Linognathus vituli*.



17. *Linognathus setosus*.



18. *Haematopinus suis*.19. Mouthparts of  
*Haematopinus suis*.20. Eggs and adult of lice  
on the hear.21. Female *Trichodectes  
canis*.22. Male *Trichodectes  
canis*.23. Flea of genus *Ctenocephala*24. *C. canis*25. Larva of *C. canis*.

26. The main end of the Mallophagoses.