



**MINISTRY OF EDUCATION AND SCIENCE OF UKRAINE  
 KHARKIV STATE ZOOVETERINARY ACADEMY  
 Faculty of Veterinary Medicine  
 PHARMACOLOGY AND PARASITOLOGY DEPARTMENT**

**VETERINARY PARASITOLOGY  
 (Part III)**

**WORKBOOK**

**for laboratory classes of educational discipline  
 for student \_\_\_ group \_\_\_\_\_ year**  
 second master's level in speciality 211 – Veterinary medicine

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(Surname and Name)

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

Surname

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Name, patronymic

Kharkiv – 2023

Approved by the methodological commission Faculty of Veterinary Medicine SBTU  
(protocol number 1 dated 2023/10 /3 )

Considered and approved at the session of the Pharmacology and parasitology department of SBTU  
(Protocol number 1 dated 2023/09/01)

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

Veterinary Parasitology Part I. Workbook for laboratory classes / O.V. Nikiforova, O.V. Mazanny, Kh., SBTU, 2023. 58 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”.

Third 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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### 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.

LABORATORY CLASS № 1, 2

« \_\_\_\_ » \_\_\_\_\_ 202\_\_ .

**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 the class using textbooks, study guides, practicals (1-4), lecture material, electronic files from the discipline "Veterinary Parasitology" on the "Portal of distance learning (MOODLE) of the SBTU of Ukraine".

**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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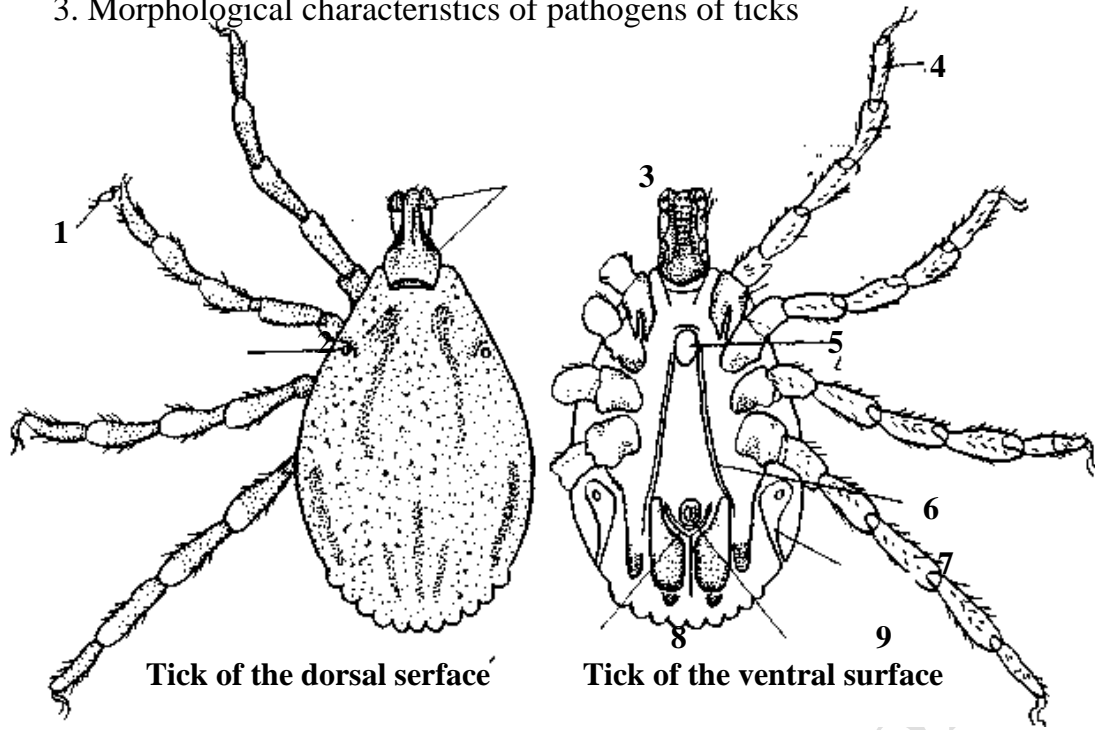
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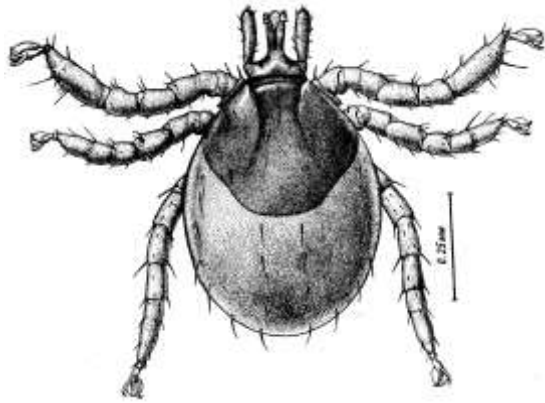
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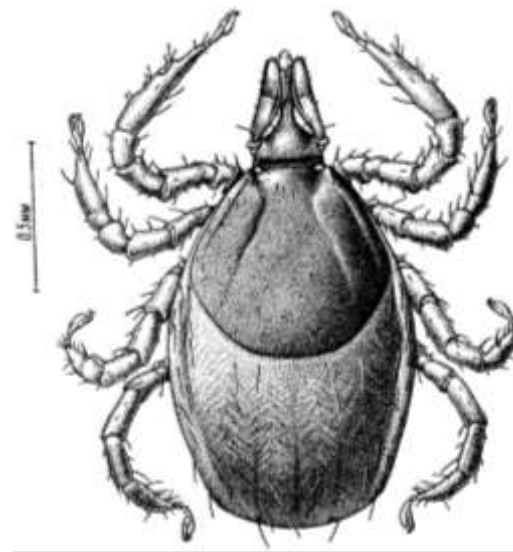
### 3. Morphological characteristics of pathogens of ticks



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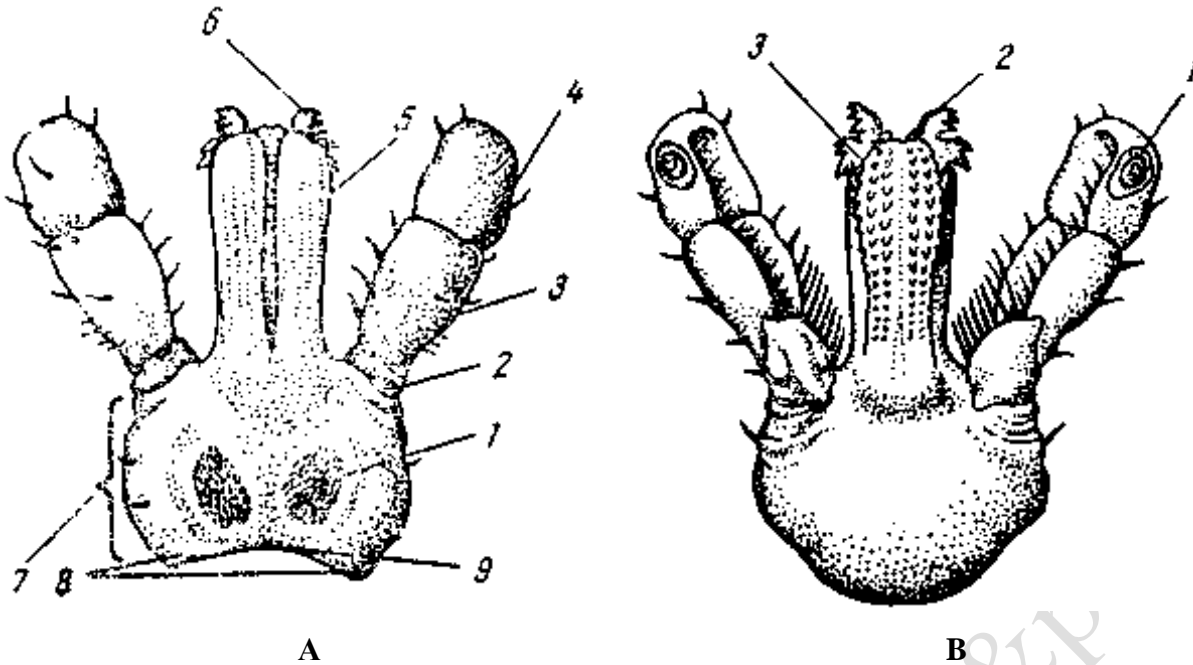


Larva

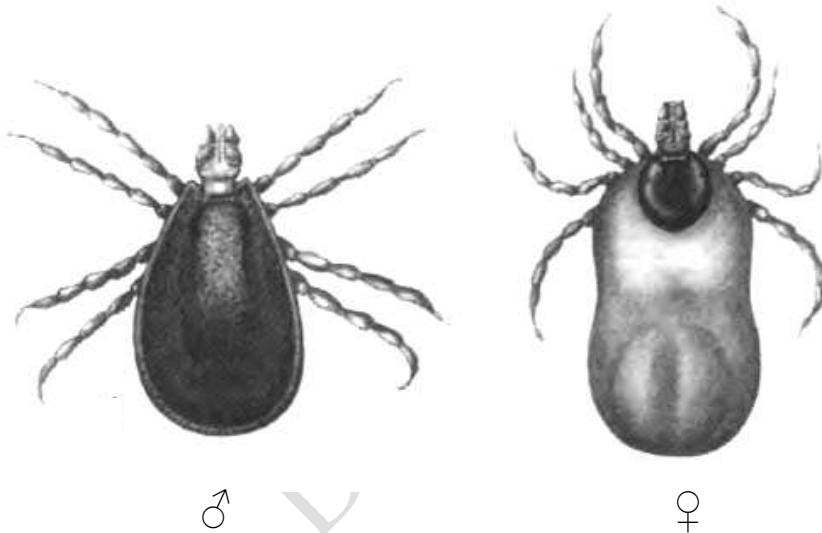


Nymph

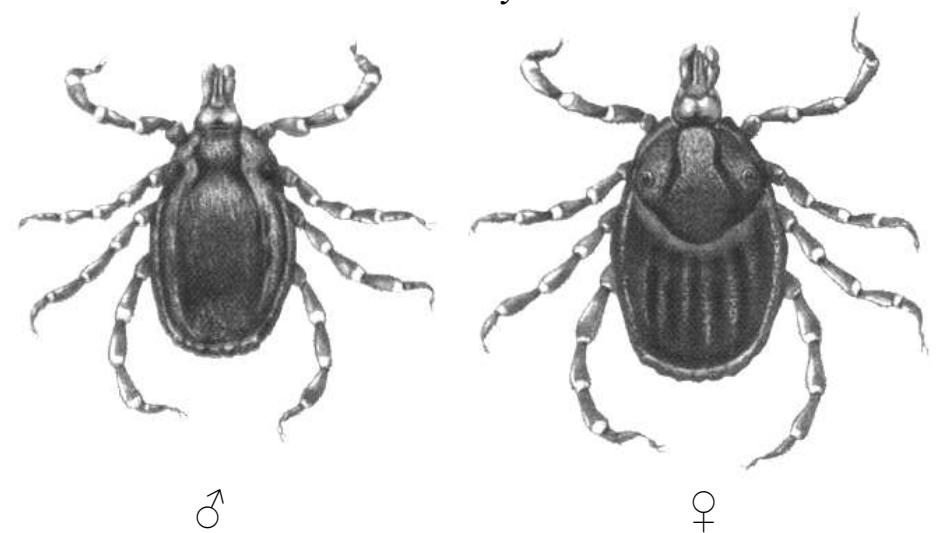
### Mouthparts of Ixodidae ticks:



### Genus *Ixodes*



### Genus *Hyalomma*





**Genus *Dermacentor***

**Genus *Haemaphysalis***



♂

♂



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♂



♀

**Genus *Rhipicephalus***

**Genus *Boophilus***



♂



♀



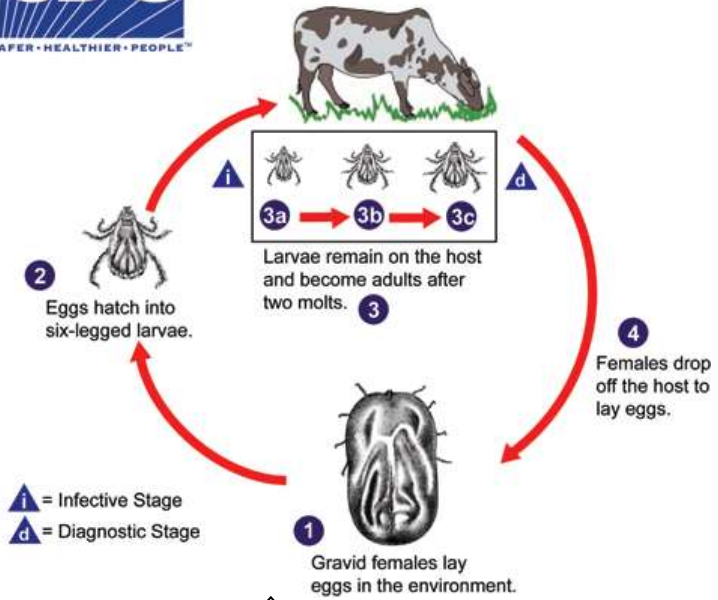
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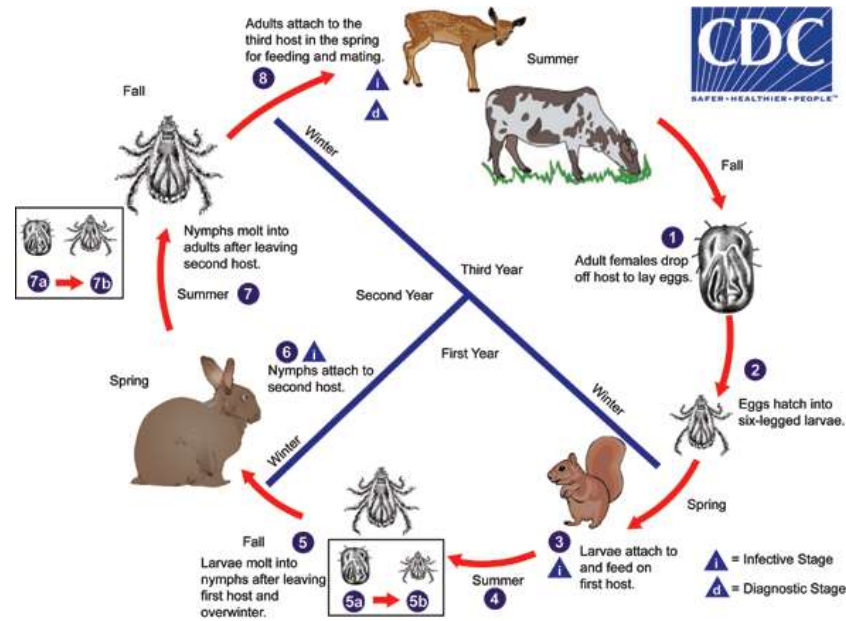
# Life cycle of Ixodidae ticks depending on the peculiarities of development and nutrition (L – larva, N – Nymph, I – imago)

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

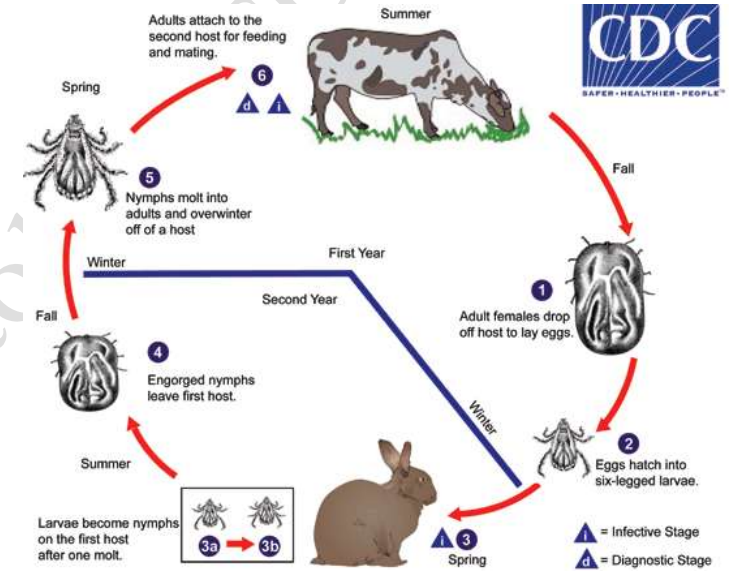


One-host life cycle

## 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 the class using textbooks, study guides, practicals (1-4), lecture material, electronic files from the discipline “Veterinary Parasitology” on the “Portal of distance learning (MOODLE) of the SBTU of Ukraine”.

**Auditory work.** To study the morphological features of Ixodidae, Argasidae and Dermanyssidae 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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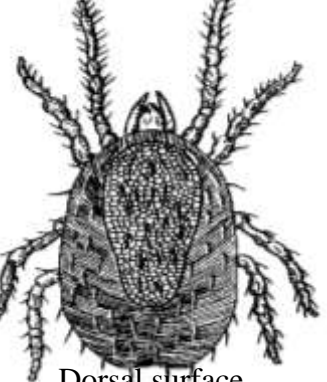
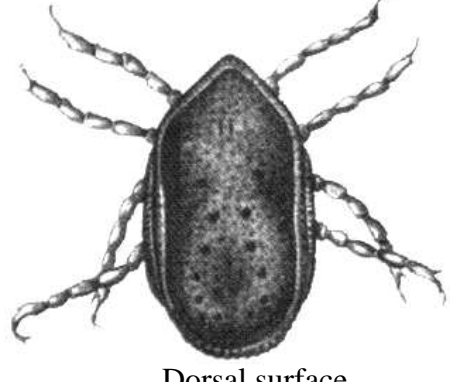
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4. Morphological characteristics of pathogens of Argasidae and Dermanyssidae ticks

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 the class using textbooks, study guides, practicals (1-4), lecture material, electronic files from the discipline "Veterinary Parasitology" on the "Portal of distance learning (MOODLE) of the SBTU of Ukraine".

**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 \_\_\_\_\_ Order \_\_\_\_\_ Family \_\_\_\_\_

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

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

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

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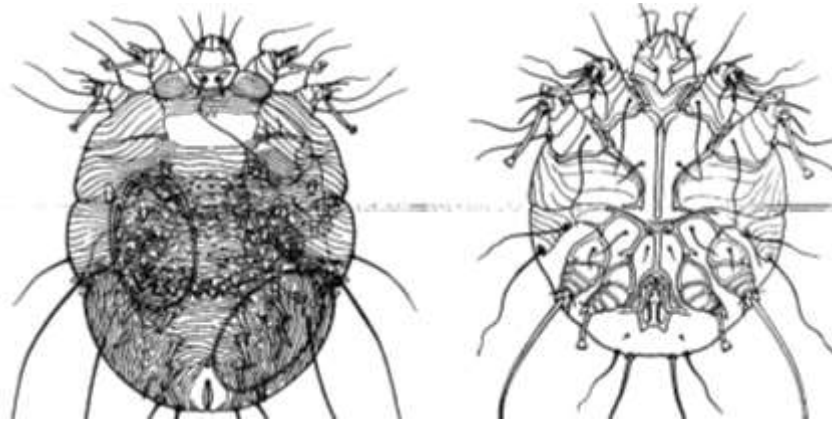


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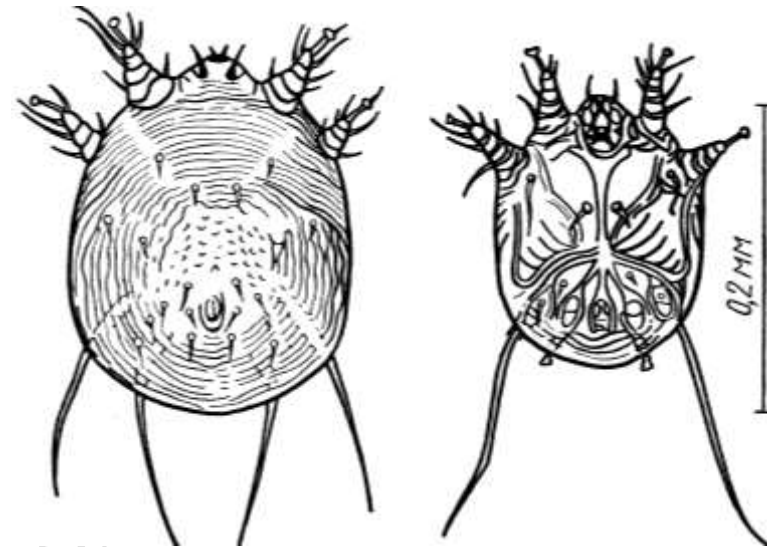
2. Morphological characteristics of pathogens of animals' Sarcoptosis:



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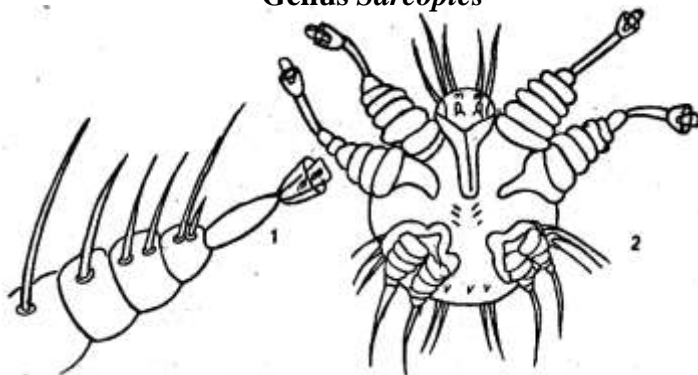
**Genus *Sarcoptes***



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**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 the class using textbooks, study guides, practicals (1-4), lecture material, electronic files from the discipline “Veterinary Parasitology” on the “Portal of distance learning (MOODLE) of the SBTU of Ukraine”.

**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.

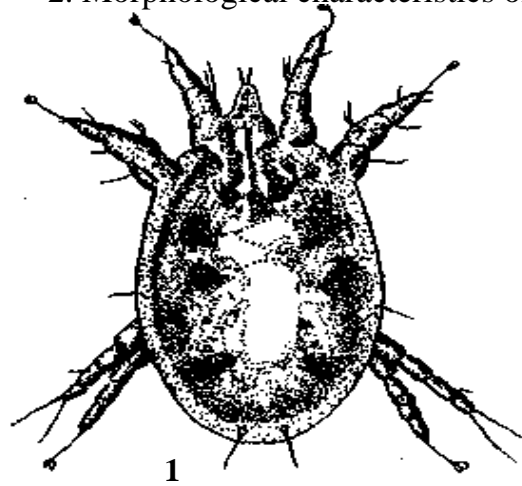
Task performance:

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

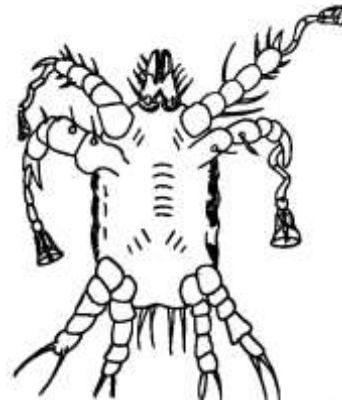
|                |                   |              |
|----------------|-------------------|--------------|
| Phylum _____   | Order _____       | Family _____ |
| Class _____    | Suborder _____    | Genus _____  |
| SubClass _____ | SuperFamily _____ | Genus _____  |

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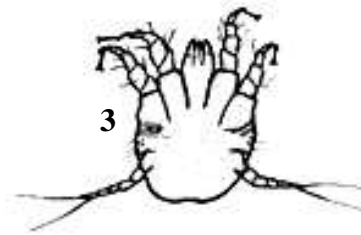
2. Morphological characteristics of pathogens of ticks – psoroptoses and otodectosis of carnivorous:



1



2



3



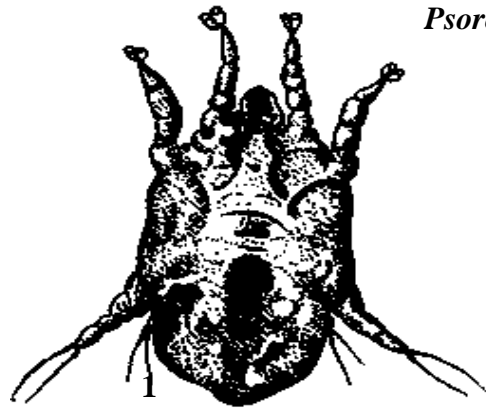
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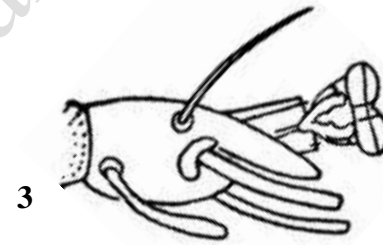
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- 1- \_\_\_\_\_
- 2- \_\_\_\_\_
- 3- \_\_\_\_\_
- 4- \_\_\_\_\_
- 5- \_\_\_\_\_

*Psoroptes cuniculi*



2



3

- 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:

5. Clinical signs of psoroptoses and otodectosis:

Dep\_pharmacol&parasitol\_SBTU



## LABORATORY CLASS № 7

« \_\_\_\_ » \_\_\_\_\_ 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 the class using textbooks, study guides, practicals (1-4), lecture material, electronic files from the discipline “Veterinary Parasitology” on the “Portal of distance learning (MOODLE) of the SBTU of Ukraine”.

**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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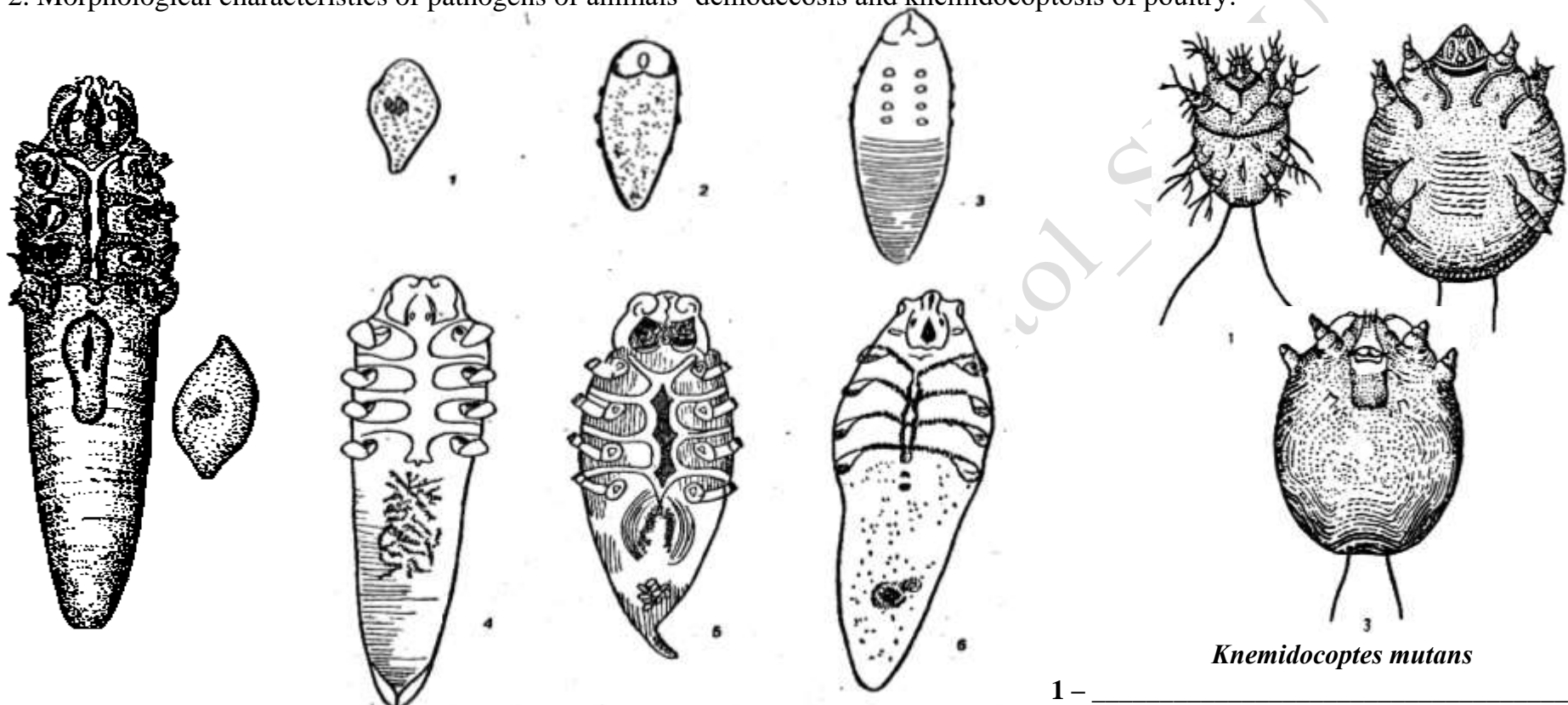


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2. Morphological characteristics of pathogens of animals' demodecosis and knemidocoptosis of poultry:



*Knemidocoptes mutans*

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

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

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

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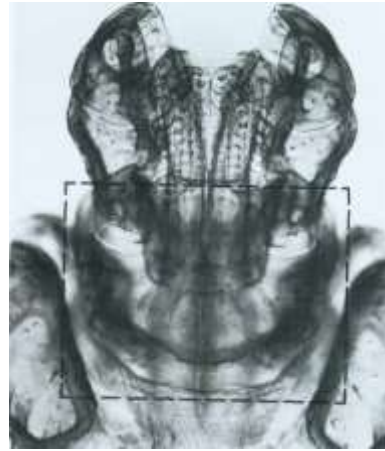
Pictures for the section «Veterinary acarology and acaroses of animals»



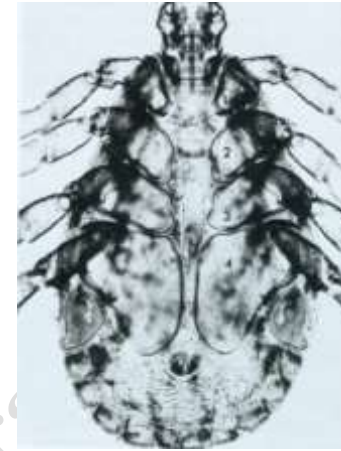
1. Mouthparts of *Boophilus calcaratus*.



2. Mouthparts of *Hyalomma scupense*.



3. Mouthparts of *Dermacentor marginatus*.



4. Male *D. marginatus* ventral surface.



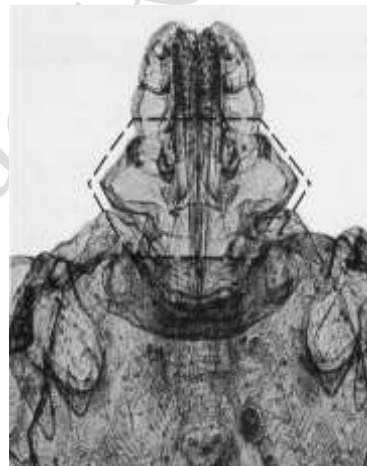
5. Male *D. marginatus* dorsal surface.



6. Male *Rhipicephalus bursa* ventral surface.



7. Larva *Rh. bursa*.



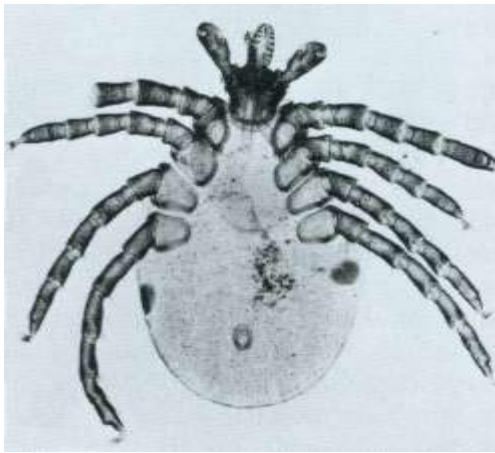
8. Mouthparts of *Rh. bursa*.



9. *Rh. bursa* male.



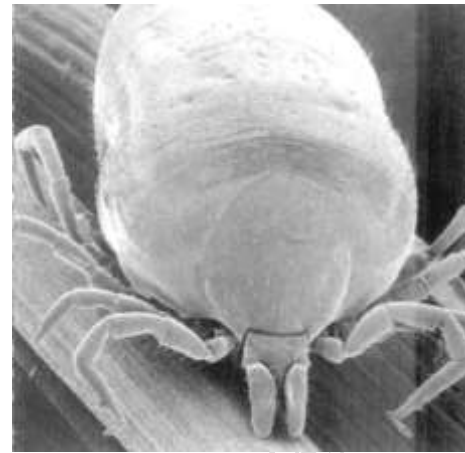
10. *Rh. bursa* female.



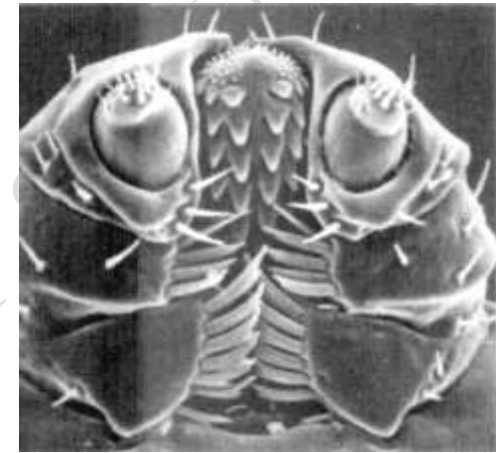
11. Nymph *Ixodes ricinus*.



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*

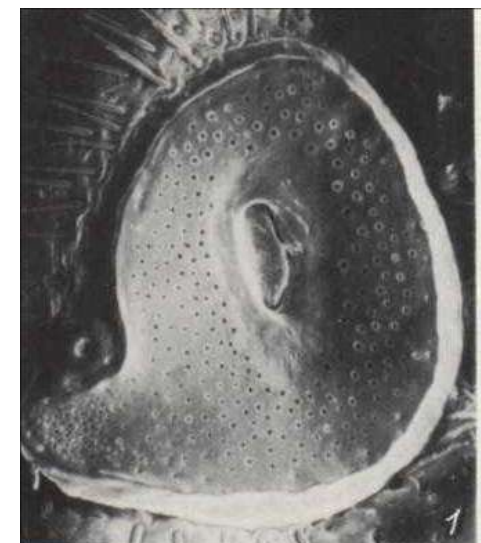


Photo by: Nikiforova O.V.

16. Capitulum of nymph *Ixodes ricinus*



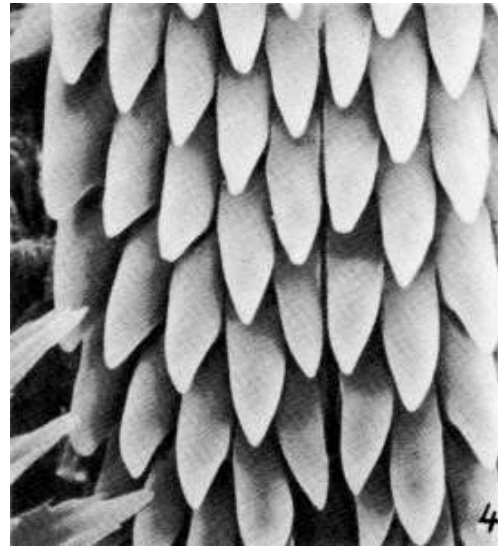
17. Peritreme of female *Rh. bursa*



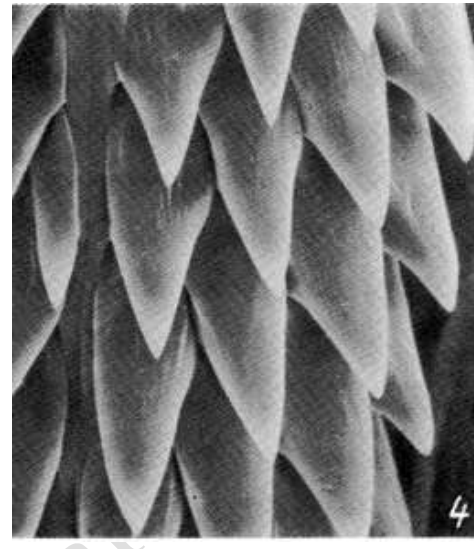
18. Peritreme of male *Rh. bursa*



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*.



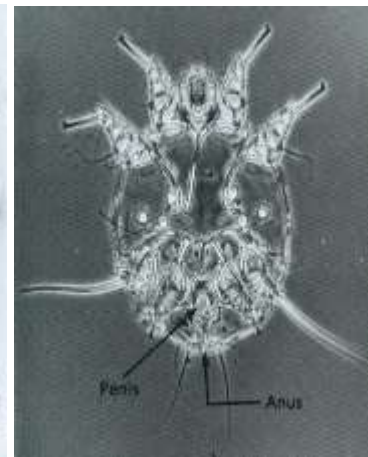
24. *Haemaphysalis otophila*.



25. *Argas persicus*.



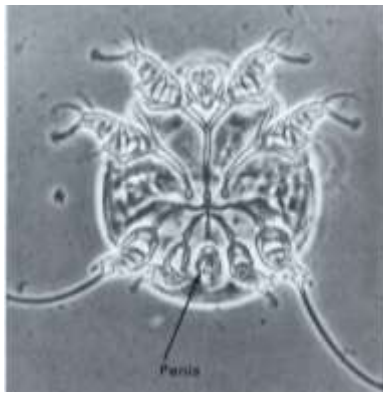
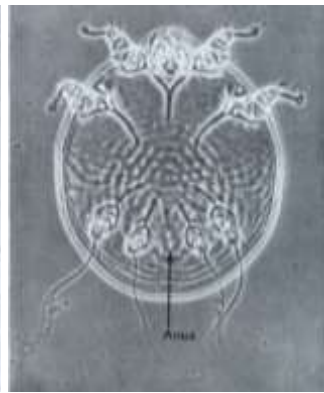
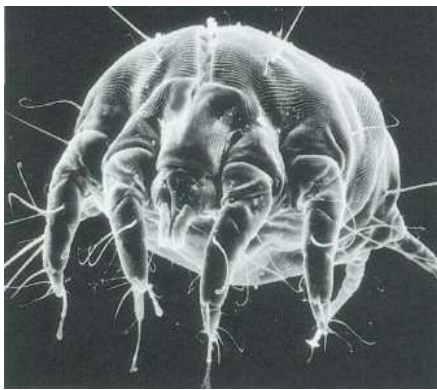
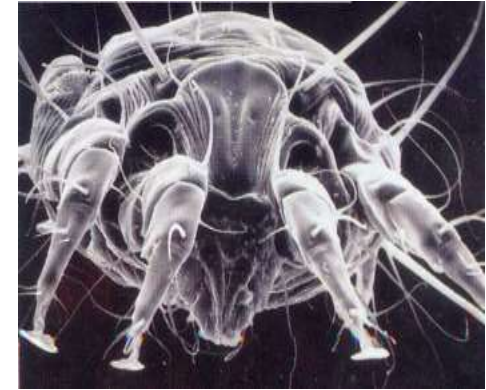
26. *Argas persicus*.



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.

**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*). Master the methods of in vivo diagnosis and differential diagnosis of cattle hypodermosis 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, 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 the class using textbooks, study guides, practicals (1-4), lecture material, electronic files from the discipline “Veterinary Parasitology” on the “Portal of distance learning (MOODLE) of the SBTU of Ukraine”.

**Auditory work.** On the museum material - permanent macopreparations, as well as temporary or permanent micropreparations to study the morphological features of insects, namely the causative agents of ruminant hypodermosis 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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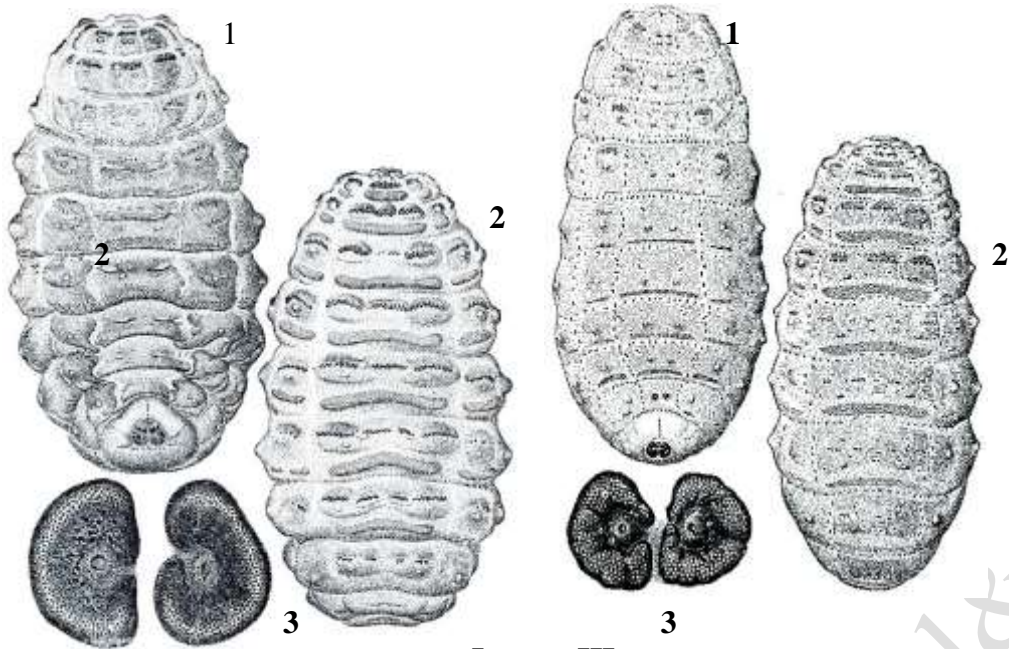
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6. Morphological characteristics of pathogens of cattle's hypodermosis:

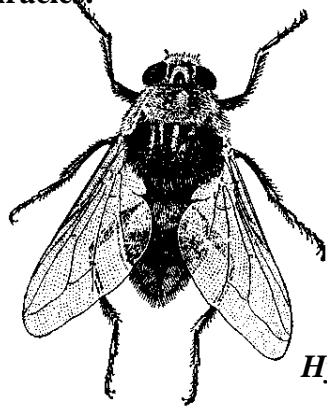


Larvae III stage:

*Hypoderma bovis*:

*Hypoderma lineatum*

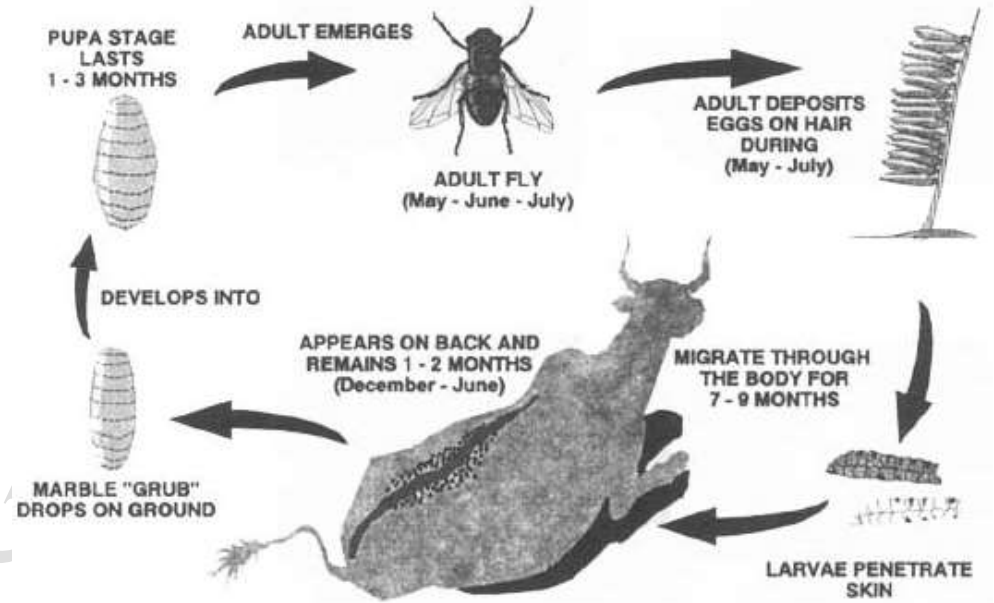
1 – general view from the back; 2 - general view from the abdominal side;  
3 - spiracles.



Adults  
*Hypoderma bovis*



LIFE CYCLE OF THE WARBLE FLY OF CATTLE



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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**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 (oestrosis, crivelliosis, cephenomyosis)**

**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*). 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, 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 the class using textbooks, study guides, practicals (1-4), lecture material, electronic files from the discipline “Veterinary Parasitology” on the “Portal of distance learning (MOODLE) of the SBTU of Ukraine”.

**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.

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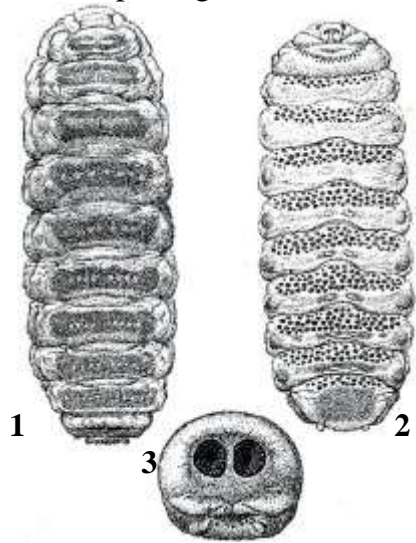


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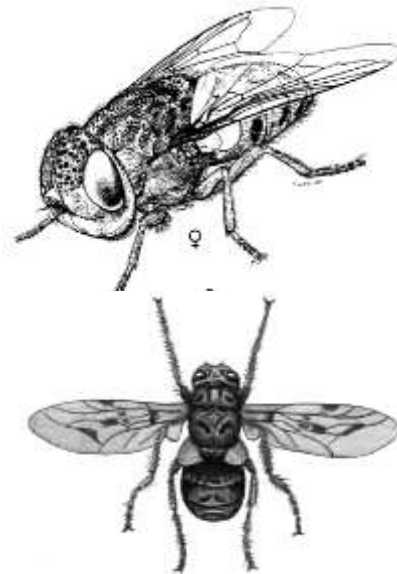
3. Morphological characteristics of pathogens of oestrosis of sheep:



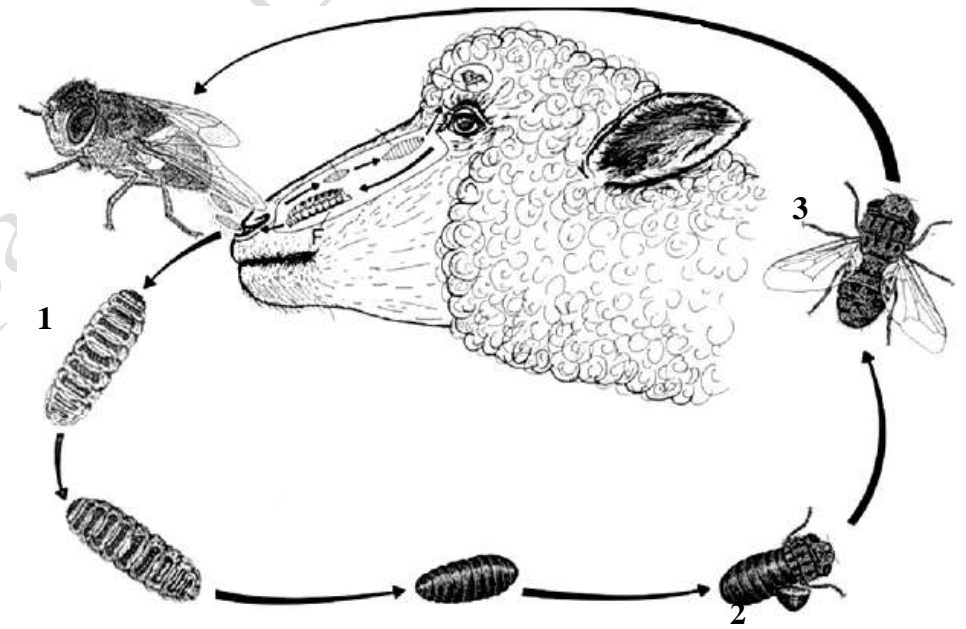
Larva III stage *Oestrus ovis*

1 – \_\_\_\_\_

2 – \_\_\_\_\_



Imago *Oestrus ovis*



Life cycle of oestrosis

1 – \_\_\_\_\_

4. Features of insect morphology:

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5. Clinical signs of oestrosis of sheep:

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6. Features of diagnosis of estrosis in sheep:

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

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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 rhinoestrosis 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 rhinoestrosis and gastrophilosis of soliped (*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 rhinoestrosis and gastrophilosis of soliped, 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 the class using textbooks, study guides, practicals (1-4), lecture material, electronic files from the discipline “Veterinary Parasitology” on the “Portal of distance learning (MOODLE) of the SBTU of Ukraine”.

**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 rhinoestrosis and gastrophilosis of soliped, to mark them on the diagrams. Get acquainted with the samples of insecticides and the peculiarities of their use in these diseases in horses.

Task performance:

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

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

Definition of rhinoestrosis: \_\_\_\_\_

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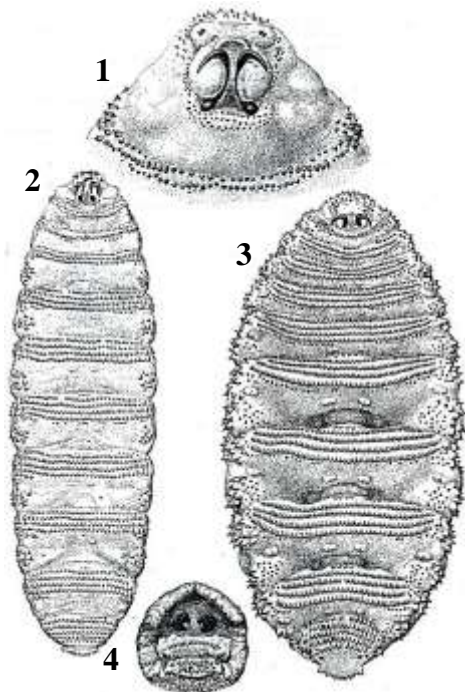
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2. Morphological characteristics of pathogens of rhinoestrosis of horse:



Larva III stage  
*Rhinoestrus purpureus*

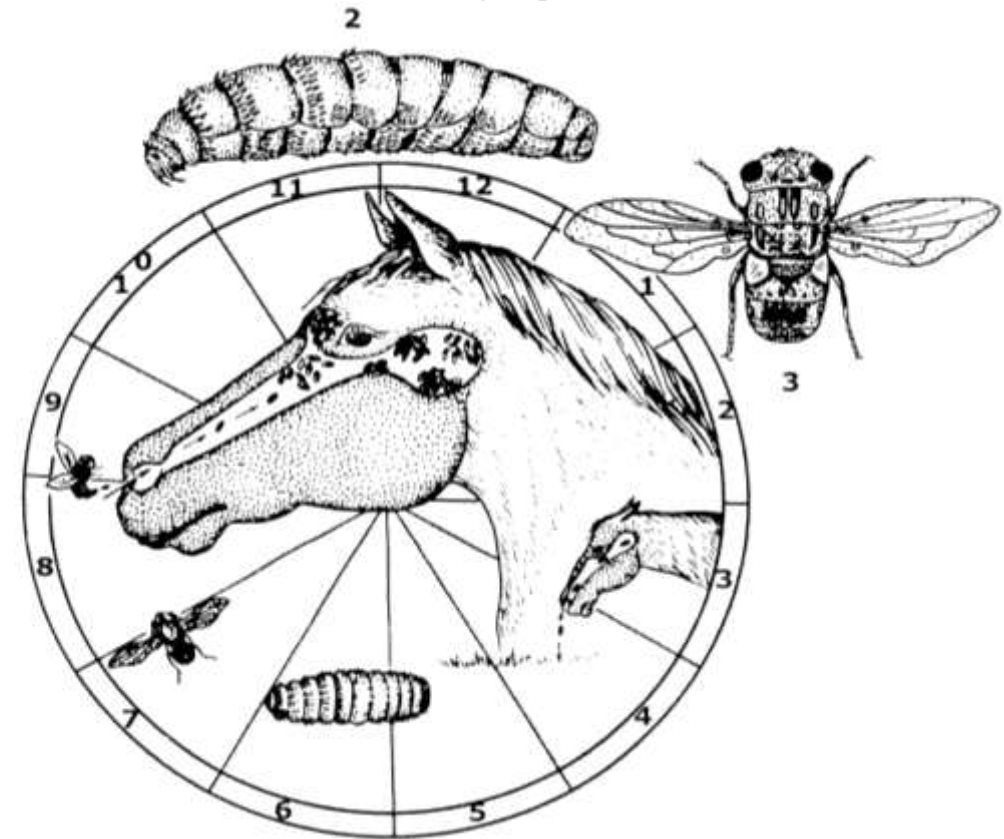
- 1 - \_\_\_\_\_
- 2 - \_\_\_\_\_
- 3 - \_\_\_\_\_
- 4 - \_\_\_\_\_



*Rhinoestrus purpureus*



*Rhinoestrus latifrons*



Life cycle rhinoestrosis

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

3. Sources and ways of invasion of animals by rhinoestrosis of soliped.

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4. Features of insect morphology:

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5. Clinical signs of rhinoestrosis of solipeds:

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6. Features of diagnosis of rhinitis in equidae:

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

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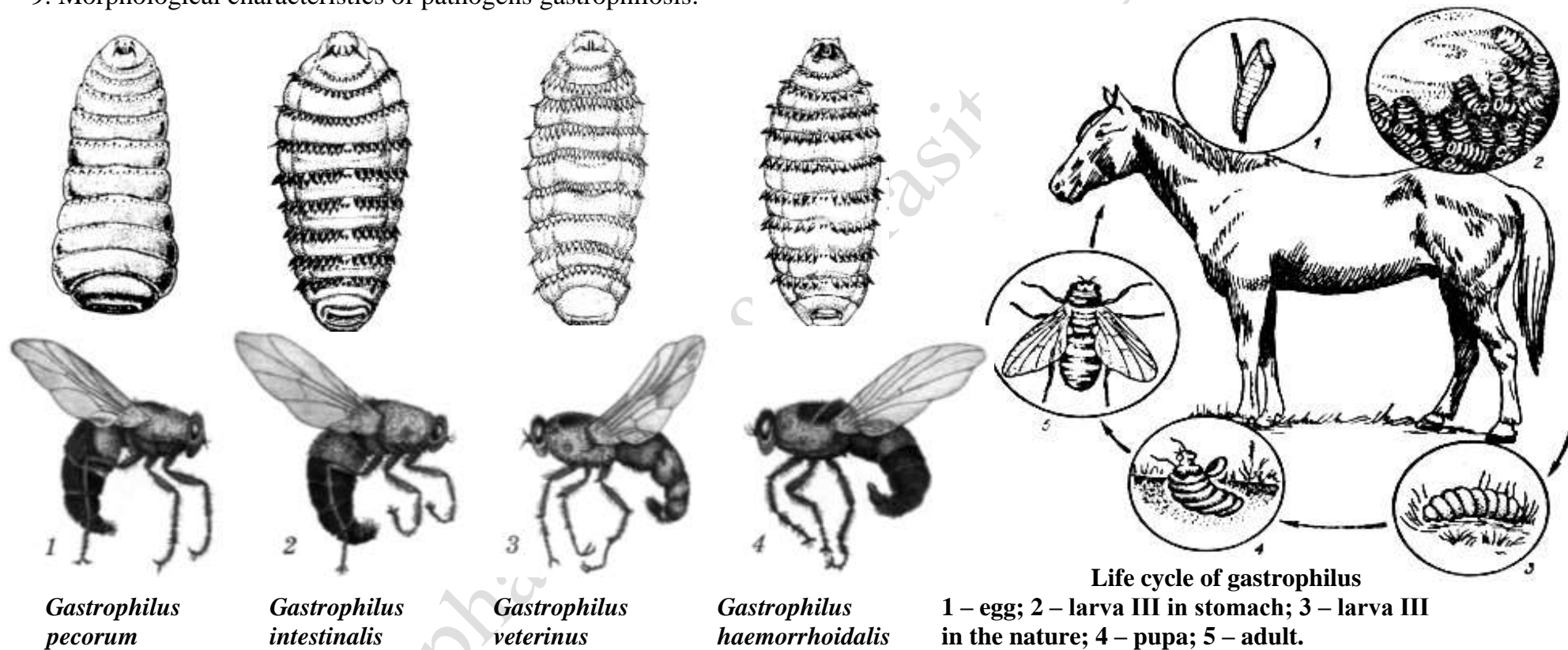
8. The place of pathogens of animals' gastrophilosis in the world animals' system (classification):

Phylum \_\_\_\_\_

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

ПідClass \_\_\_\_\_ Suborder \_\_\_\_\_ Genus \_\_\_\_\_

9. Morphological characteristics of pathogens gastrophilosis:



*Gastrophilus pecorum*

*Gastrophilus intestinalis*

*Gastrophilus veterinus*

*Gastrophilus haemorrhoidalis*

Definition of gastrophilosis: \_\_\_\_\_

\_\_\_\_\_  
 \_\_\_\_\_

10. Sources and ways of invasion of animals by horse gastrophilosis.

11. Features of insect morphology:

Dep. Pharmacol & parasitol. CBTU

12. Clinical signs gastrophilosis of horse:

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13. Features of diagnosis of gastrophilosis of horse:

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14. 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:** Blood-sucking Diptera insects (Midges): morphological and biological identification of clegs, blackflies, punkies, mosquitoes and sandflies.

**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 the class using textbooks, study guides, practicals (1-4), lecture material, electronic files from the discipline “Veterinary Parasitology” on the “Portal of distance learning (MOODLE) of the SBTU of Ukraine”.

**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:

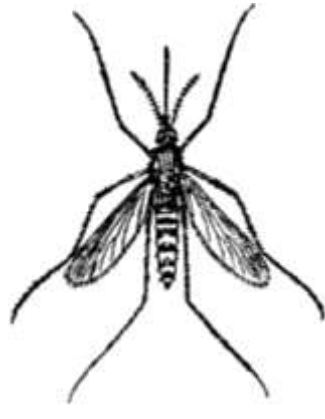
1. The place of pathogens of Midges in the world animals’ system (classification):

|                |                            |                  |                   |
|----------------|----------------------------|------------------|-------------------|
| 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:



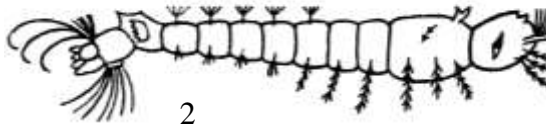
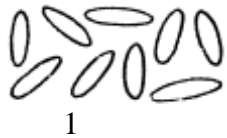
*Aedes caspius*



*Culex pipiens*

Imago of Mosquitoes

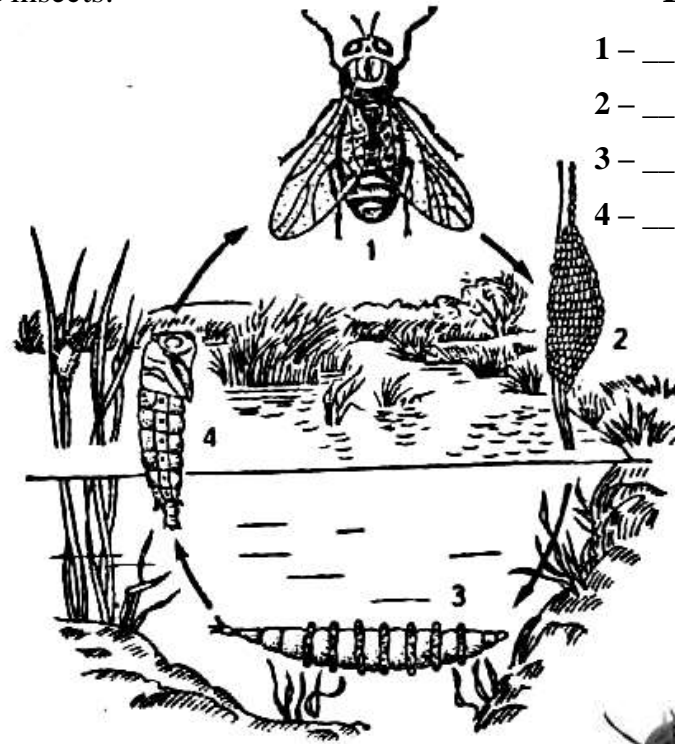
Life cycle Mosquitoes



3

4

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



Life cycle clegs:

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



Genus *Tabanus*



Genus *Hybomitra*



Genus *Haematopota*



Genus *Atylotus*



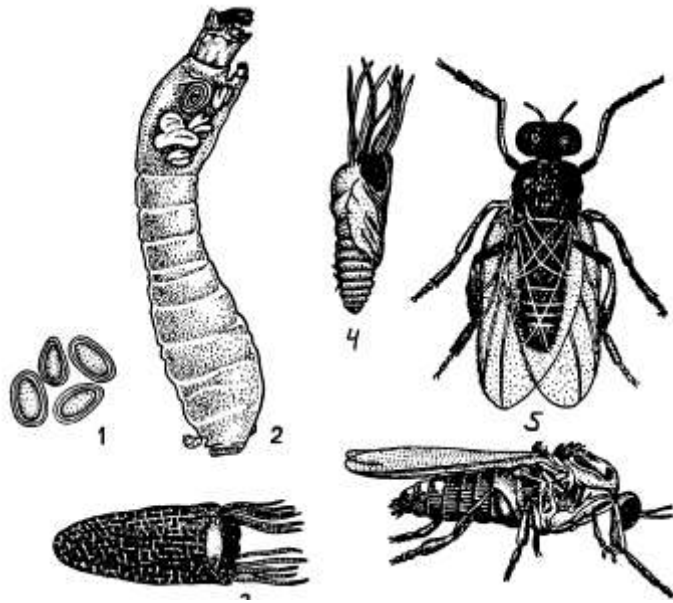
Genus *Chrysops*



*Stomoxys calcitrans*

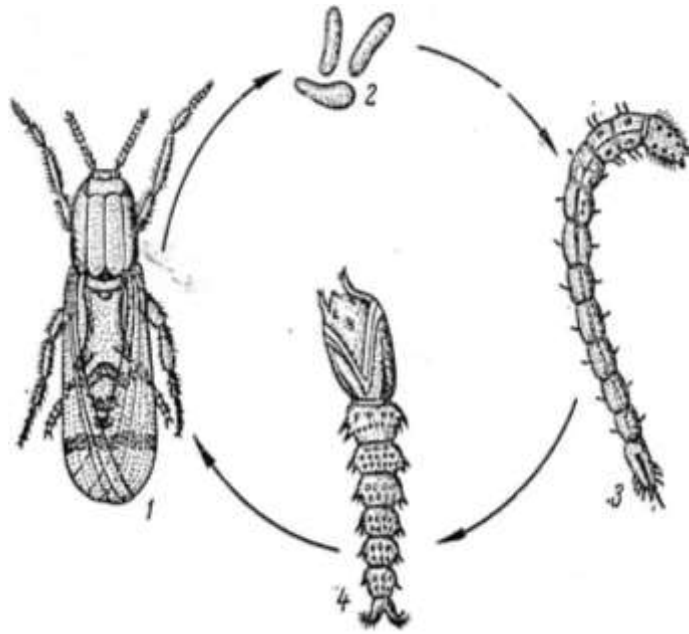


*Haematobia irritans*



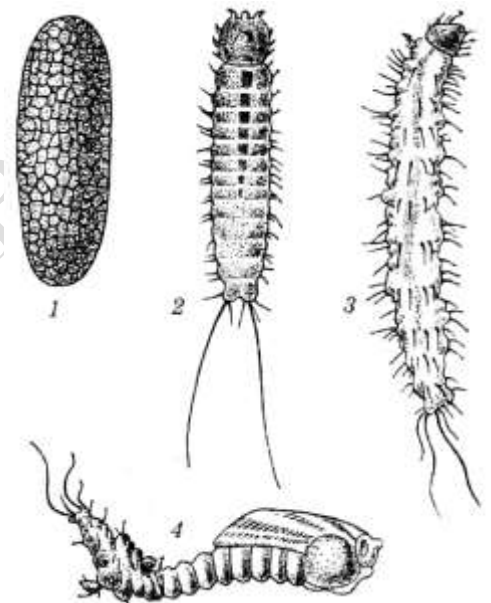
**Life cycle Blackflies**

- 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**

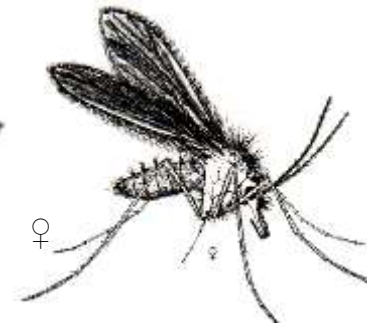
♂



♀



♂



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**Larva Sandflies**



**TOPIC:** Zoophilous flies: morphological and biological identification of family Muscidae, Sarcophagidae, Calliphoridae, Glossinidae.

**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 - zoophilous flies: morphological and biological identification of family Muscidae, Sarcophagidae, Calliphoridae, Glossinidae. 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 the class using textbooks, study guides, practicals (1-4), lecture material, electronic files from the discipline “Veterinary Parasitology” on the “Portal of distance learning (MOODLE) of the SBTU of Ukraine”.

**Auditory work.** On the museum material - permanent micropreparations, as well as temporary or permanent macropreparations to study the morphological features of zoophilus flies. 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 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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2. Morphological features of insects:

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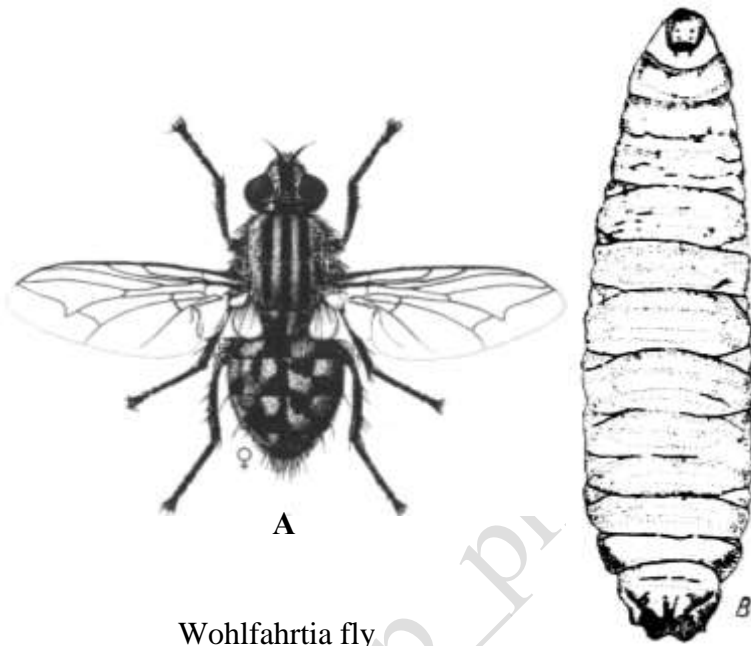


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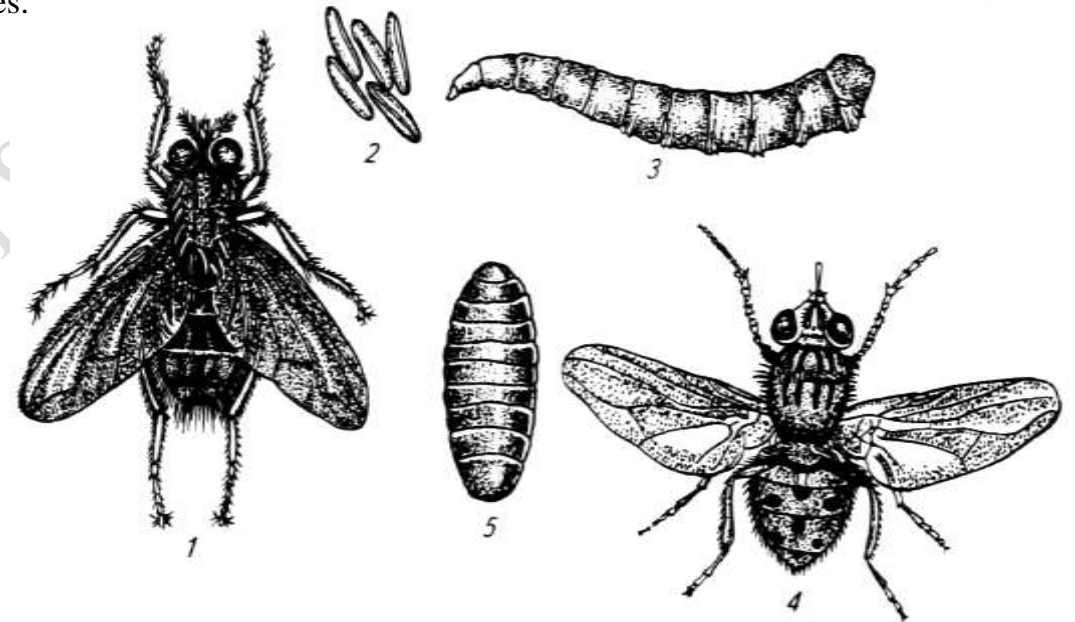
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3. Morphological characteristics of main species of zoophilic flies.



Wohlfahrtia fly

A – \_\_\_\_\_  
 B – \_\_\_\_\_



Stages of development of flies

1 – \_\_\_\_\_  
 2 – \_\_\_\_\_

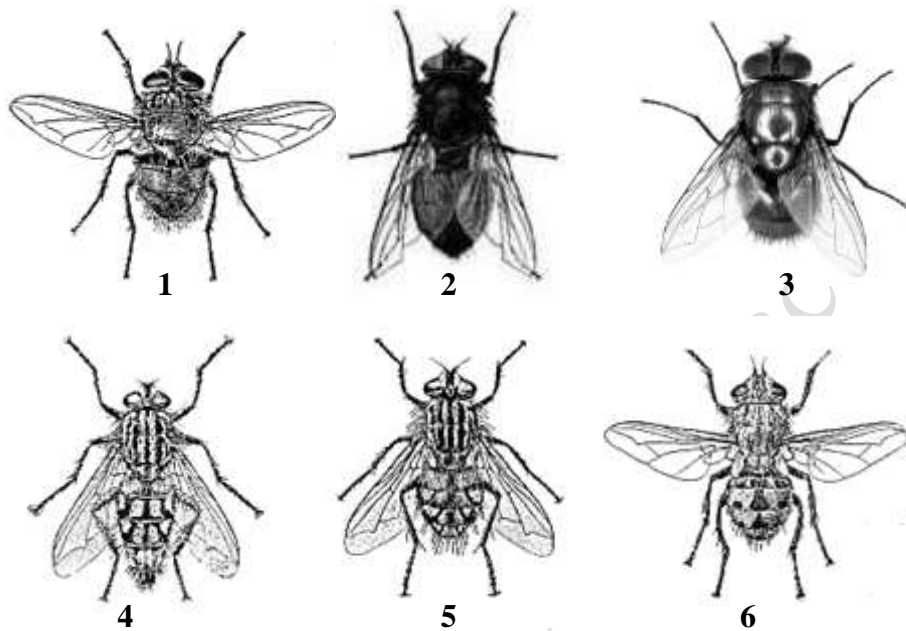


*Muscina stabulans*

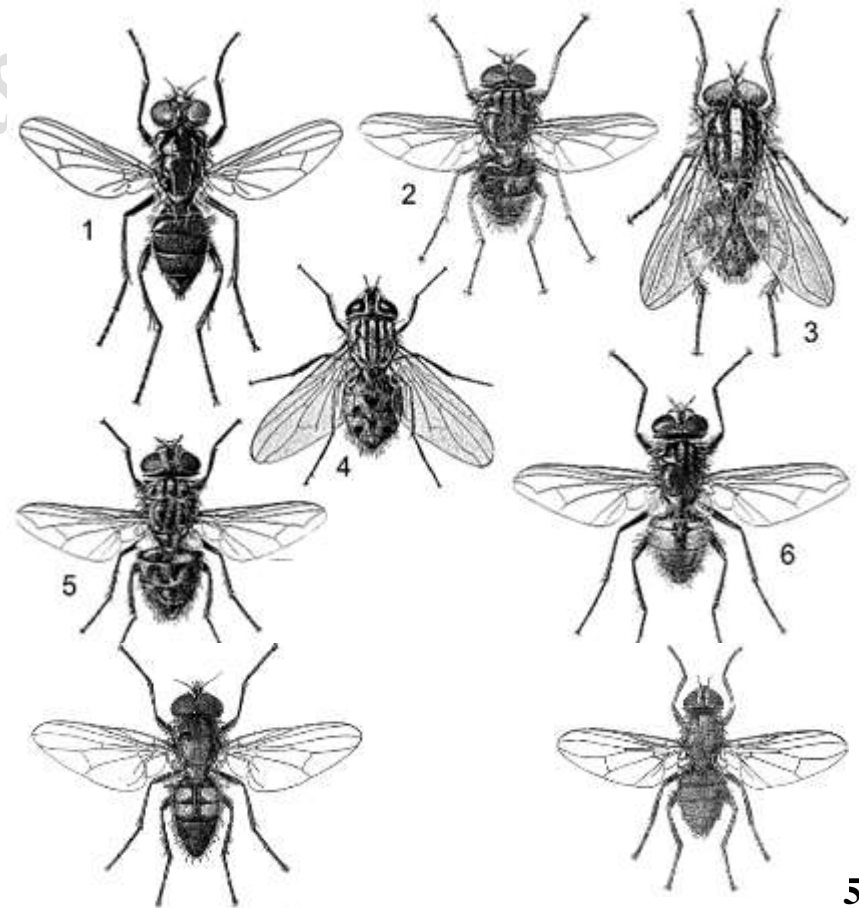


*Musca autumnalis*

3- \_\_\_\_\_  
 4- \_\_\_\_\_  
 5- \_\_\_\_\_



**Representatives of families *Calliphoridae*, *Sarcophagidae*:**  
*Calliphoridae*: 1 - *Calliphora vicina*, 2 - *Protophormia terraenovae*,  
 3 - *Lucilia sericata*, *Sarcophagidae*: 4 - *Sarcophaga subvicina*, 5 -





**TOPIC:** Diagnostics of simuliotoxicosis and animals' myiasis (Wohlfahrtiosis, Luciliosis)

**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 zoophilous flies. 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 Wohlfahrtia fly and Lucilia fly. Get acquainted with the features of the biology of the components of flies. To differentiate the components of Wohlfahrtia fly and Lucilia fly 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 Wohlfahrtia fly and Lucilia fly, 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 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 of Wohlfahrtiosis: \_\_\_\_\_

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\_\_\_\_\_

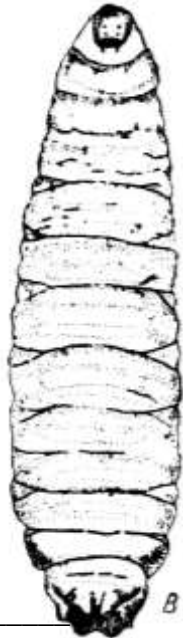
\_\_\_\_\_

2. Morphological characteristics of main species of zoophilic flies.

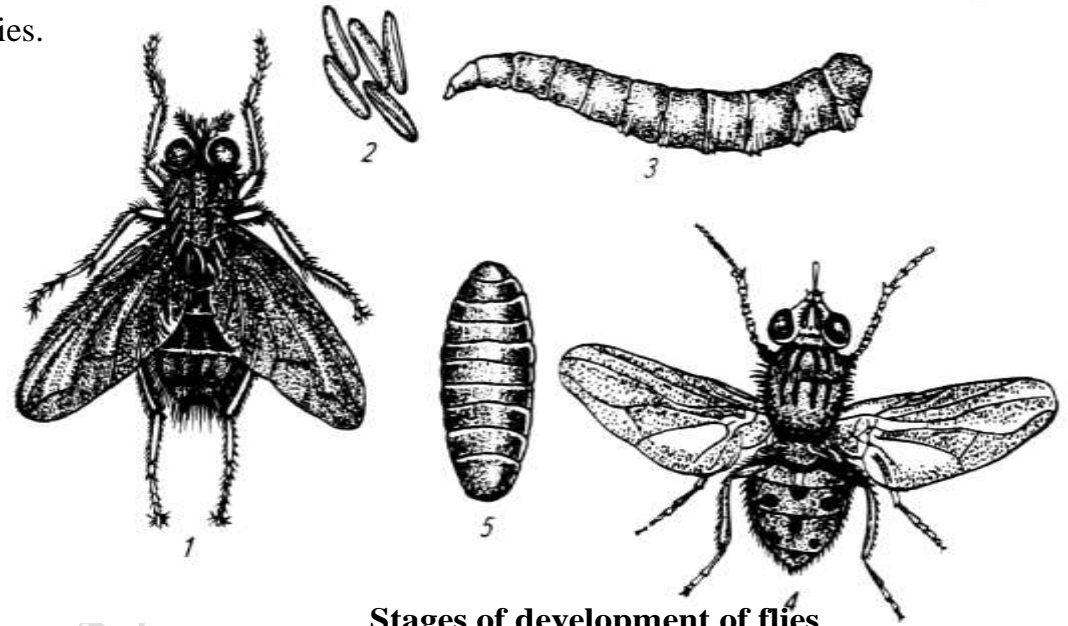


A

Wohlfahrtia fly



B



Stages of development of flies

A – \_\_\_\_\_  
 B – \_\_\_\_\_

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



1



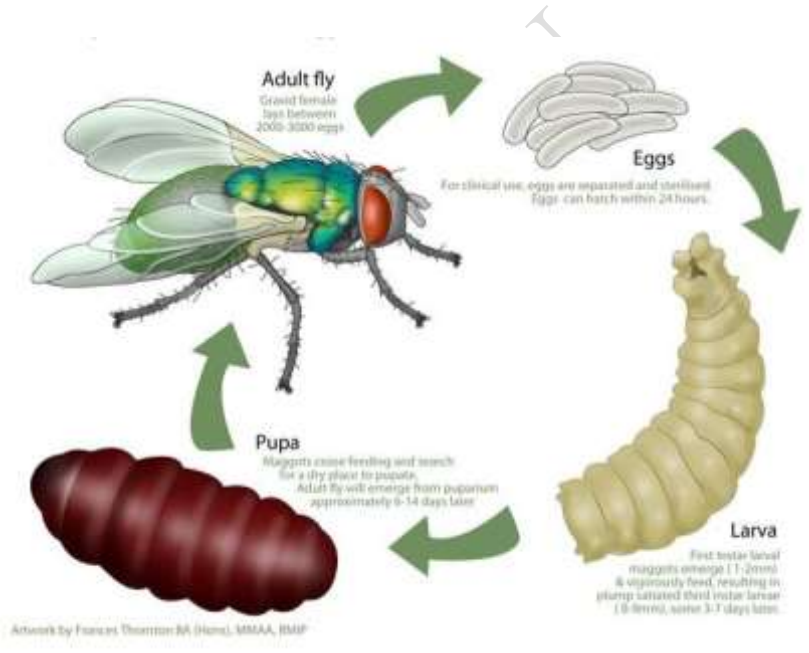
2

Representatives of families *Calliphoridae*, *Sarcophagidae*:

*Calliphoridae*: 1 - *Lucilia sericata*, *Sarcophagidae*: 2 - *Wohlfahrtia magnifica*



Lucilia sericata (Meigen, 1826)  
([https://e-insects.wageningenacademic.com/lucilia\\_sericata](https://e-insects.wageningenacademic.com/lucilia_sericata))



Life cycle of *Lucilia sericata*  
(<https://loveamaggot.com/clinical-preparation/>)

Definition of Luciliosis: \_\_\_\_\_  
\_\_\_\_\_  
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\_\_\_\_\_  
\_\_\_\_\_

8. Medico-veterinary significance of flies.

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\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

9. Features of lifelong diagnosis of Wohlfahrtiosis:

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

**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:** 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 the class using textbooks, study guides, practicals (1-4), lecture material, electronic files from the discipline “Veterinary Parasitology” on the “Portal of distance learning (MOODLE) of the SBTU of Ukraine”.

**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 \_\_\_\_\_

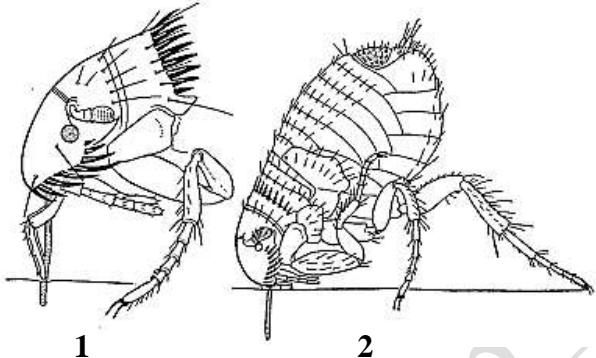
Family \_\_\_\_\_

Family \_\_\_\_\_

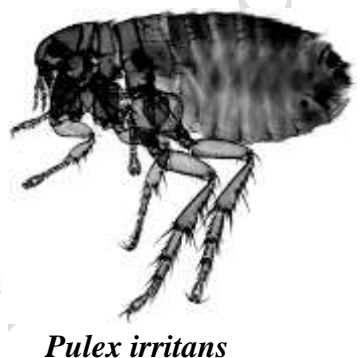


Definition: \_\_\_\_\_  
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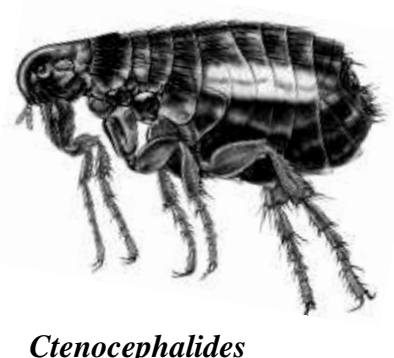
3. Morphological characteristics of Wingless parasitic insects:  
**Fleas**



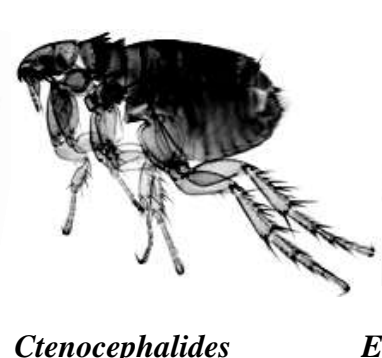
1 – \_\_\_\_\_  
2 – \_\_\_\_\_



*Pulex irritans*



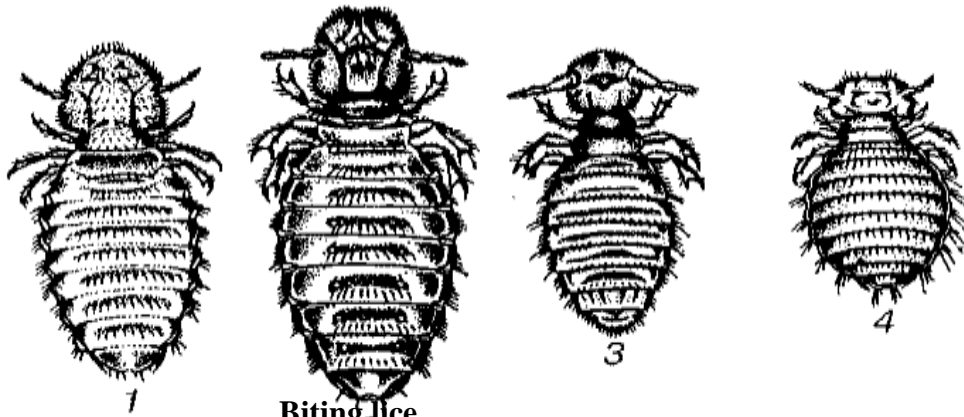
*Ctenocephalides  
canis*



*Ctenocephalides  
felis*

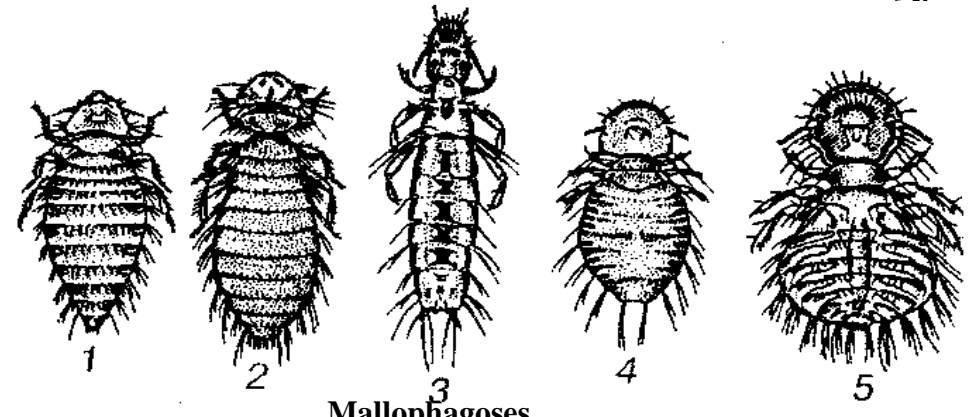


*Echidnophaga  
gallinacea*



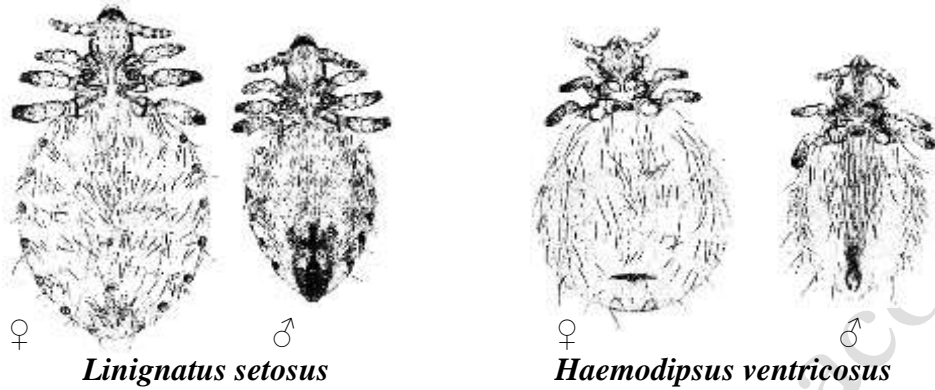
**Biting lice**

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



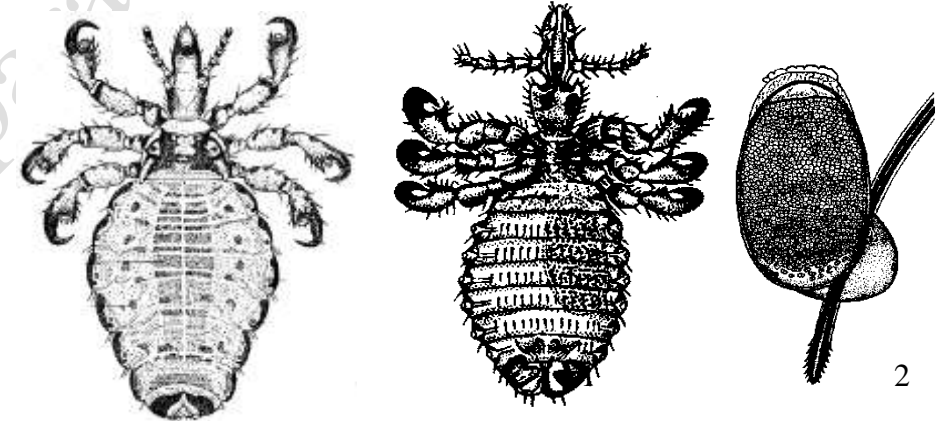
**Mallophagoses**

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



*Linignatus setosus*

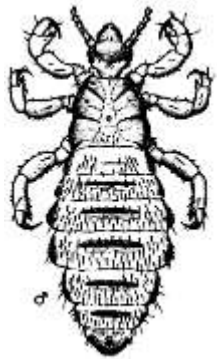
*Haemodipsus ventricosus*



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

*Haematopinus suis*

1 – \_\_\_\_\_  
2 – \_\_\_\_\_

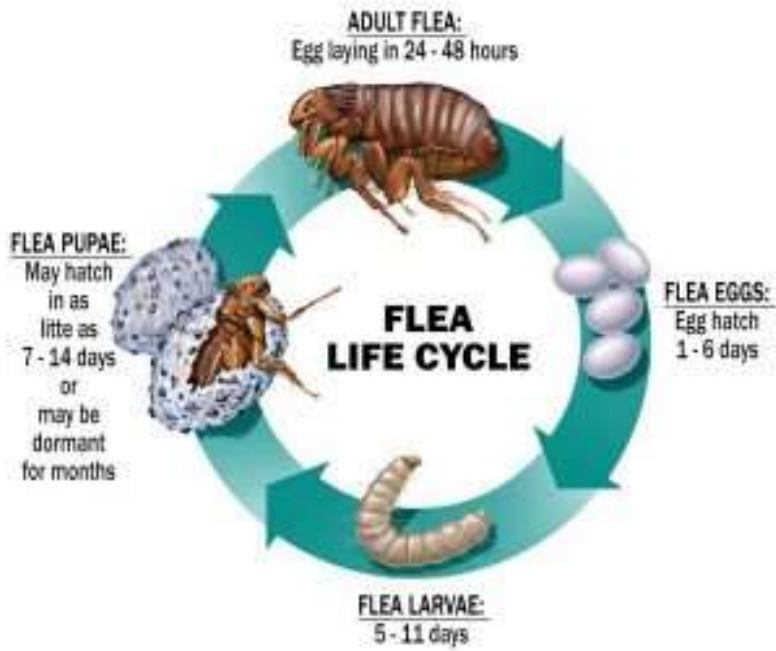


*Pediculus capitis*



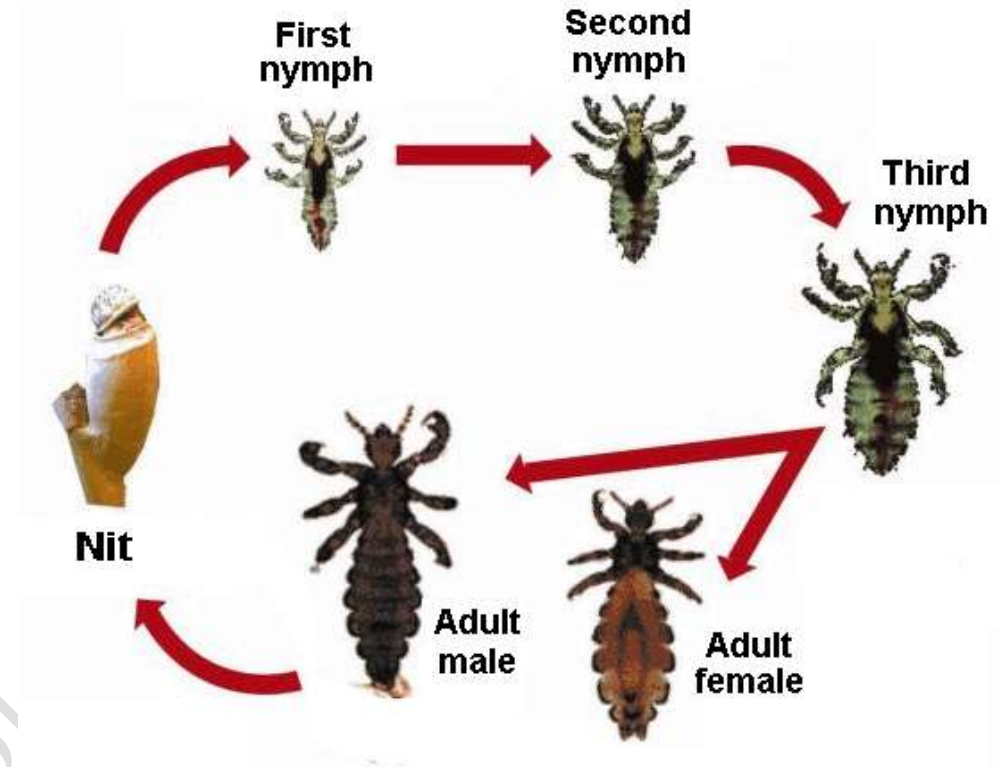
*Pthirus pubis*

*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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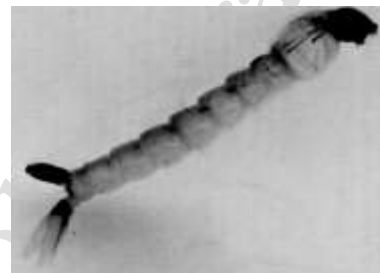
Pictures for the section «Veterinary entomology and animal entomoses»



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

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

6. Clegs.



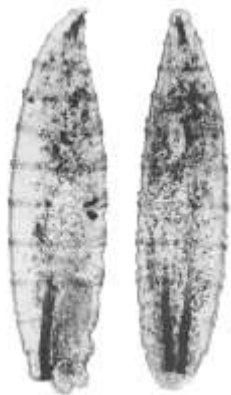
7. Mosquitos.

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*.



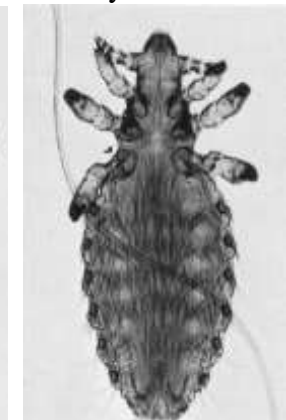
14. *Lipoptena cervi*.



15. *Melophagus ovinus*.



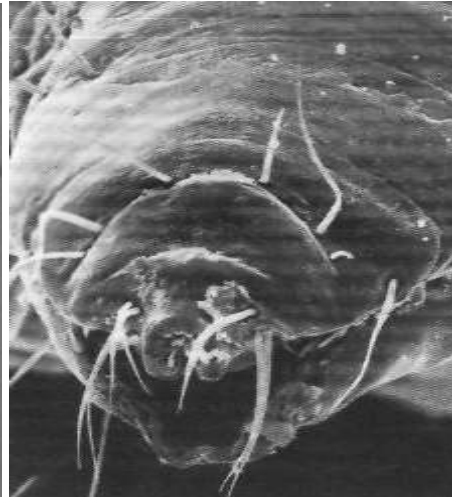
16. *Linognathus vituli*.



17. *Linognathus setosus*.



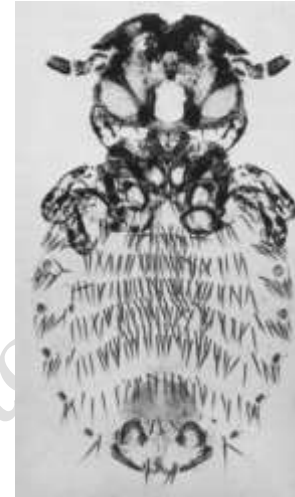
18. *Haematopinus suis*.



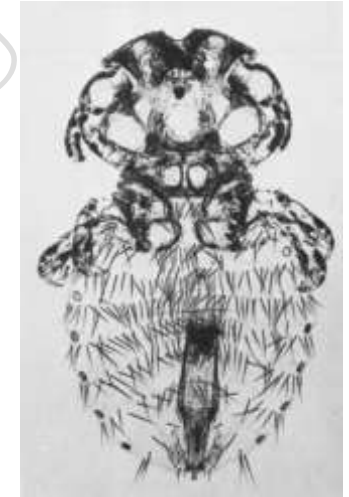
19. Mouthparts of *Haematopinus suis*.



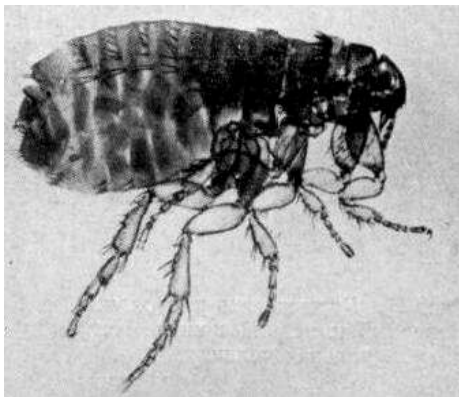
20. Eggs and adult of lice on the hear.



21. Female *Trichodectes canis*.



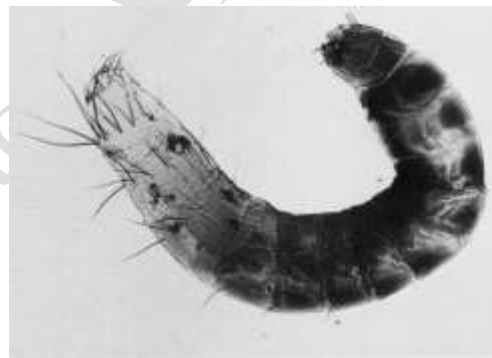
22. Male *Trichodectes canis*.



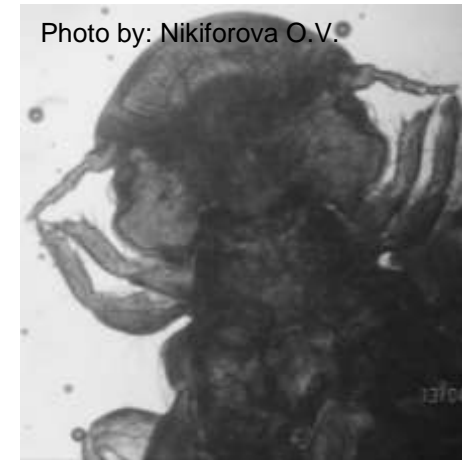
23. Flea of genus *Ctenocephala*



24. *C. canis*



25. Larva of *C. canis*.



26. The main end of the Mallophagoses.

Educational edition

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MAZANNY Oleksiy Volodymyrovych

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(PART III)

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for laboratory classes

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