NAZAROVA FATIMA SHARIPOVNA
JUMANOVA NARGIZA ESHMAMATOVNA
TASHMAMATOV BAKHTIYOR NORBEKOVICH

By science

# MEDICAL BIOLOGY

## BASES OF MEDICAL PARASITOLOGY. HUMAN NEMATODOSES AND TREMATODOSES

**MINISTRY OF HIGHER AND SECONDARY SPECIAL EDUCATION OF THE REPUBLIC OF UZBEKISTAN**

**Nazarova Fatima Sharipovna,**
**Jumanova Nargiza Eshmamatovna.**
**Tashmamatov Bakhtiyor Norbekovich**

**By science**

# MEDICAL BIOLOGY

## BASES OF MEDICAL PARASITOLOGY. HUMAN NEMATODOSES AND TREMATODOSES

Study guide for students of medical universities



**Toshkent**
**"METODIST NASHRIYOTI"**
**2023**

**UDK: 576.8**
**KBK: 28.0**
**N 18**

**Nazarova F.SH.**
**By science, MEDICAL BIOLOGY BASES OF MEDICAL PARASITOLOGY. HUMAN NEMATODOSES AND TREMATODOSES/ / Nazarova F.Sh., Jumanova N.E., Tashmamatov B.N., / Study guide for students of medical universities /– Toshkent: "METODIST NASHRIYOTI", 2023, 132 b.**

**Developers:**

**Nazarova F.SH.** - Department of Medical Biology, Samarkand State Medical Universities

**Jumanova N.E.** - Department of Medical Biology, Samarkand State Medical Universities

**Tashmamatov B.N.** - Department of Human Anatomy, Samarkand State Medical Universities

**Reviewers:**

**Koziyev M.S.** - Head of the Department of Biochemistry of SamSU, Candidate of Human and Animal Physiology, Biology, Associate Professor.

**Husanov E.U.** - Head of the Department of Human Anatomy and Clinical Anatomy of the Samarkand State Medical Universities, candidate of medical sciences, associate professor.

***Samarqand davlat tibbiyot universitetining 2023-yil "8"- iyundagi "A/F 277"- sonli buyrug'iga asosan nashrga tavsiya etilgan.***

**ISBN 978-9910-740-27-5**

## Enter

*This textbook is intended for students of medical universities, it provides modern ideas about helminths and helminthology, nematodes, trematodes, their structure, diseases caused by them, as well as specific symptoms, diagnostic methods and differential diagnostics are covered. .Emphasis is placed on personal and public preventive measures. Brief information about human parasitic roundworms, their pathogenesis, diagnosis and treatment methods is presented. Studying the information presented in the textbook will help students to have the right idea in the formation of knowledge about helminths. Taking into account the above, we believe that this study guide is useful for students of the medical university.*

## THE ARCHETICS OF THE CLASSROOM ARE THE VENUE

In the classrooms of the Department of Medical Biology and Genetics. Training. Microscopes, macropreparations on roundworms, micropreparations, illustrative slides, electronic appliances, handouts prepared on the subject. Duration of training. (6 hours) The purpose of the training. In humans, parasitic round worms, their structure, their pathogenesis, the diseases they cause, the symptoms of a little, their symptoms, clinical signs and treatment methods.

**Tasks of the class:**

1. To have a general understanding of helminthology, to study the classification of helminths.

2. To study a brief history of helminthology.

3. The class of requests is to organize the general features of trematodes.

4. Hepatic worm - study the morphological structure, developmental cycle, parasitological diagnosis, profilactics and epidemiological significance of fasciola hepatic.

5. Cat sucking - The study of the morphological structure, developmental cycle, parasitological diagnosis and prevention and epidemiologic importance of the opisthorshis felineus.

6. Lancetical sore - Morphological structure and developmental cycle of the dicrocelum lanceatum, organizing parasitological diagnosis, prophylaxis.

7. Organism - the morphological structure of the paragonimus ringer, the developmental cycle, parasitological diagnosis and prevention of the organism to learn.

8. Blood absorption is a study of the morphlogic structure,

developmental cycle, parasitological diagnosis and prevention of trematodes belonging to the schistosome generation.

9. Organize the basic classification and general properties of the type of round worms.

10 - Organization of the morphological structure, developmental cycle, parasitological diagnosis, prophylaxis and epidemiological significance of the human career - Ascaris lumbricoids.

11 - Ostrisa - Organize the morphology, developmental cycle, parasitological diagnosis and epidemiological significance of the enterobius vermicularis.

12 - Head-headed worm - organize the morphological structure, developmental cycle, parasitological diagnosis, prevention of tricocecefhalus trichiurus.

13 - Curved head worm - organize the morphological structure, developmental cycle, diagnosis and prevention of Ancylostoma duodenale, epidemiological significance.

14 - Trichinella - Morphology of Trichinella spiralis, developmental cycle, parasitological diagnosis and prevention Organization.

15 -Rhanga - Morphological structure of Dracunculus medinensis, developmental cycle, diagnosis and Organization of prevention.

16. - Wuxereriya - Study of the morphology, developmental cycle, parasitological diagnosis and prevention of Wushereria Bankroft and Loa-LoA.

**Students should know:**

1. The concept of helminthology.
2. Classification and brief history of helminths.
3. Classification and general properties of flatworms.

4. Trematodes. General structural features.

5. To have an understanding of the liver worm, cat sucking, lanceolate, soup, blood sucking.

6. To have an understanding of the general properties of roundworms.

7. Human parisites of roundworms. To have an understanding of the human soldier, ostritsa, ostritz, curved head worm, trixinella, ring, wuxereriya and Loa-LoA.

8. To have knowledge of microscopic methods of ovogelmintoscopy and ovogelmintoscopy.

9. Know the structure of helminth eggs and their identification.

**The student must be able to do.**

1. The human parasites in organism should lose their morphological structure, their vital cycle.

2. The parasites of the organ should be transmitted to humans, pathogenic effects, laboratory diagnosis and preventive measures.

3. Students should know how to make a diagnosis based on the collection of analysis data, biopsy, immunologic, allergological examination.

4. Operating to examine under a microscope by removing grease from the perianal folds of the skin to detect ostrisic eggs.

5. To detect blood clots in the urine, urination should be performed on the time of analysis.

6. - Students should organize ovogelmintoscopy and helminthoscopy methods, including devastation.

7 - Microscopic methods of ovogelmintoscopy: Native surkash method, suture method, flotation methods should be

organized.

**Motivational analysis of the topic.** Toxic effects of helminths, mehanic effect, migration phenomenon of helminth larvae, invasion of the development of the mother in the womb, interaction of helminths with infections, feeding methods of helminths, Due to the formation of Os in helminthiasis, this topic should be covered more for students of the Faculty of Treatment, Pediatrics, Medical Pedagogy and Dentistry of the Medical Institute.

**Interdependence and science.** Therapy, pediatrics, endocrine diseases, oncological diseases, therapeutic dentistry, surgery, and gynecology are related to topics. The study of parasitic nematodes and trematodes is important for the practice of any physician in the future. The study of parasitic worms depends on several departments of medical biology - "Medical Protozoology", "Medical Helmintology", "Medical Arachnology" and others.

**The content of the lesson.** The morpho-physiological properties of parasitic worms, the vital cycle and the diseases they gain, the paths of infection, laboratory diagnosis, prevention measures, methods of laboratory examination of parasitic vomiting eggs in the laboratory are widely covered.

**Training Control Questions.**

1. Characteristic signs of flatworms.
2. Signs of adaptation of trematodes to parasitism.

3. Liver Squest Development Cycle.

4. Laboratory diagnosis, prophylaxis of fasciolesis.

5. Distribution of opisthorchiasis, development cycle, medical sources.

6. Laboratory diagnosis, prophylaxis of opisthorchiasis.

7. Paragonimus Ringer, a little originality, a developmental cycle.

8. Laboratory diagnosis, prophylaxis of Dicrocelium lanceatum.

9. Indicate which of organized trematodes are anthropozoonosis, anthroponosis- a natural source disease.

10. Characteristic signs of roundworms.

11. Why nematodes are geohelminths.

12. The structure of the foundation.

13. 14. Different aspects of the structure of Ostrisa's soldier.

15. Why is autoreinvasia in enterobios disease, but not in ascariasis?

16. What is inactive and passive invasion?

17. Which of the diseases those nematodes develop is a disease related to the profession.

18. Which type of nematodes is more common in children?

19. Biological method of combating hookworm.

20. How laboratory diagnosis of ntmatodes is performed?

21. General in the prevention of nematodes.

22. The peculiarity of the development of Trichinella.

23. How Trixinellosis is determined.

24. Rishta's progress cycle.

25. Prevention of dracunkulosis.

26. Filaria's life cycle.

27. Why Wuxereriosis disease is spreading in cities.

28. Rize Ovogelmintoscopy methods.

## THE MORPHOLOGICAL AND PHYSIOLOGICAL FEATURES OF HELMINTHS ARE THE BILATERAL SYMMETRICAL THREE-LAYERED INVERTEBRATES

They are presented in three types: flatworms (Plathelminthes), roundworms (Nemathelminthes) and ringworms (Annelides). Often worms live a free life. However, many have become parasites. Parasitic worms are helminths, and the diseases they cause are called helminthiasis. The department of helminths in parasitology is called helminthology. Scientist Konstantin Ivanovich Skriabin made a great contribution to this science; under his leadership, a large school of helminthologists was created. K.I. Scriabin put forward the principle of destruction of parasitic worms through a number of measures:

1. To get people out of parasitic worms;
2. Destruction of released parasites, their eggs and larvae;
3. To protect people from new infectious diseases;
4. Cleaning the external environment from helminthic invasion sources.

Scientists who have made a significant contribution to the study of helminths are V.G. Gnezdilov's life cycles of the Cestodes, academician E.N. Pavlovsky - organized the problem of parasitocenoses. Human helminthiasis is mainly derived from two types of worms: flat and round worms. The source of helminth infection is humans, domestic and wild animals. Depending on the characteristics of the biological cycle of the development of parasites, their distribution factors are divided

into geohelminths and biohelminths. Geohelminths are worms that should shoot in the soil of the life cycle. Biohelminths are parasites that go through all stages of the life cycle in the body of the career. The entry of helminths into the human body occurs mainly through the oral tract, in some cases - through percutaneous and transmissive pathways. Most of the worms that parasitize in humans are intestinal helminths. However, there are also tissue helminths that live in the subcutaneous tissue or lymphatic system in adulthood. Each type of helminth is characterized by a specific localization in the human body. Some helminths at different stages of development are found in different organs. In most helminthiasis, immunity is not tight. Antibodies are lost 6 to 12 months after deworming or healing.

**Classification**

**Group**: Vermes - Worms

**Type**: Nemathelmintes - Round Worms

**Classes**: Gastrotricha - Abdominal Rotatoria - Kolovratska AkantoSephala - Scrapers Nematoda - Original Round Worms

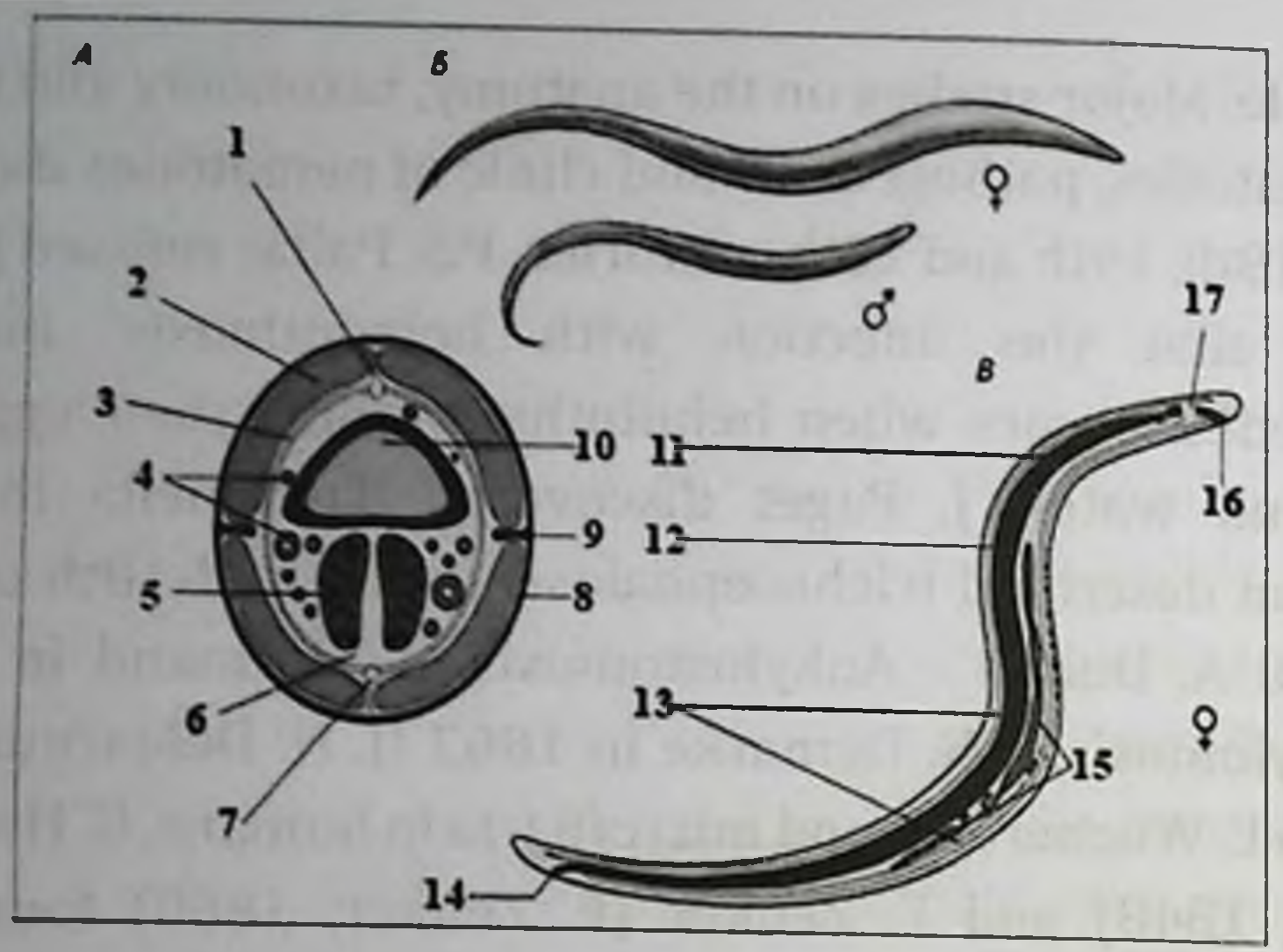
Nematoda Class Types:

- Ascaris Lumbricoides - Human Soldier
- Trichocephalus Trichiurus - Surbon Worm
- Enterobius Vermicularis - Ostrisa
- Toxocara Canis - It Toxocarasi
- Toxocara MISTAX - Cat Toxocarasi
- Ancylostoma Duodenale - Duoden Bow Egribosh Vomagus
- Necator Americanus - Necator some nematodes (ascariasis, enterobiosis) have been known since ancient times. The parasitism of Ascaris and Ostrisa is mentioned in the papyrus of Ebers, in the works of Hippocrates, Ibn Sina, and

Aristotle. Major studies on the anatomy, taxonomy and biology of nematodes, pathogenesis and clinic of nematodes date back to the 18th, 19th and 20th centuries. P.S. Pallas refused (1760), noting that the infection with helminthiasis, including nematodes, occurs when helminths swallow their eggs with food and water. J. Paget discovered Trichinella in 1835; J.Morgan described trichocephalosis in the mid-18th century; In 1838 A. Dubini - Ankylostomosis, A. Normand in 1876 - Strongyloidosis, D.N. Demarke in 1863 (J. N. DeMarquay) and in 1866 E. Wucherer found microfilaria in humans. G. Herbst (G. Herbst, 1848) and F. Zenker (F. Zenker, 1860) found that infection with trichinellosis occurs during the consumption of meat infected with trichinella larvae. A.P.Fedchenko (1869) proved that a person can be infected with dracunculosis when drinking water with small shrimp infected with the larvae of the ring. P. Munson (1878) identified the spread of wuxeriosis through mosquitoes. S.P. Botkin (1884) noted the importance of neuro-reflex effects in the pathogenesis of hookworm. Mechnikov I.I. (1901), M.V. Weinberg (1907), K.I. Scriabin (1923) showed the role of nematodes as conductors of microbial flora in human body tissues. The allergic nature of the clinic of some nematodes, the manifestation of the initial stage of VP Bazhenov (1935) indicated in the example of trichinellosis.

**General features of the type of round worms.**

The type of round worms (nemathelminthes) is the second type of the Vermes group. Roundworms are developed from free-living flatworms (turbellaria).




1 – dorsal nerve tube, 2 – striated muscles, 3 – nerve fibers, 4 – ovary, 5 – uterus with ovules, 6 – head of a medullary body, 7 – abdominal nerve tube, 8 – cuticle, 9 – 12 – excretory duct, 10 - 11 - digestive tube, 13 - nerve fibers, 14 - anal opening, 15 - reproductive organ, 16 - mouth, 17 - nerve ring around the larynx.

The body is pea-shaped, circular in cross-section. The size is very variable: from microscopically small sizes up to 0.4 mm - gastropods (Gastrotricha), rotatorflies (Rotatoria) up to 1.5 m female ringworm (Dracunculus medinensis) and even 8 m female Placentonema gigantea, in sperm while placenta lives.

The body of these worms is a skin-muscle bag. Its wall has three layers. Outside - the cuticle, which is a derivative secreted by hypodermia. In parasitic forms, it is multi-layered, solid; in free-living organisms, it is thin and provides gas exchange with the environment. The chemical composition of the cuticle is complex and includes a number of organic compounds of different nature: albumins, collagen, keratins, glucocorticoids,

lipids, etc. The presence of keratins and collagens determines its mechanical strength.

Under the cuticle - hypodermis - a thin layer of syncytial epidermis. In addition to the formation of the cuticle, the hypodermis serves as a kind of storage for chemical protection and nutrients (lipids and glycogens).

Beneath the hypodermis is a muscle layer represented by smooth muscle tissue. It is not solid, but in the form of four ribbons, separated from each other by ridges of the hypodermis protruding between the ribbons (Fig. 1).

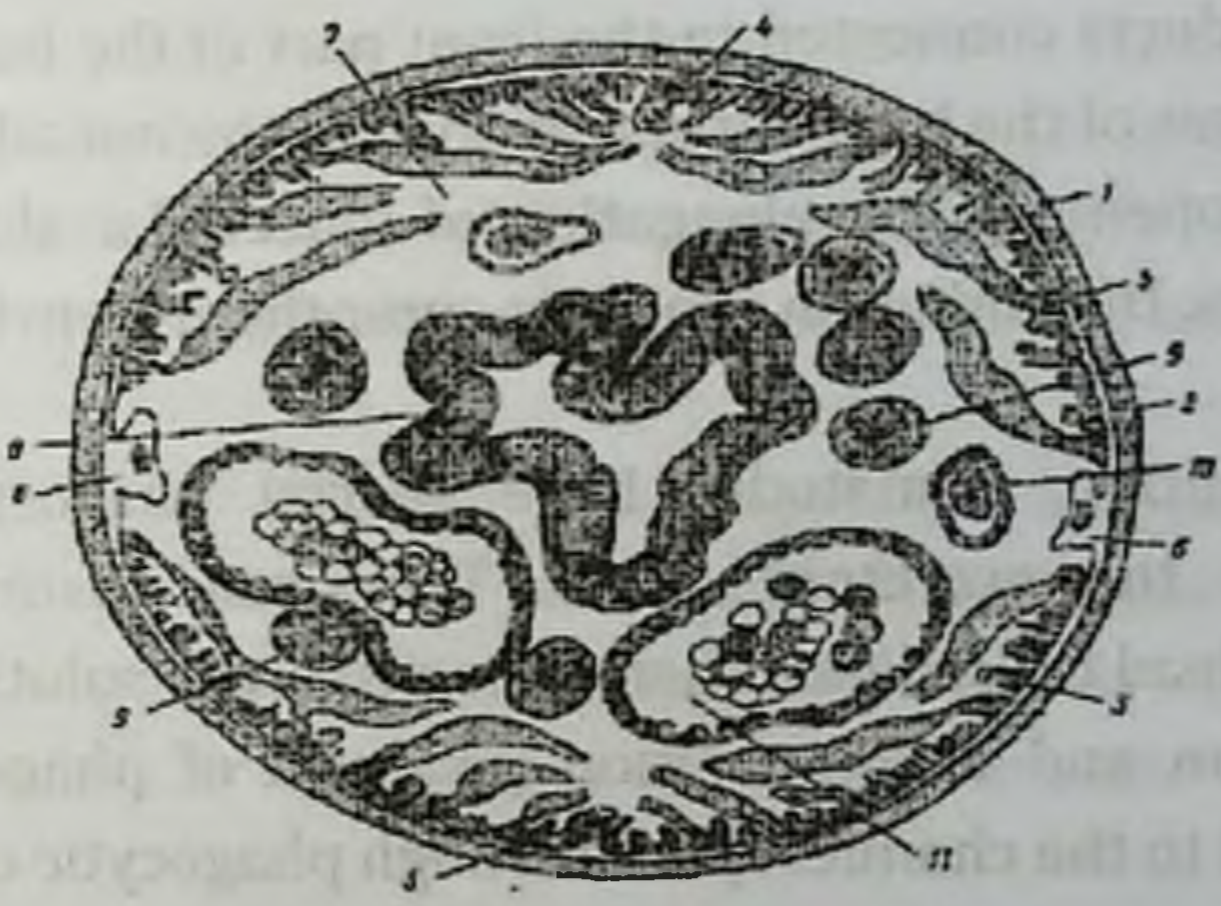


Figure: 1. 1 - cuticle; 2 - hypoderm; 3 - muscles; 4 - dorsal hypodermis pad with nerve cord; 5 - abdominal pad of the hypodermis with a nerve cord; 6 - lateral ridges of hypodermia with excretory channels; 7 - main body cavity; 8 - intestine; 9 - ovary; 10 - egg passage; 11 - uterus.

The walls of the skin-muscle bag surround the cavity formed by the gradual reduction of the parenchyma, which fills

all the spaces between the organs in flatworms. The nascent cavity is a primary or pseudo cavity because it does not have its own epithelial wall. The appearance of a free body cavity is one of the aromorphoses of roundworms. The pseudo-cavity is filled with a fluid that acts as a transporter. This allows the transfer of substances and gases to occur much faster than flatworms because the fluid is in constant motion. In addition, the cavity fluid performs the function of muscle movement, that is, it plays the role of a hydroskeleton while maintaining the body shape of worms.

In representatives of the class of nematodes, there are excretory ducts connected in the front part of the body in the lateral ridges of the hypoderm and open to the outside with an excretory opening. The elongation of unicellular skin glands forms tubes. Dissimilation products enter them from the cavity fluid.

In addition, nematodes have special phagocytic cells located in the excretory ducts. They can absorb rotten products, dead cells, digest them. The dissolved solution of the dissimilation and decomposition products of phage cells is transferred to the channel space through phagocytic cells.

In microscopic rotifers, gastropods, and some other groups of roundworms, the excretory system is protonephridial.

Two nerve fibers pass through the dorsal and ventral ridges of the hypodermis. The type of nervous system is the same - ganglion-vascular. However, due to an active lifestyle, the laryngeal nodes are larger and contain more nerve cells, and the nerve fibers are thicker. At the same time, the degree of cephalization remains weak. Nerve endings are associated with external cuticular formations that serve to perceive the effects

of mechanical, chemical and other stimuli. Most of them have normal eyes when they live freely.

The digestive system is a tubular type; however, the intestinal tube is not divided into two, but three parts: front, middle and back. The structure of the posterior part led to the formation of the anus. The intestinal tube is open on both sides, food moves in one direction. Undigested food remains are removed through the anus, not through the mouth as in flatworms. A similar structure of the alimentary canal is another aromorphosis of the type Nemathelminthes.

Roundworms have a more perfect way of digesting food - a cavity, in which food is broken down and digested faster, which allows you to replenish spent substances and energy as quickly as possible. The middle part of the intestinal tube has an endodermal origin. It digests food and absorbs broken down food.

Circulatory and respiratory systems are absent. The transfer of substances is carried out through the cavity fluid. In free-living worms (aerobes), gas exchange is carried out through the external pores of the body. Parasitic worms are anaerobes.

The method of movement is simple, it is provided only by the contraction of longitudinal muscles. Movements are serpentine, in which the whole undivided body participates. A feature of these worms is the formation of cytoplasmic cysts by the muscle cells, which are directed to the nearby neural tubes.

Reproduction is only sexual, in some species parthenogenesis occurs. Roundworms have two layers, which is their aromorphosis. Sexual dimorphism is well expressed: females are larger than males, in males the back of the body is

bent ventrally, in females the gonads are paired, in males they are not paired, females have two uteruses (Fig. 2).


Figure l: 2. on the left, the female of the opened roundworm, on the right - the male gonads.
1 - ovary; 2 - ovary; 3 - uterus; 4 - vagina; 5 - the lateral layer of the hypodermis; 6 - phagocyte cells; 7 - nerve ring; 8 - lips; 9 - esophagus; 10 - intestine; 11 - genital opening; 12 - anus.

Fertilization is internal. Free-living worms have direct development. In parasites, it is larval and develops mainly without changing the host, less often by changing the host.

Roundworms are well-adapted to the most diverse habitats due to the strict stability of their structure, down to the stability of their cellular composition. Free life forms live in soil, fresh and seawater and are an important link in the food chain of biocenoses. A large group of soil nematodes is destructors. Destroying the remains of dead animals and plants, harmful nematodes create conditions for further actions of soil bacteria - mineralizers. Mineralizers ensure the return of chemical elements from organic molecules to inorganic substances,

which are then introduced into biotic circulation.

Many species of the class Nematoda are parasites of humans, animals and plants. Phytonematodes affect any vegetative organs of higher plants. Parasites of animals are related roundworms and representatives of the class Acanthocephala.

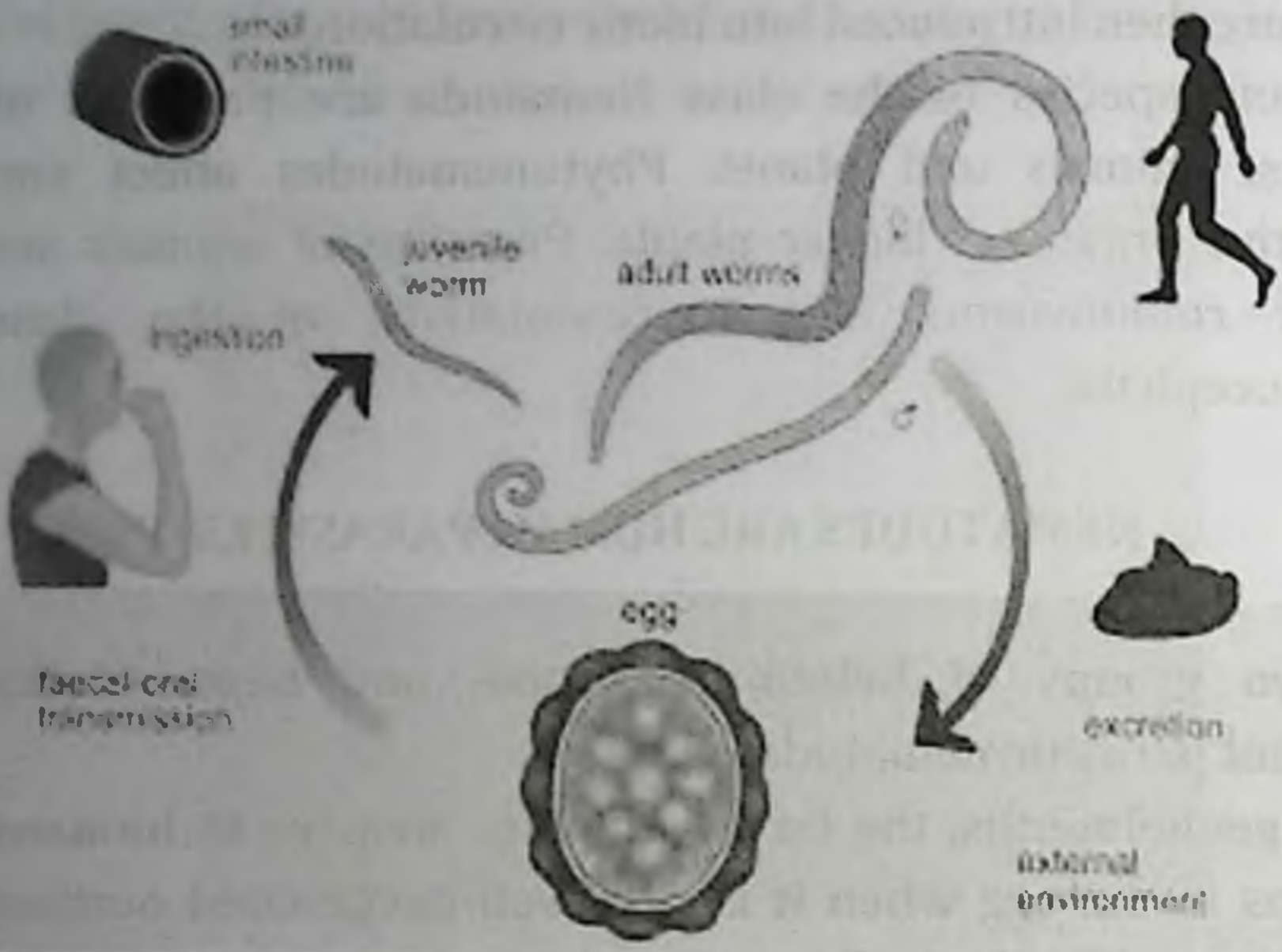
## NEMATODES ARE HUMAN PARASITES

Two groups of helminths - geo- and biohelminths, represent parasitic nematodes.

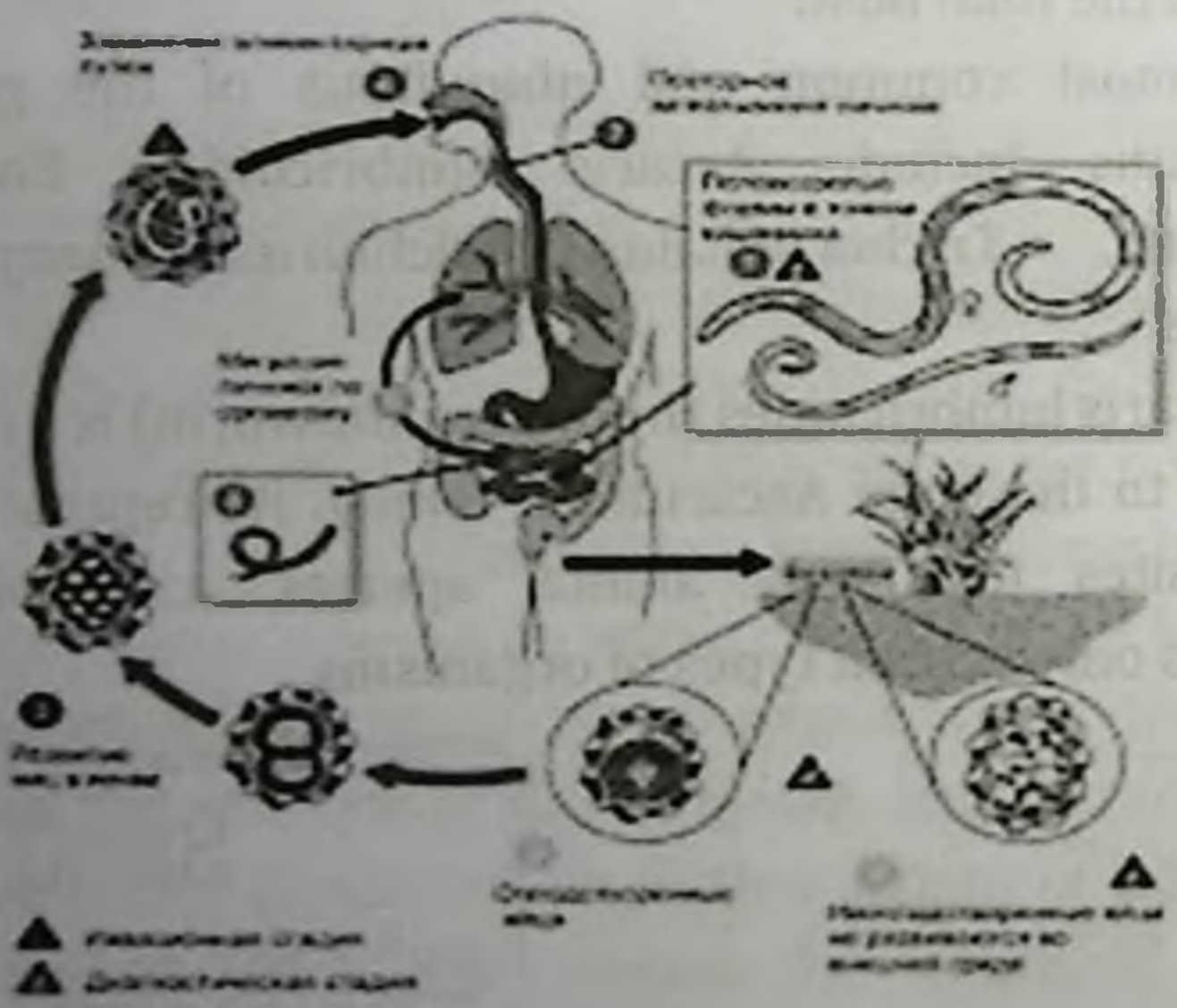
In geohelminths, the larva, which is invasive to humans, develops in the egg when it is in a well-oxygenated outdoor environment. The larva formed in the egg infects humans. In the development cycle, biohelminths have an intermediate host, in which the larva develops, which is invasive to humans, if it acts as the final host.

The most common and ubiquitous of the group of geohelminths include Ascaris lumbricoides, Enterobius vermicularis, Trichocephalus trichiurus, Ancylostoma duodenale.

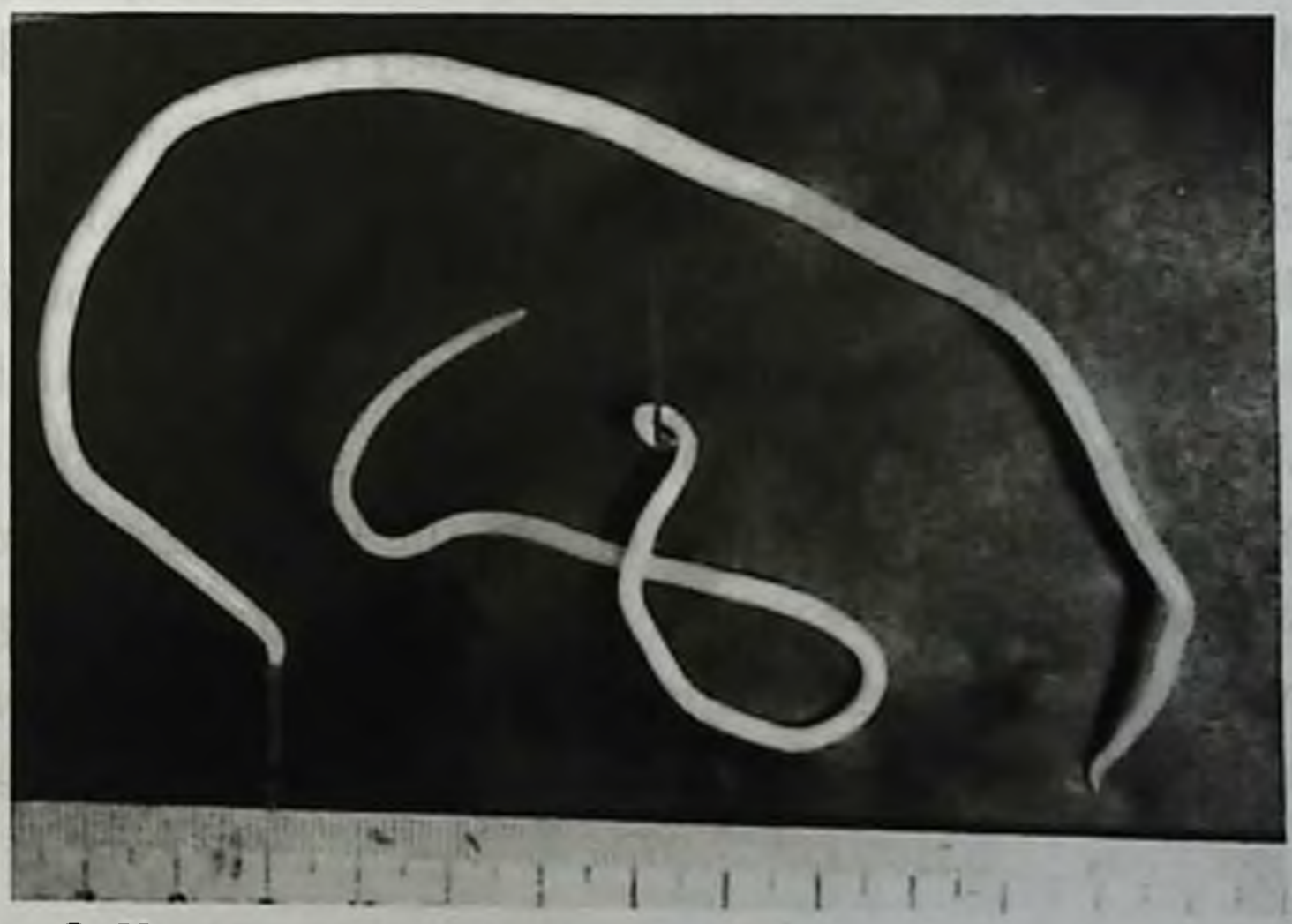
● Ascaris lumbricoides (human roundworm) is a helminth belonging to the large Ascarididae family. Its representatives are parasites for many animal species, each of which parasitizes only certain types of organisms.




**The life cycle of the human ascarida**



Ascariasis, which is a parasite in humans, most often affects children, but it also occurs in adults. These are oozing, pink worms, the size of females is 40-44 cm, males are 12-15 cm. The opening of the mouth is surrounded by three cuticular lips, with which they can occasionally injure the intestinal mucosa, the tail part of the male body is bent towards the abdomen. (Figure 3). They parasitize in the small intestine, mainly in the ileum, they feed on the contents of the intestine, especially absorbing many vitamins. The average life expectancy is about one year (9-12 months). If women and men have this worm in their intestines, after fertilization, the female lays up to 200,000 eggs per day, which are excreted in the feces. The female can also lay unfertilized eggs on her host. Oviposition stops during the last two months of parasitism.



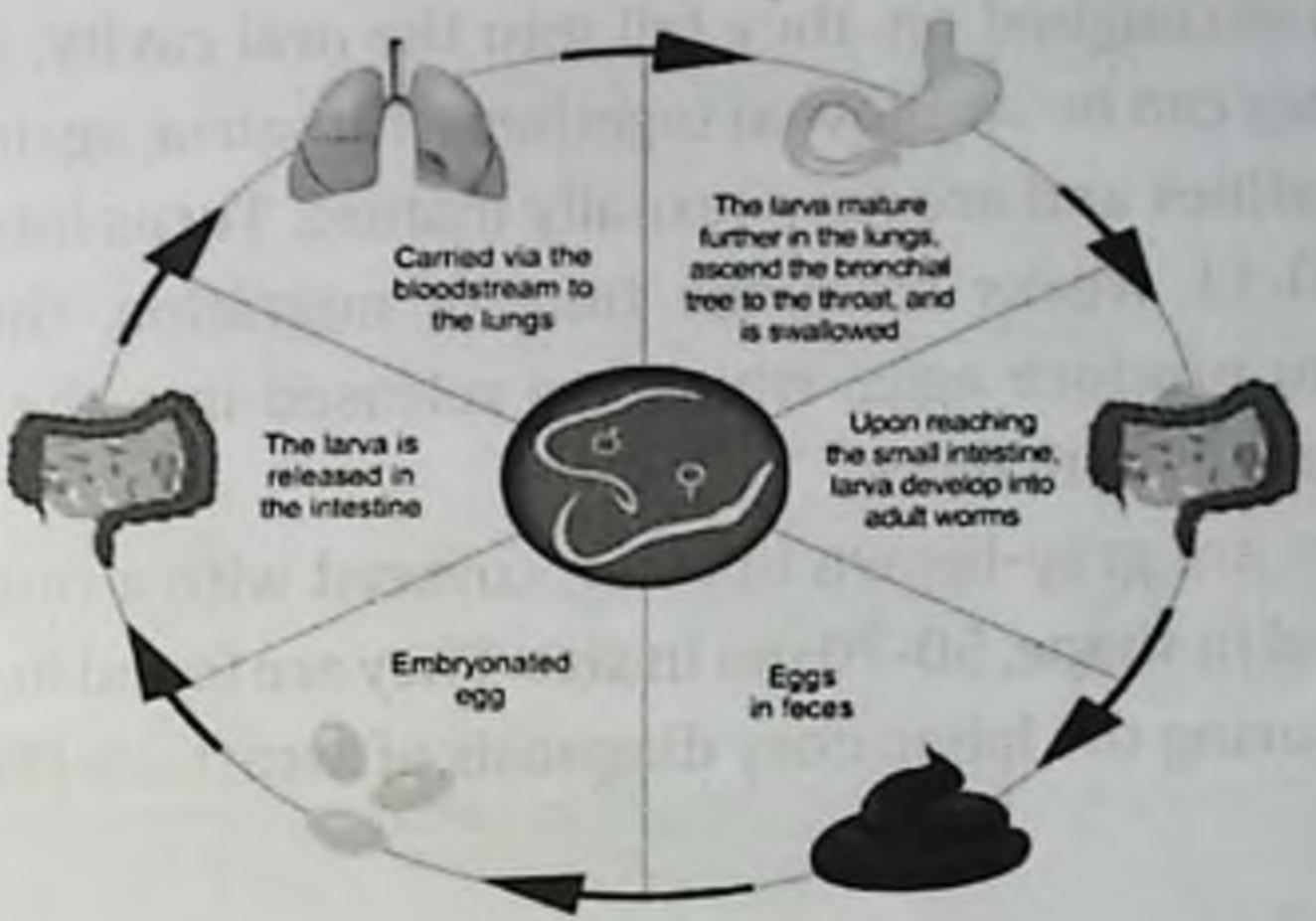
Picture: 3. Human roundworm - Ascaris lumbricoides. female and male. - anal hole; 2. - Spicules.

The development of the larva in the egg makes it invasive, which occurs only in the external environment (soil). The time of larvae formation depends on the combination of favorable conditions (temperature + 25 ° C, availability of O2, humidity 90%). Ripening is completed in 10-12 days. With changes in temperature and humidity (but at least 8%), the development time of larvae varies from 42 days at 13.5 °C to 9 days at 30 °C.

In recent years, it was found that under certain conditions, invasive larvae can hatch and actively penetrate the skin of experimental animals.

The shell of eggs is multi-layered, which makes them resistant to various external influences. The outer protein and adjacent carbohydrate layers provide mechanical protection, while the inner fat-like layer makes the shell impermeable to many toxins. Eggs remain viable for several months in a saturated solution of 3% formalin, 15% H2SO4, mercuric chloride. In the outdoor environment, they retain the ability to live up to 7 years. Ultraviolet rays are harmful for them. Temperature has a harmful effect on the emerging larva (+ 50 ° C, it dies within 15 minutes, at + 70 ° C - within a second).

The route of transmission of ascariasis is through the mouth, the invasive stage is the egg. In the small intestine, the larva leaves the swallowed egg, enters the blood vessels of the intestinal walls, and begins a complex migration (Fig. 4): intestinal vessels → liver → inferior vena cava → right heart → pulmonary artery → after 4 days it is found in the lungs can be




Picture. 4. Scheme of migration of Ascarida larvae in the human body.

The duration of the average migration stage is 10-15 days. O2 is needed in the egg and in the embryonic stage of larval development

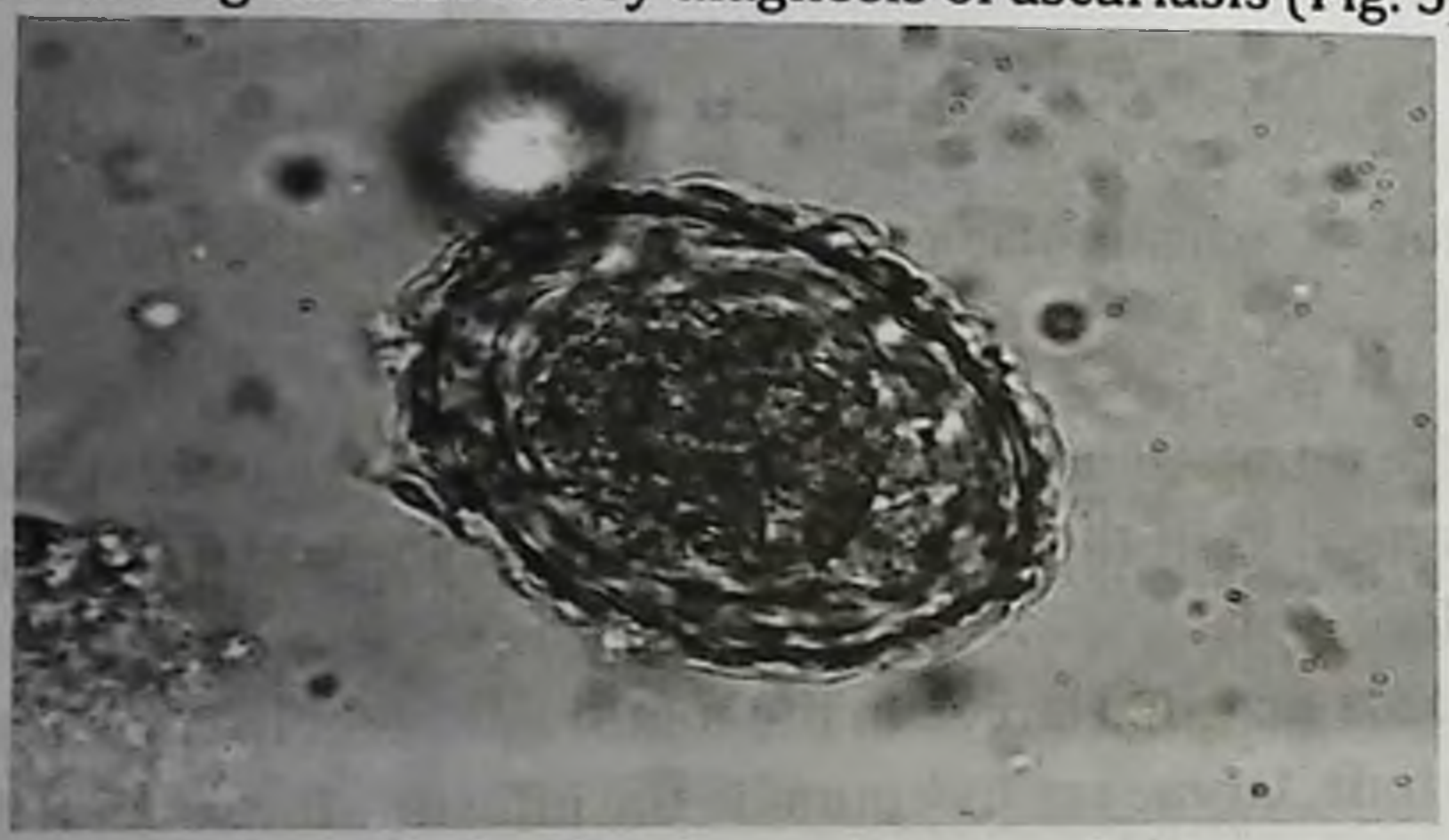
O2 is toxic for larvae in the mature anaerobic stage. At the same time, larvae can live outside the intestine for several days.

Larvae are very small (0.2-0.3 mm). During migration, they jump twice, rise to 1.5-2.2 mm, feed on blood plasma, and then on erythrocytes. After migration in the lungs, they erode the walls of the capillaries and alveoli and shoot into the alveolar cavity, where they continue to develop (they jump twice and reach 1.5-2.1 mm in size). Then the larvae begin to ascend through the respiratory tract. Their movement speed is very low. Stimulating receptors in the respiratory tract, they cause an unconditioned cough reflex.

Due to coughing, they quickly rise through the bronchi, trachea, enter the larynx, the head of the nose, when the

sputum is coughed up, they fall into the oral cavity, and from there they can be swallowed together with saliva, again fall into the intestines and are now sexually mature. Turns into a stage. After 10-11 weeks from the time of migration, the female begins to produce eggs, which are released into the external environment with feces.

Eggs are gray-brown in color, covered with a rough outer shell, oval in shape, 50-70 μm in size. They are found in the stool smear during the laboratory diagnosis of ascariasis (Fig. 5).



Picture. 5. Juvenile fertilized ascarida eggs (50-75 microns).

When there is no male in the intestines, the female releases unfertilized eggs, which are found on the surface film when using the flotation method (they are lighter than fertilized eggs). In the presence of symptoms of ascariasis, but in the absence of females, eggs are not detected in the feces.

Ascarida larvae can be found in the sputum during migration and can be identified by the presence of three cuticular lips around the mouth opening (Figure 6).

# MORFOLOGIA DE ASCARIS LUMBRICOIDES

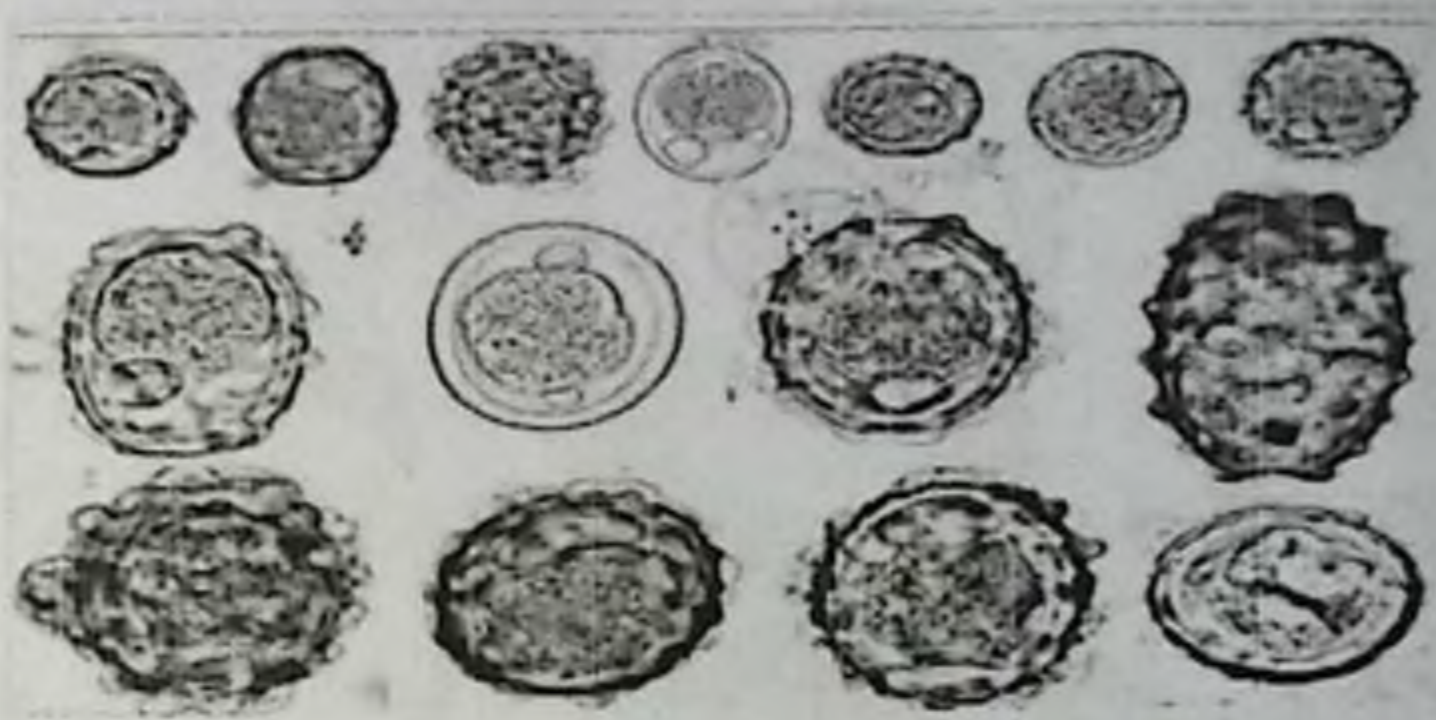


Figure: 6. Larvae of ascarida isolated from the lungs.
During ascariasis, two stages are clearly distinguished: the first is associated with the migration of larvae, and the second - with the parasitism of mature worms.

The pathogenic effect of larvae is associated with intoxication, allergies. The body is sensitized by foreign proteins, the source of which is the metabolic products of the larvae and the dying larvae themselves. With weak infestations, there may be no symptoms of the disease, in the case of severe infection, allergy symptoms are clearly manifested. Migrating larvae damage intestinal walls, liver and especially lungs, symptoms of acute ascarid pneumonia, exudative pleurisy and bronchial asthma are observed. (Figure 7).

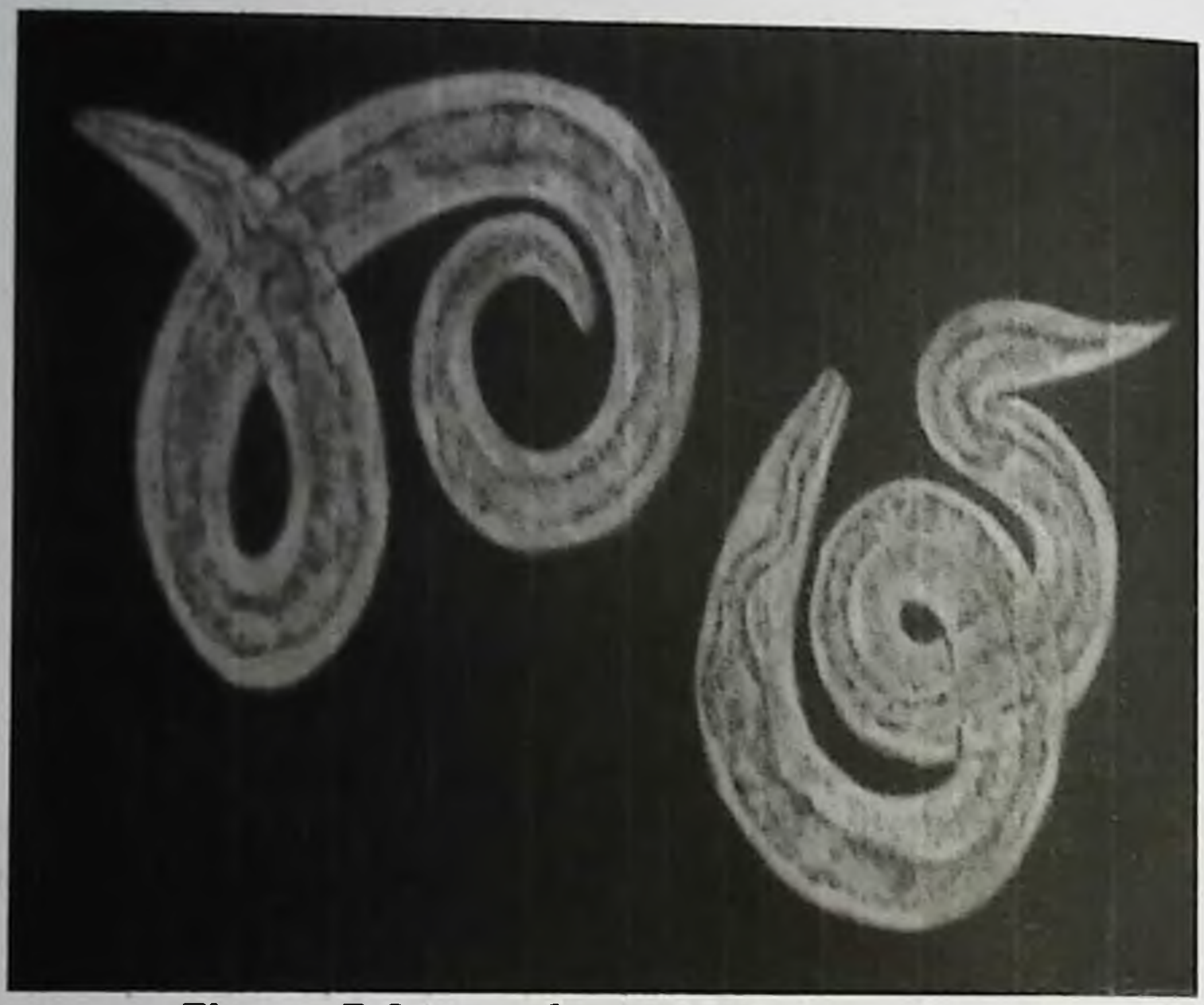
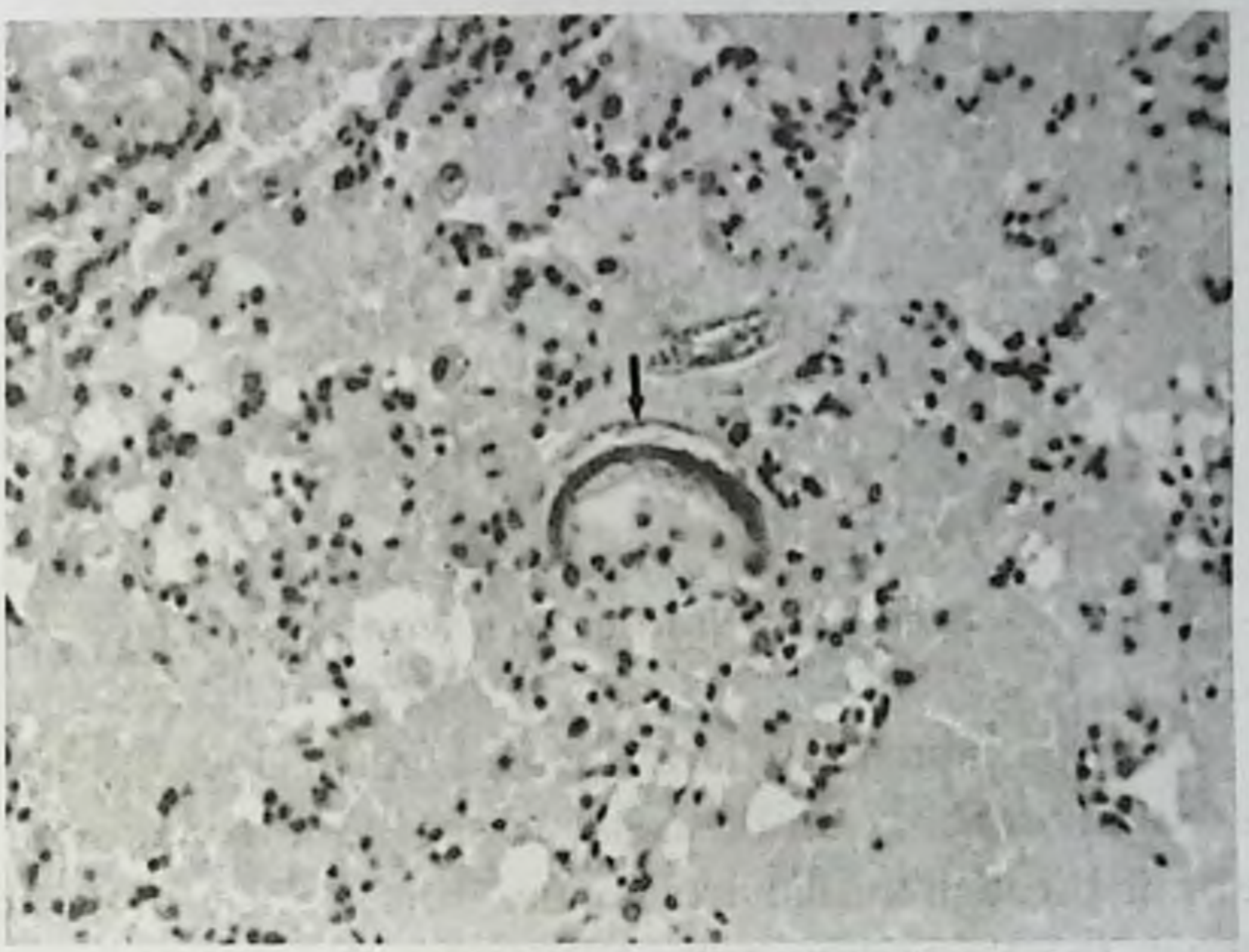


**Figure: 7. Larva of ascarida in lung tissue.**

The presence of sexually mature worms in the intestine is accompanied by general intoxication and allergic events. Serious complications are associated with intestinal obstruction during the parasitism of several worms that form a ball in the head of the intestine (Fig. 8).

Obstruction can occur in a reflex spasm of the intestine, in which one colon is located along the intestine, pressing the ends of the body against its walls. Spontaneous migration of roundworms is also dangerous.

In a suspended state in the intestine, they resist the movement of food and can rise from the intestine to the duodenum, thence to the hepatic bile ducts, pancreatic ducts and stomach.



**Picture. 8. Ascarida collection in the intestine.**

**Picture. 10. a soldier in a woman's ovary.**

From the stomach to the esophagus and through the throat, the oral cavity can enter the nasal passages, the frontal sinuses, the brain through the halviroid bone. From the head of the nose through the Eustachian tube, they enter the middle ear and then through the eardrum to the external ear canal. Its migration does not end there (Figures 9, 10).

**Figura.9. In the child's liver soldier**

Figura. 10. In a woman's ovary soldier

It can enter the abdominal cavity through the intestinal wall, then the liver, ovaries, and even the lungs through the diaphragm. In the feces of a one-month-old baby, the egg is static in the detection of mature round worms, which is explained by the random entry of this parasite through the uterus. During such migration, tissues and organs are damaged and abscesses appear. Increased migration activity of Ascariida can be caused by unfavorable intestinal conditions. The course and symptoms of the disease. The clinical manifestations of ascariasis depend on the localization of parasites and the intensity of damage. In the clinical course of ascariasis, two phases are distinguished - early (migratory) and late (intestinal). The first stage corresponds to the period of migration of larvae, while the second is associated with parasitism of intestinal helminths and possible complications. In the early stages of ascariasis, clinical manifestations are

sometimes poorly expressed, the disease persists unnoticed. Sometimes the onset of the disease is severe, there is a dry cough, or with a small amount of mucous sputum, sometimes purulent inflammation occurs. The sputum is sometimes orange in color and contains a small mixture of blood. Body temperature is usually normal and subfebrile, rarely rising to 38 ° C. Allergic reactions to the skin are very common for this stage, they often occur in the form of rashes and small blisters with a transparent content on the hands and feet. X-ray examination of the lungs reveals the presence of infiltrates. Infiltrates can be single or multiple, found in one section or in the entire lung. Characterized by eosinophilia, reaching 60-80% in some patients; It occurs, as a rule, at the same time as infiltrates in the lungs, less - later and even less - before them. The late (intestinal) stage of ascariasis is associated with the presence of helminths in the intestines. Sometimes it shrinks subclinically. Often patients report increased fatigue, changes in appetite, usually a decrease in it, nausea, sometimes vomiting, and abdominal pain. Some patients have diarrhea, while others have diarrhea that is replaced by constipatio. Symptoms similar to dysentery, cholera, and typhoid are described, but the possibility of combining ascariasis with infectious diseases should be considered. In ascaridosis, headache, dizziness is observed mental exertion. Occasionally there are insomnia, nocturnal fears, α cases, epilepsy, and others. Complications. Frequent aggravation of ascariasis is a blockage of the intestine, which goes with the closure of the intestinal head with the ascaris collection and leads to a disorder of neuromuscular regulation of intestinal tone. A serious complication of ascariasis is the penetration of

helminths into the bile ducts and gallbladder. In such cases, severe pain occurs, which can not be relieved even by narcotic analgesics.

Against the background of these attacks, vomiting often occurs and sometimes helminths are released. Jaundice occurs when the common bile duct is mechanically blocked. The penetration of ascarida into the pancreatic ducts causes acute pancreatitis.

Their entry into the appendix causes appendicitis or appendicular colic. In some cases, it rises along the digestive tract, rises into the throat, and from here he throws into the paths of breathing, leading to the death of asphyxia.

In rare cases, it is found in the urinary tract, tear nasal passages, middle ear, outer ear canal.

Ascari invasion exacerbates the course of various infectious and non-infectious diseases, disrupting immunogenesis in infectious diseases. Diagnosis and differential diagnosis.

In the first phase of the accurate identification of ascaridos, immunological reactions that allow the detection of larvae in the sputa and specific antibodies in the blood are the study of feces for eggs in Ascari in the intestinal phase of the disease. If the egg is detected in duodenal fluid, this may indicate the presence of parasites in the horse and pancreatic ducts.

However, sometimes there are parasites of the same sex in the gut, they can be detected by radiological method. Uncomplicated ascariasis is relieved, and the prognosis is good. Scaridosis - Ntroponosis. The main source of invasion of the environment is the sick person, so the asticea of public prophylaxis is the identification and treatment of these patients, ELIB, among which the main patients are children.

Prevention of ascariasis.

The soil should be ogited with composted feces. When the disease reaches 40% and above, the planned treatment is carried out 2 times a year for all residents of this region. In isolated cases of helminthiasis, only those with Ascarida eggs in the feces are treated. After treatment, the helminths removed from the patient are boiled or burned, boiling water is poured into the feces and stored in a closed container for 40 minutes.

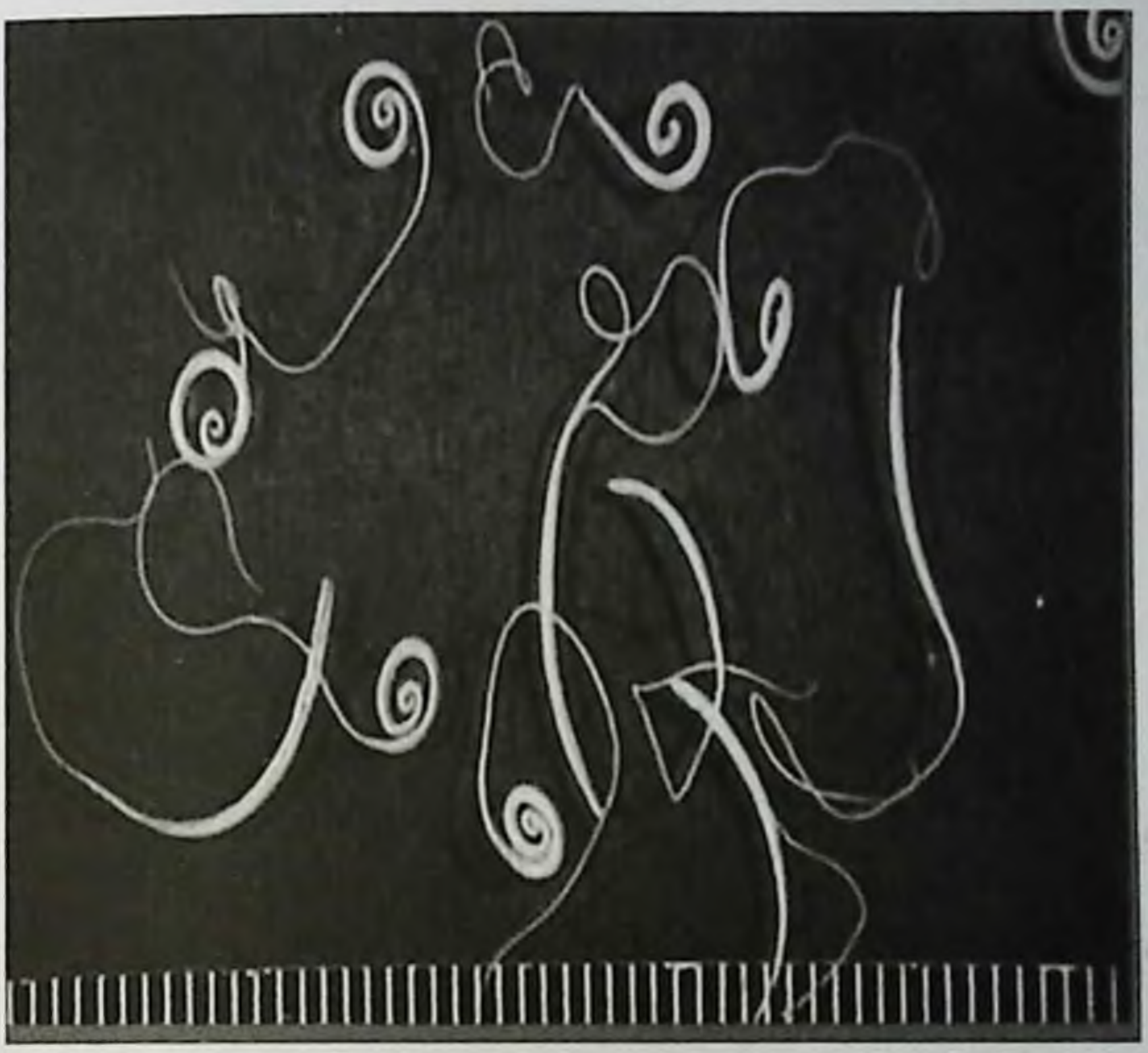
The area cannot be contaminated with feces, mosquitoes must be combated They are mechanical carriers of the eggs of round worms. It is not possible to fertilize the soil planted with fresh feces.

The use of such fertilizer sources is possible only after composting.

The temperature of the "compost pile" should be 80C, which will damage the larvae of the round worms inside the egg. Personal prevention - adherence to the rules of personal hygiene (clean hands, fruits, vegetables, dishes, protection of buildings from mosquitoes).

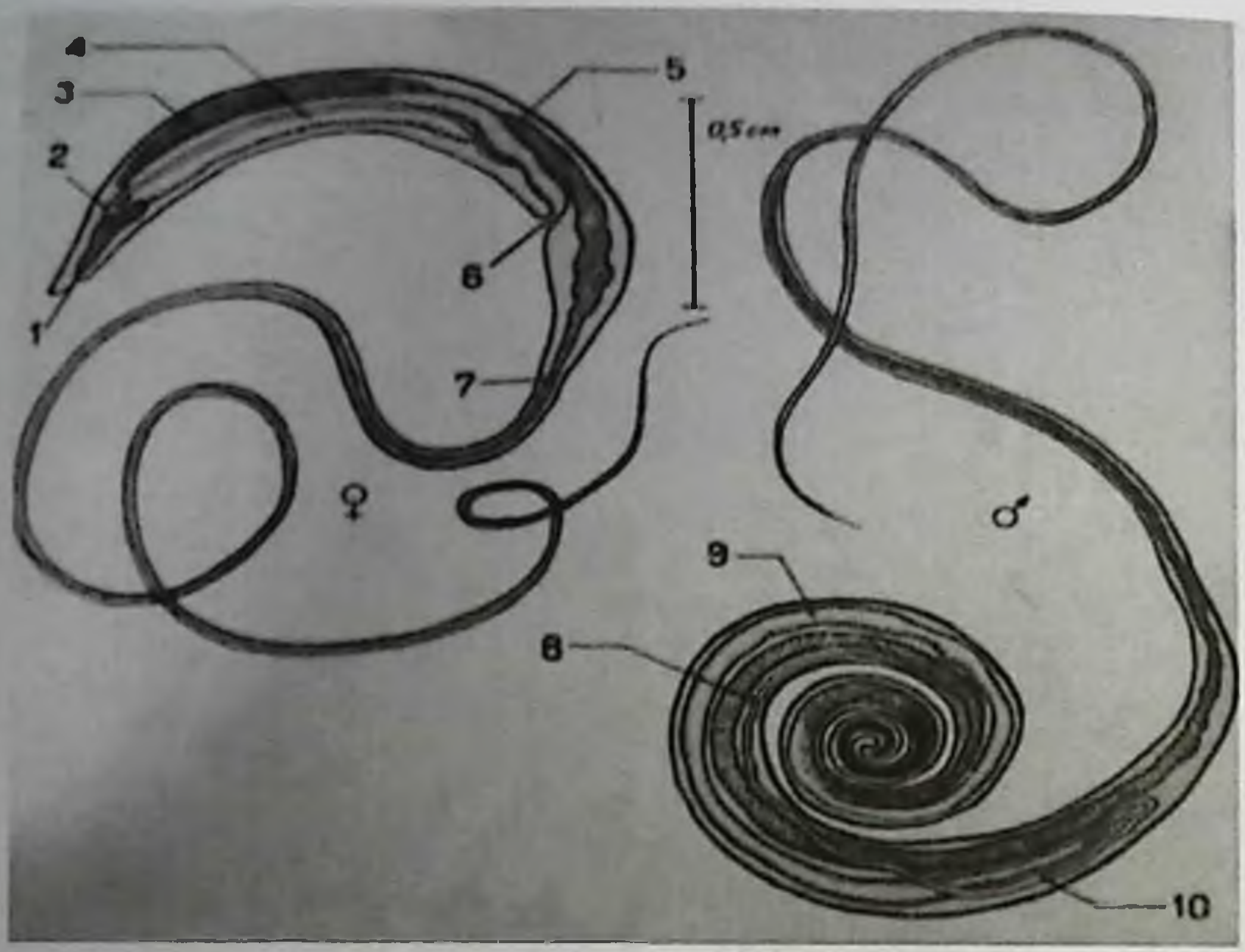
● Trichocephalus trichiurus - so named because the previous 2/3 of the body parts resemble a thread. Only the esophagus is located in this part of the body.

In Urgoli, the posterior dilated part of the body is arched in the form of an arch, in males it is spiraled to the ventral. Females and males of this species are 3 to 5 cm in size, while males are always shorter (Fig. 11, 12).

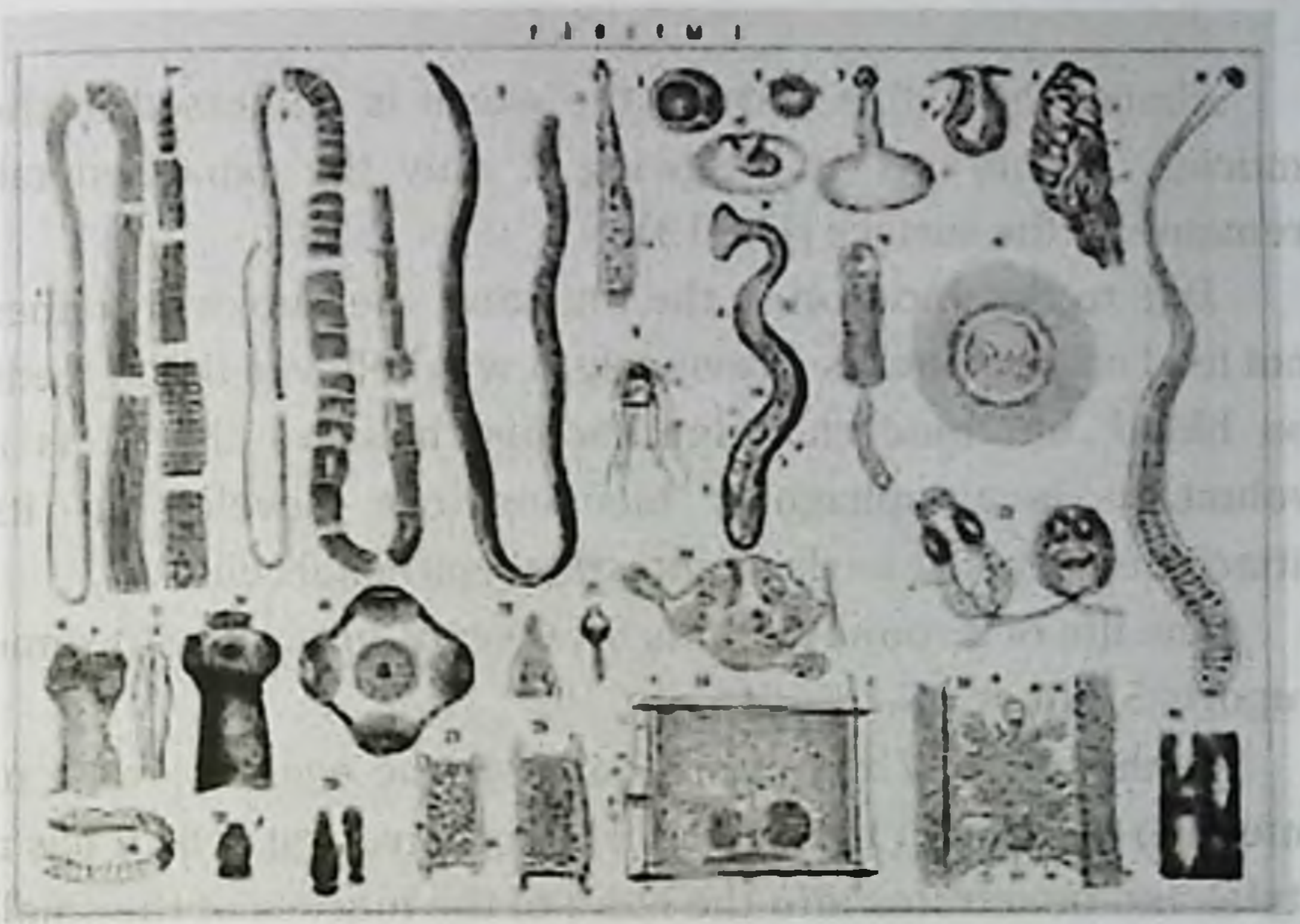


Picture: 11. Trichocephalus trichiurus – the shrike

Pinworm is a human parasite that parasitizes the large intestine, mainly the cecum, but in severe infestations, helminths can also be found in the distal parts of the large intestine.




Picture: 12. Kilbosh worm. Male and female. 1 - anal opening 2 - fallopian tube; 3 - ovary; 4- uterus; 5 - intestine; 6 - genital opening; 7 - esophagus; 8 - testicle; 9 - ejaculatory channel; 10 - seed tube.



Picture. 13. Pinworm attached to the intestinal wall.

Almost the entire body of the worm is immersed in the mucous membrane, as if sewing it, only the expanded tail remains on the surface (Fig. 13).

Due to this location in the intestine, the hookworm does not feed on its contents. Previously, it was believed that it feeds on blood, but modern helminthology believes that it is a voluntary hematophagous, bleeding can develop in its attachment sites. It feeds on intestinal epithelial cells.

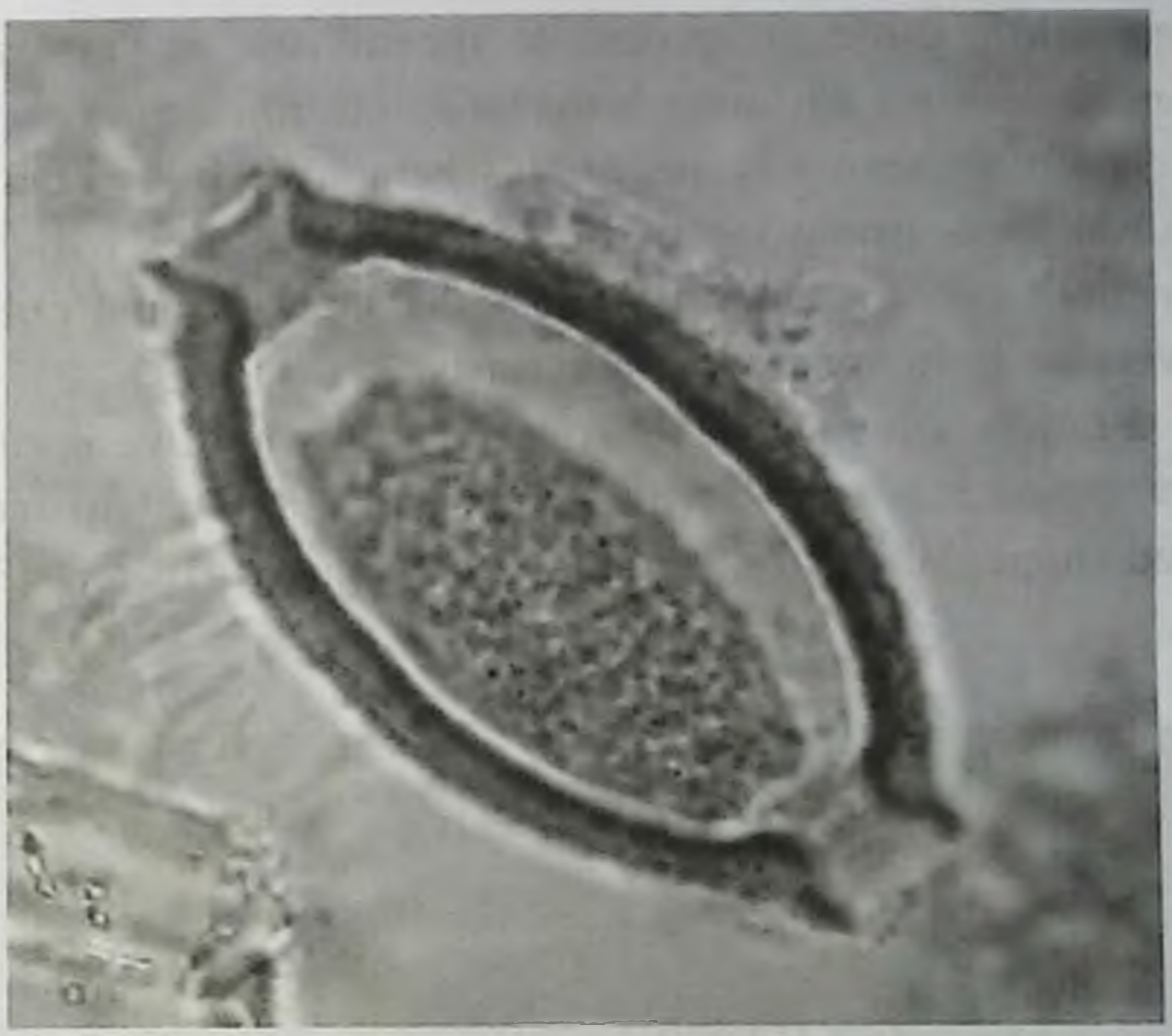
The life of a roundworm is 5 - 6 years, according to some reports 5 - 10 years.

Geohelminth. The invasive stage is the egg, the route of infection is through the mouth. The invasive egg, which has a stylet and penetrates into the hairs of the mucosa of the small intestine, hatches into a larva, where it remains for up to 10 days. Then the larvae enter the intestinal cavity again, reach the cecum, where they attach to the mucous membrane and reach the mature stage in about a month. Eggs appear in the feces 12 weeks after the first occupation, the female lays about 5000 eggs per day. Diagnosis is to find eggs in feces.

The eggs are shaped like a barrel or bag; poles have transparent plugs; the size of the eggs is up to 50 microns (Fig. 14).

In the external environment, below + 15C, the eggs cannot develop, but the embryos can develop slowly and after 4-6 months.

Nymphs develop into the first larval stage. To + 26-28C, oxygenated environment and sufficient humidity, eggs become invasive after 3 weeks. Eggs remain viable and invasive for 1.5 years.



Picture. 14. Roundworm eggs (50 microns).

Eggs of roundworms are resistant to drying, high temperature and rotting, and roundworms are much less susceptible to roundworms than roundworms.

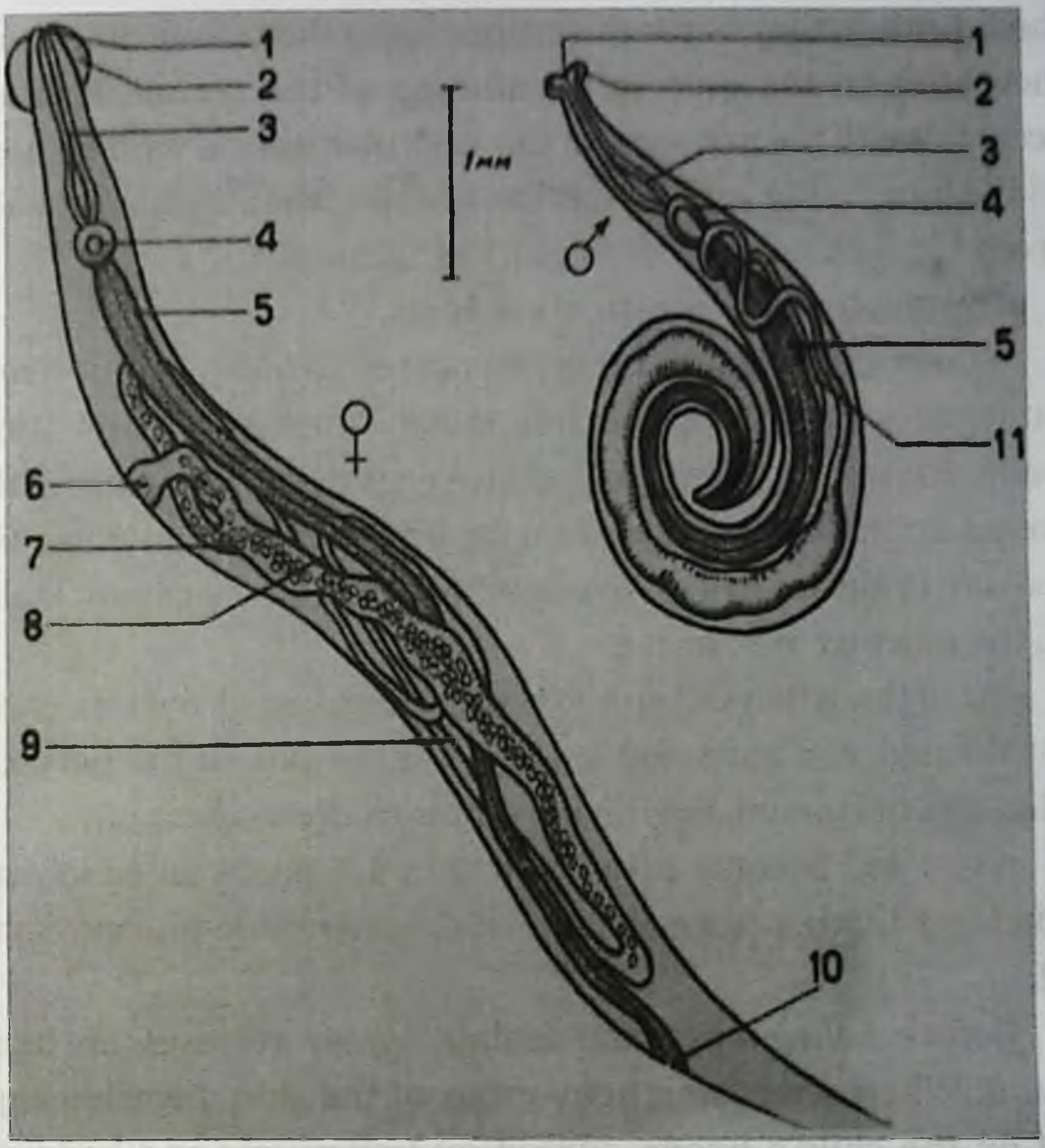
The only source of environmental spread is a sick person, because trichocephalosis is anthroponosis. Dust, wind, flies help spread the eggs. Roundworms scattered on the soil can fall on the fur of cats and dogs, and from there on the skin of a child's hands. Trichocephalosis occurs almost all over the world, except for the Far North and desert regions.

The pathogenic effect of hookworm is determined by intoxication, damage to the mucous membrane, which allows secondary bacterial infection to occur. As for the role of

tapeworm in the development of appendicitis, in very rare cases, tapeworms are found in the large intestine.

The most severe forms of this helminthosis develop in children. Deworming for trichocephalosis requires patience from both the doctor and the patient. Personal and public prevention is the same as for ascariasis.

● Enterobius vermicularis (ostris) is the causative agent of enterobiasis. It is a small white worm with a pointed tip and a tufted shape. Males are 2-5 mm long, females 8-13 mm (Fig. 15).




Picture: 15. Female and male ostriches. 1 - mouth; 2 - vesicle; 3 - esophagus; 5 - Bulbus; 6 - intestine; 7 - genital opening; 8 - uterus; 9 - ovary; 10 – Egg road; 11 - anal hole.

Ostrisa parasitizes the beginning of the large intestine and the lower part of the small intestine. The average lifespan is 3-4 weeks.

Geohelminth. The invasive stage for humans is the egg, the route of infection is through the mouth. After ingestion, larvae emerge from the eggs in the intestine. In the terminal part of

the intestine, they enter the crypts, jump there four times, and then stick to the mucous membrane of the cecum. Fixation occurs due to the pressure of the vesicular vesicle with its head on the host tissue and the suction action of the esophageal bulb. From 12 to 14 days, oysters reach adulthood.

Oysters feed on intestinal contents

sometimes swallows erythrocytes, which appear from damaged areas of the mucous membrane/ After copulation, males die, females begin to produce eggs that accumulate in the uterus. In the following weeks, the fertilized females enter the rectum. In the case of an overload with eggs, they cannot stand on the mucous membrane.

At night, when the sphincters are weakened, oysters come out through the anus and lay eggs on the skin of the perianal folds and perineum. Egg-laying embryos develop rapidly.

Eggs will become invasive within 4-7 hours when human skin has a temperature of 35C – 36C, human skin moisture and O2.

Before laying eggs, the female oyster releases an itchy liquid. When scratching itchy areas of the skin, invasive eggs fall on the child's hands, spread on underwear and bedding, settle on the surface of various objects, and therefore are easily swallowed again. Re-infection occurs very often - reinvasion. As a result, with the short life of an ostrich (about 1 month), the disease can last for several months and even years.

Oyster eggs are very sensitive to drying. In the outdoor environment, they are able to live for about three weeks.

After laying eggs, females usually die, but they often return to the large intestine through the anus or, in girls, enter the vagina and even the uterus.

Ostrisa is not a dangerous parasite, but its pathogenicity is not in doubt.

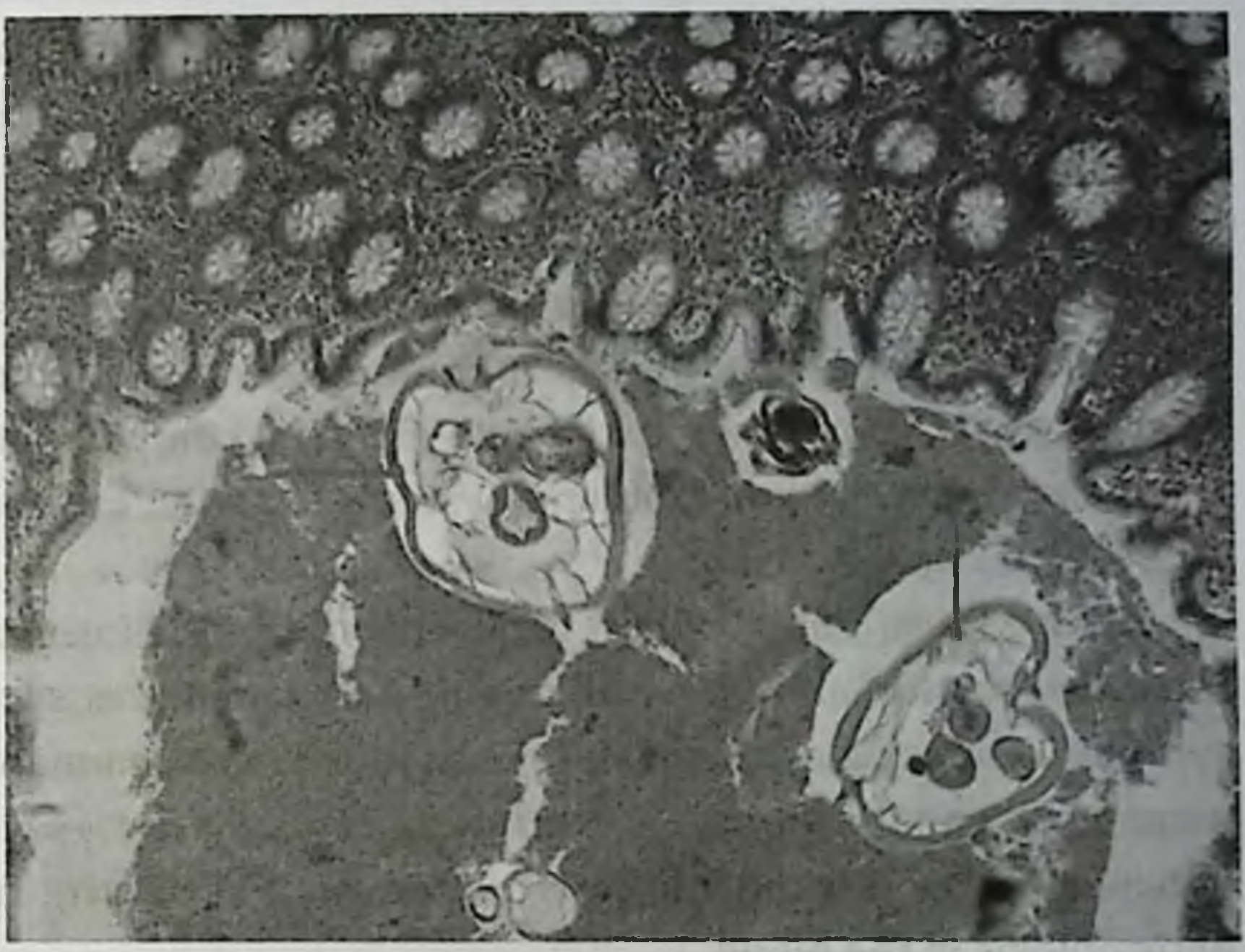


Figure: 17. Transverse section appendix (ostris).

The pathogenic effect of oysters is associated with intoxication caused by itching during egg laying. Intestinal worms can enter the abdominal cavity and internal organs and penetrate deep into the tissues. Probably, oysters often contribute to the development of appendicitis (Fig. 17).

Symptoms and course. Sometimes, some people infected with oysters may not have any noticeable symptoms of the disease. In most cases, some symptoms of the disease develop. In the evening, a patient with a mild form of enterobiosis develops mild itching in the perianal folds. It lasts for 1-3 days

and then disappears on its own, but often reappears after 2-3 weeks. Such a frequency in the form of itching is associated with the change of ostrich generations - the result of reinvasion.

When there is a large number of oysters in the patient's intestines and there is a massive re-invasion, the itching is constant and very painful. Scraping around the patient's anus leads to friction, secondary bacterial infections of the skin and dermatitis, which aggravates the development of the disease. In some patients, intestinal disorders come to the fore - frequent mucoid stools, sometimes mixed with mucus. A combination of secondary bacterial infection and oyster infestation can cause enterobiosis appendicitis.

With severe enterobiosis, headache, dizziness, insomnia, increased mental and physical fatigue, and sometimes severe symptoms of psychosthenia and neurasthenia are common. In women, genital warts sometimes cause very severe vulvovaginitis. Eosinophilia is often noted with new enterobiosis in the blood.

Diagnosis and differential diagnosis. The most characteristic symptom of enterobiosis is perianal itching. Nevertheless, it should be remembered that it is observed in a number of other diseases. Therefore, the diagnosis can be determined with full confidence only when ostrich eggs or helminths are found in the patient. Female oysters lay their eggs mainly in the perianal area and rarely in the intestines. Therefore, they are usually not detectable in feces. It is easier to find oyster eggs with a microscope by taking a smear from the perianal area. To simplify the identification of enterobiosis, a 3-fold examination using transparent adhesive tape is used. Ostris eggs are often found in debris taken from under the

fingernails. An adult motile female otrisha can often be observed on the surface of the patient's freshly released feces.

The prognosis of enterobiosis is positive.

Prevention.

Careful implementation of sanitary-hygienic measures leads to the elimination of enterobiosis. This requires:

- wash the child's hands several times a day, especially in the morning;

- strict control of the length of nails;

- changing underwear in the morning, then washing and ironing with a hot iron;

- cleaning the room using a vacuum cleaner, because the eggs left on the bed may shake during bed cleaning and fall in the air and on the ground;

- sanitizing the nose, because when breathing with an open mouth, the egg in the air can get into the gastrointestinal tract;

- until the sick child is treated, he should be isolated from other children and the premises of the kindergarten group should be in sanitary conditions.

The geographical distribution of helminthiasis is wide.

Laboratory diagnosis of enterobiosis is carried out by identifying ostrich eggs from smears in perianal folds.

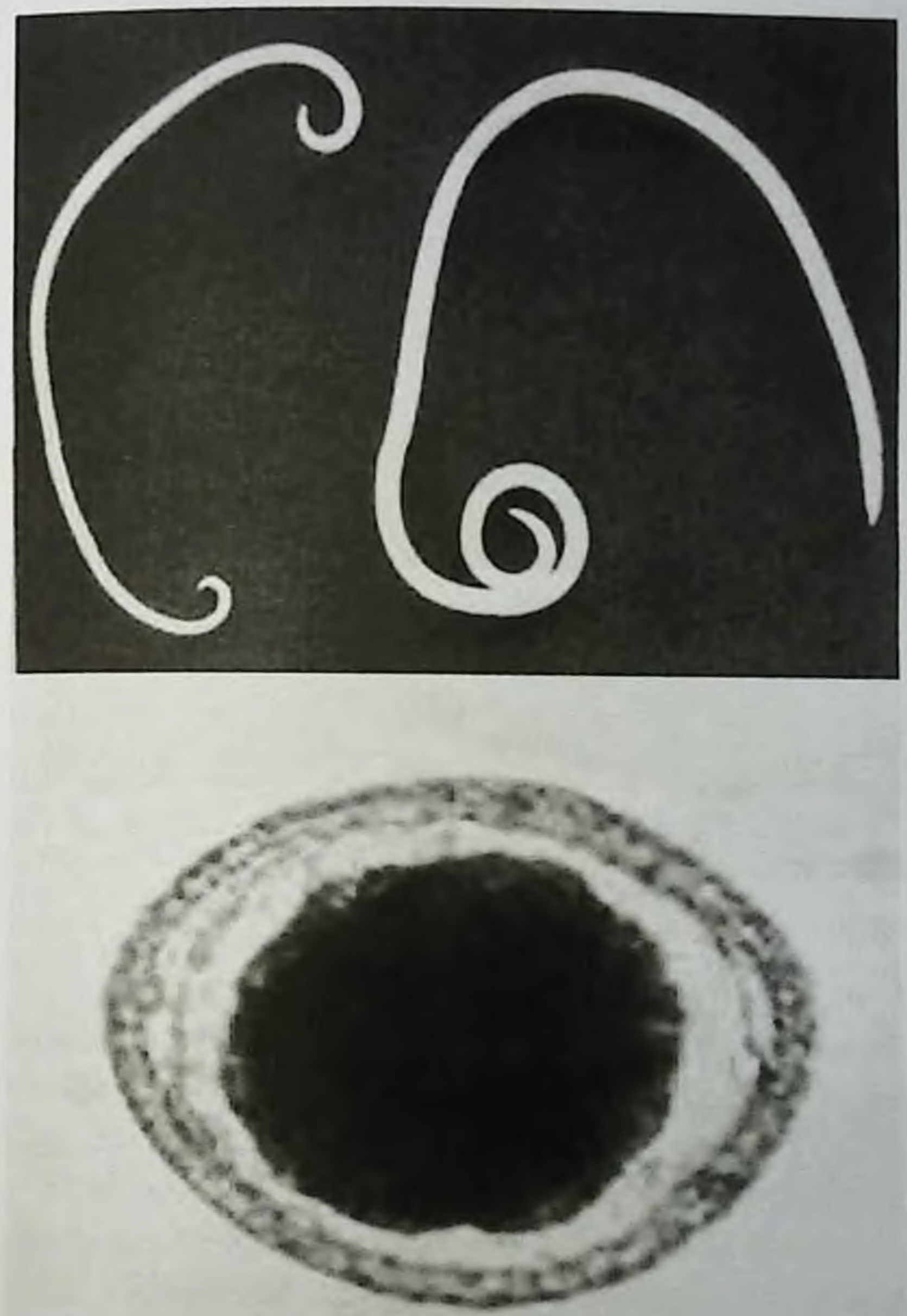
The egg has a transparent asymmetric, multi-layered shell, 50-60 mm in size. Sometimes you can see an already formed larva in them (Fig. 18).

Picture: 18. Oyster eggs (50-60 microns).

The source of the spread to the environment is a sick person, because enterobiosis is a common anthroponosis in children.

● Toxocara canis, Toxocara mistax - toxocara of dogs and cats, respectively - the causative agent of the larval form of toxocarosis in humans. Intestinal toxocariasis is rare in humans. For these parasites, humans are the biological dead species.

In animals, toxocariasis parasitizes the small intestine, morphologically similar to roundworms, their size is 12-19 cm in dogs (Fig. 19), 3-7 cm in cats.



Picture: 19. Dog toxocara. On the left - a male and a female, on the right - an egg of Toxocara.

Picture: 20. Toxocara larvae.

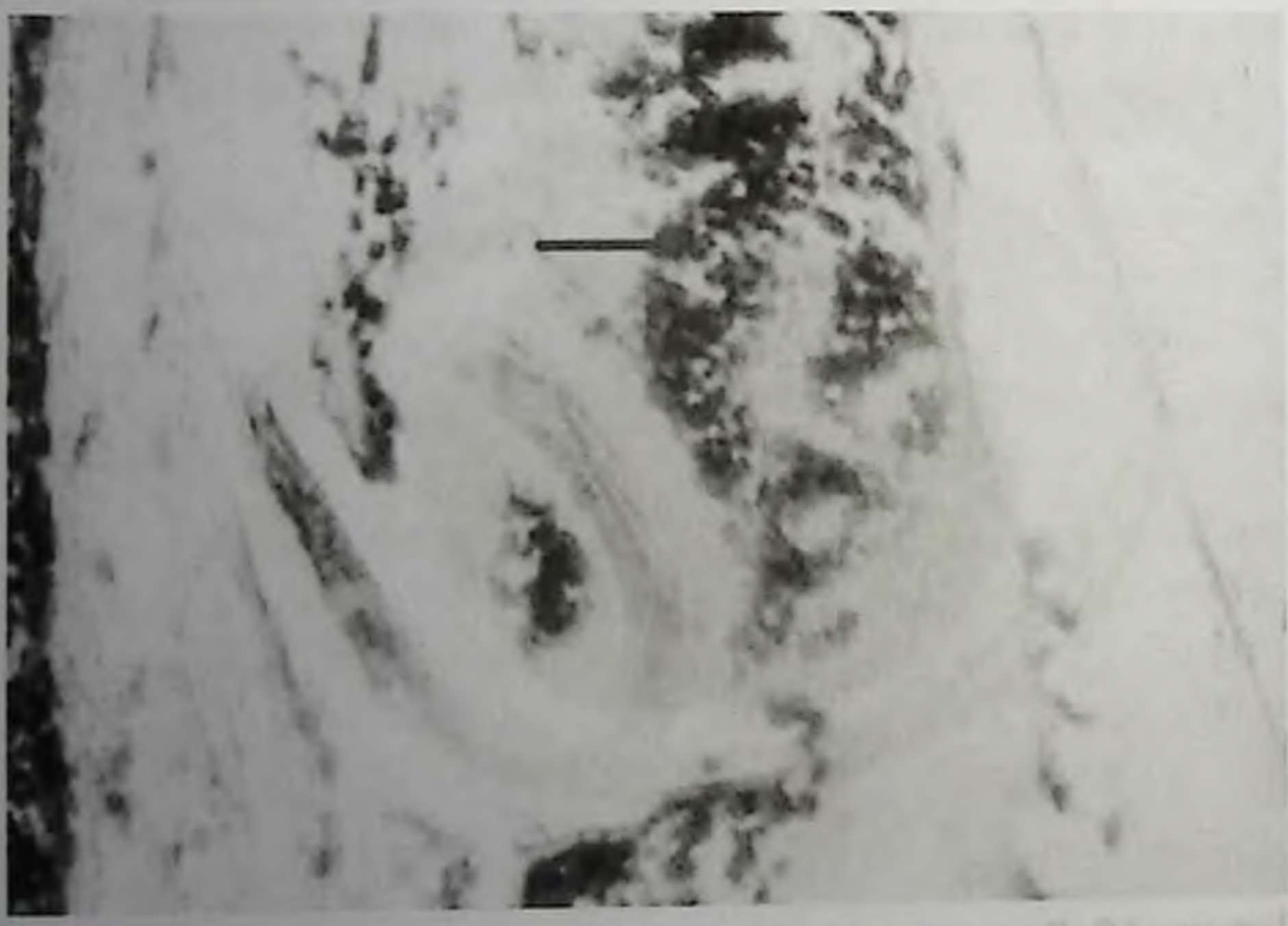


Figure: 21. Toxocara larvae in eosinophilic granuloma

Figure: 22. The appearance of human skin in the localization of Toxocar larvae.

Geohelminths. Toxocara lays eggs, in which larval development occurs in the soil. Humans are infected with toxocarosis through the mouth, the invasive stage is the egg. Eggs hatch in their intestines

Larvae and roundworms begin migration as larvae. The development of the parasite in the human body is limited to this stage. Visceral migration larva - larva migrans. Toxocara larvae (Fig. 20) are smaller than Ascaris larvae, so they are not "filtered" by the lungs.

Larvae can remain viable for months and years without

morphological changes. As a result of settlement of migrating larvae in various organs (lungs, spleen, liver, eyes, brain), foci of inflammation with necrosis in the center and allergic edema appear in them (Fig. 21, 22). Serious damage to the eye occurs with loss of vision.

Symptoms and course. Children between the ages of 2 and 10 are more likely to get sick. Clinical manifestations of toxocarosis depend on the localization of parasites and the intensity of invasion. There are 2 forms in the clinical course: visceral and ocular toxocarosis.

Visceral toxocarosis is often manifested by recurrent fever for several weeks or even months, and the temperature is often subfebrile. In most patients with visceral toxocarosis, lung damage is observed in the form of bronchitis and bronchopneumonia. In some cases, bronchial asthma may develop.

80% of patients have an enlarged liver, 20% have an enlarged spleen. In one third of patients, the disease is accompanied by recurring skin rashes.

Damage to the central nervous system, epileptiform seizures, paresis and paralysis are observed during migration of Toxocara larvae to the brain.

Eosinophilia is one of the permanent symptoms of toxocarosis, which is often accompanied by leukocytosis.

When a person is infected with a small number of toxocariasis larvae, the development of eye toxocarosis can be observed.

Aggravations. Cases of severe pneumonia ending with pulmonary toxocarosis are known.

Diagnosis and differential diagnosis. Epidemiological

anamnesis is very important for diagnosis.

Keeping a dog in the family or being in close contact with dogs indicates a relatively high risk of toxocarosis. The presence of an allergy to animal fur is often associated with toxocariasis.

Intravital parasitological diagnosis of toxocariasis is almost impossible, since migrating larvae are difficult to find. Histological studies of biopsy samples allow to identify Toxocara larvae and determine the final parasitological diagnosis only in a number of cases. Serological reactions are also used.

Prognosis. In most cases, the prognosis is good. In severe cases, with intensive invasion, when the larvae enter vital organs, the prognosis becomes serious.

Prevention/Measures aimed at the source of damage (checking and treating dogs, catching stray dogs, equipping special places for dog walking, etc.). Personal (washing hands after contact with soil or animals; careful processing of greens, vegetables and other food products that may contain soil particles, etc.) and public hygiene (cleaning children's playgrounds, gardens 's, protection of fields) to comply with the rules. Protection from animals.

Preventive measures include deworming of dogs and cats; It is necessary to observe the rules of regular personal hygiene.

- Ancylostoma duodenale - the curved head of the duodenum, the causative agent of hookworm.
- Necator americanus is the causative agent of nekatorosis.

Egribosh and nekator belong to the Ancylostomatidae family. These are small worms of pale pink color, the size of

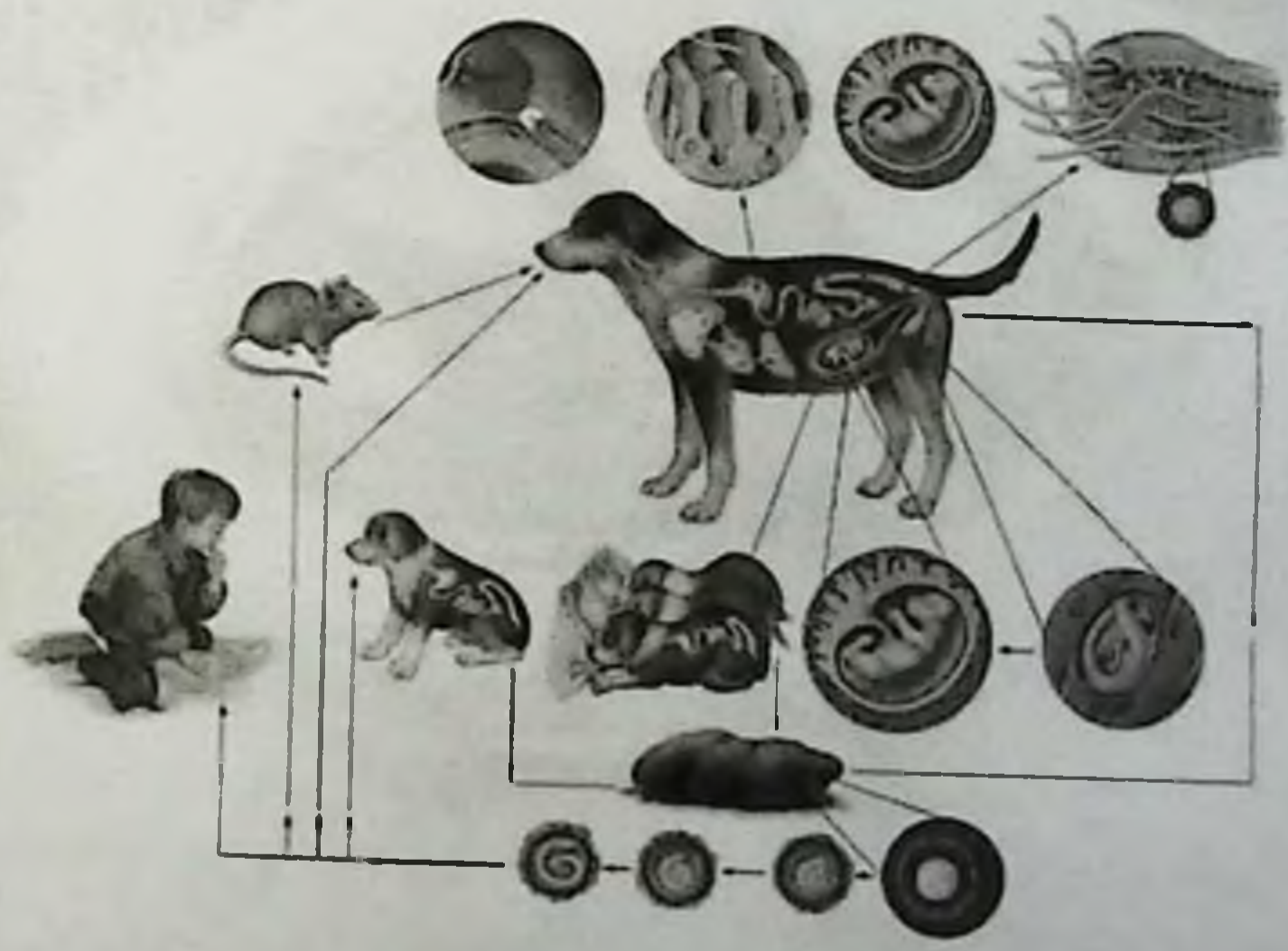
female hookworms is 10-13 mm, males are 8-11 mm. Some are smaller than the curved head (females 9-11 mm, males 5-9 mm). In a curved head, the front end of the body is bent dorsally (Fig. 23).

Picture: 23. Hookworm - Ankylostoma duodenale

Both worms are blood-sucking, both have a mouth opening surrounded by an oral capsule, inside which there are 4 incisors on the curved head and two incisor plates on the nector (Fig. 24, Fig. 25).

The duodenal anticostome is smaller and swallows 0.15 ml

of blood every day, while the American nekator is less (0.05 ml of blood). Both species live in the head of the intestine, adhering to the mucosa of the duodenum and upper small intestine. The life of a hookworm is about 5 years, and the life of a nekator is 10-15 years.



Duodenum

Figure: 24. Oral capsule of hookworms with teeth.

Figure: 25. Condala section of hookworm, section attached to the mucous membrane of the small intestine.

After fertilization, the female of the curved head lays up to 25,000 eggs per day, the nekator - three times less. Eggs are released into the environment together with feces (Fig. 26).

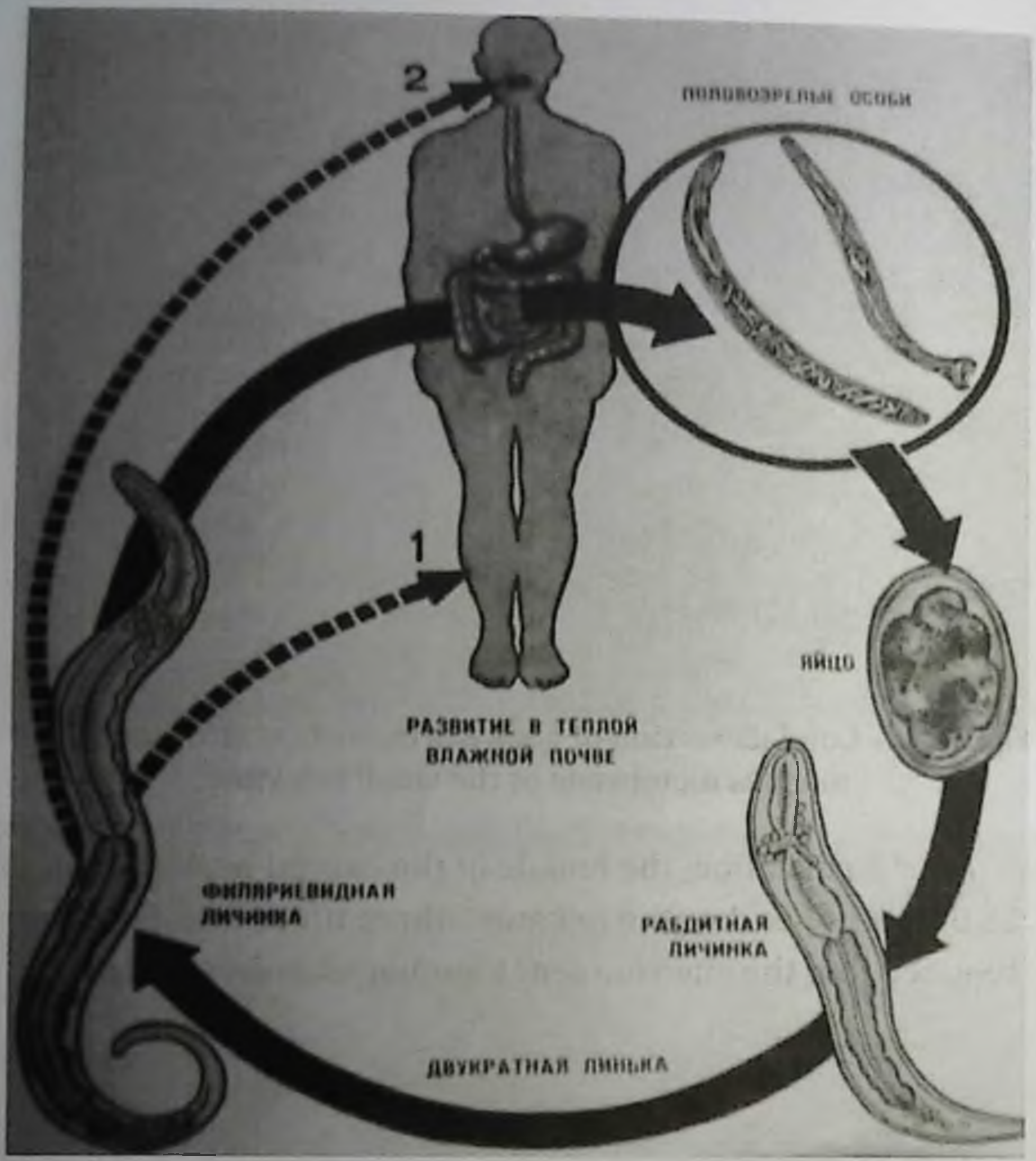



Figure: 26. Development cycle of hookworm. 1 - through the skin; 2 - by mouth.

Geohelminths. The most favorable conditions for the development of larvae in eggs are conditions of humid subtropics and tropics (temperature 32 ° C, high humidity, O2, moist humus-rich soil). In this case, after a day, two of the eggs

hatch into free-living rhabdite larvae that feed on bacteria. In these larvae, the esophagus consists of two extensions separated by a narrowing. In warm soil, rhabdite larvae molt twice (on days 3 and 5) to become invasive filarial larvae. This stage takes place in the cuticle - it is surrounded by the cuticle of the second larval stage, which does not fill. Filariform larvae remain in the soil without food for up to 18 months. At the same time, they can perform vertical migration

Migration. When it gets cold in winter, they sink to a depth of 1 m where they can hibernate. When the temperature rises, they rise to the upper layers of the soil and even crawl over the plants.

The invasive stage for humans is the filarial larva. There are two ways of transmission: through the skin and through the mouth. In the first case, when a person comes into contact with the soil, the larva actively penetrates the skin. At the time of entry, the larva sheds its skin and jumps. Oral infection can be through contaminated vegetables, fruits, water.

Japanese researchers have shown that hookworm infection occurs mainly by swallowing larvae, and nekatorosis occurs through the skin. There are known cases of transplacental invasion.

Regardless of the method of entry, the migration of hookworm larvae in the human body is an obligatory stage of the development cycle of these parasites. Larvae enter the circulatory system through the skin, oral mucosa, and intestinal mucosa. The migration ends in the lungs, where the larvae destroy the walls of the capillaries and alveoli, damage the lung tissue, infiltrates, hemorrhages and foci of pneumonia appear (Fig. 27).

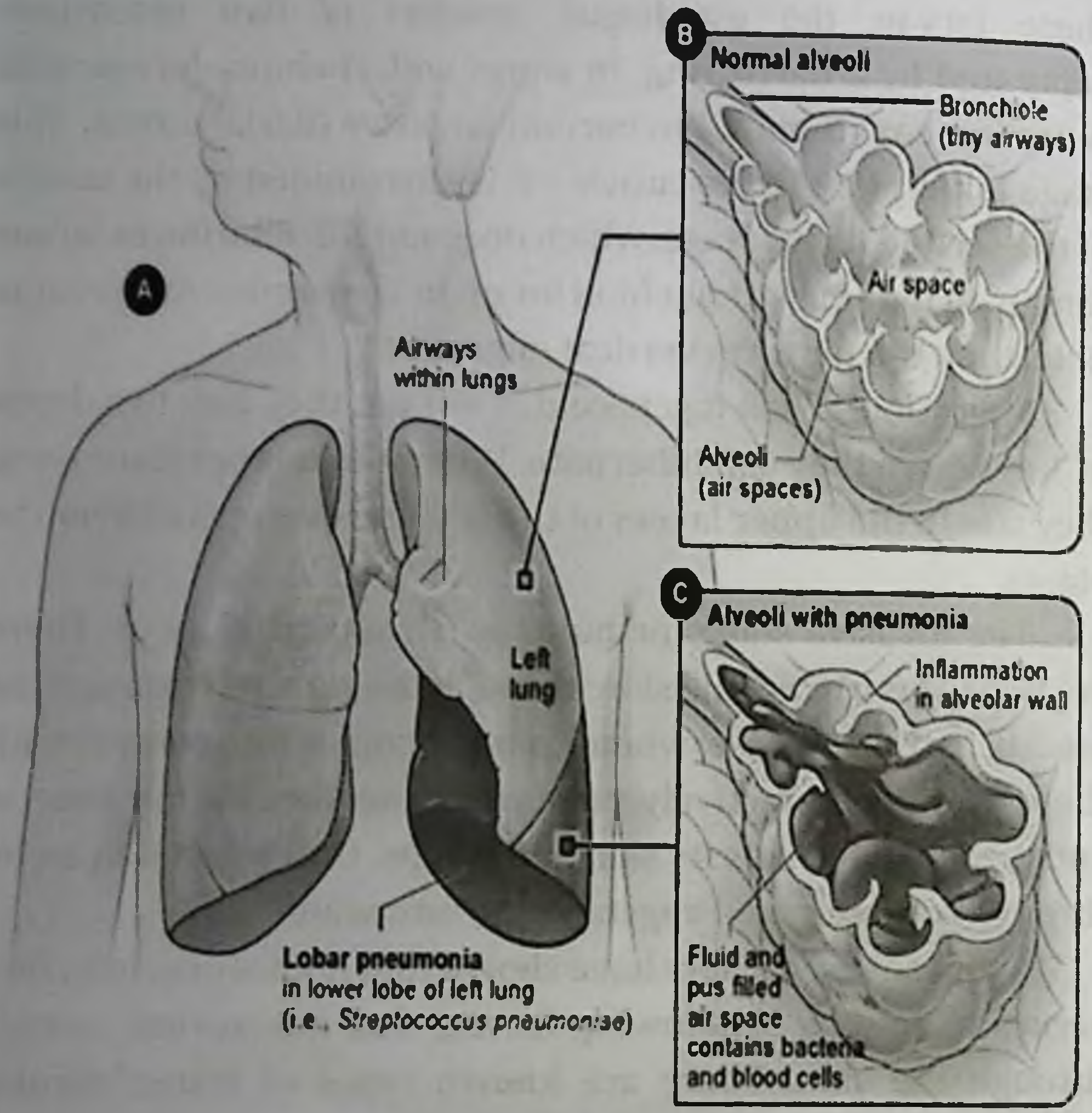



**Figure 27.**

A lung damaged by ankylostoma larvae In addition, the larva enters the respiratory tract, then along with the sputum in the larynx, oral cavity, and then in the intestine when swallowed with saliva, water, food. Entering the intestine (duodenum), the larval shell dissolves and causes adult worms,

which penetrate deep into the mucous membrane with the front end and pass into the blood feed. Ankylostoma reaches puberty in 5-6 weeks. At the same time, the females of Necator americanus begin to lay eggs. Ancylostoma has a delayed period of duodenale development: most of the riots begin to lay eggs 6-8 months after they enter the human body through the skin. Symptoms and course of the disease. When hookworm larvae enter through the skin, the initial clinical events are related to their migration from the body. The next day or one day after the first infection, the patient develops itching and erythema with tiny red papules on the skin. After 10 days, these rashes disappear.

In the second infection, the larvae of the hookworm appear immediately after entering the skin, which disappears after a few hours, and is replaced by red papules. With the third and fourth infection of the same person, the lesions become more severe and are accompanied by local swelling and the appearance of blisters on the skin. In the early stages of hookworm, fever and high-blood eosinophilia and eosinophilic infiltrates and vascular pneumonia are observed in the lungs. Wheezing and even tracheitis and laryngitis with Afonia have been reported. In some cases, these events last up to 3 weeks. 8-30 days after infection, some people experience abdominal pain, vomiting, diarrhea, and general fever.

At the beginning of the disease, the pains are acute, but over time they become less pronounced. The most characteristic feature of hookworm is hypochromic anemia, which develops in a significant part of patients, sometimes in a very severe form. The degree of lesion with hookworm depends on the number of helminths and the composition of their species, the

duration of parasites and the quality of nutrition of the patient.

Diagnosis and differential diagnostics. Recognition of hookworm infection is based on taking into account clinical and laboratory data, the main thing is to analyze feces for hookworm eggs. Feces are examined to detect eggs of hookworm. Ankylostoma is diagnosed and detected when an egg is found in the feces. The eggs are oval, 60mm, covered with a transparent membrane, are released in the form of a morula, consisting of 4-8 or 16 cells.

The duodenum contains the helminths themselves and their eggs. Sometimes larvae are found in sputum during migration.

The pathogenicity of hookworms depends on: - skin damage during the entry of larvae and the addition of secondary infection; - intoxication of migratory larvae and adult parasites; - Damage to lung tissue during larvae migration; - Damage of the duodenal mucosa with cuticular teeth and plates of sexually mature helminths; - Blood feeding and prolonged bleeding of the mucous membrane due to the introduction of anticoagulants into the blood against the background of constant change in the place of attachment of the parasite to the mucous membrane. The disease with severe invasion is difficult, especially in men. Very severe damage during childhood and adolescence can lead to a delay in physical and mental development. Children under the age of three rarely get sick.

Ankylostomosis and necatorosis are anthroponoses, the main source of spread in the environment is the sick person. The geographical distribution is limited to areas with warm and humid climates, in which the annual precipitation rate is

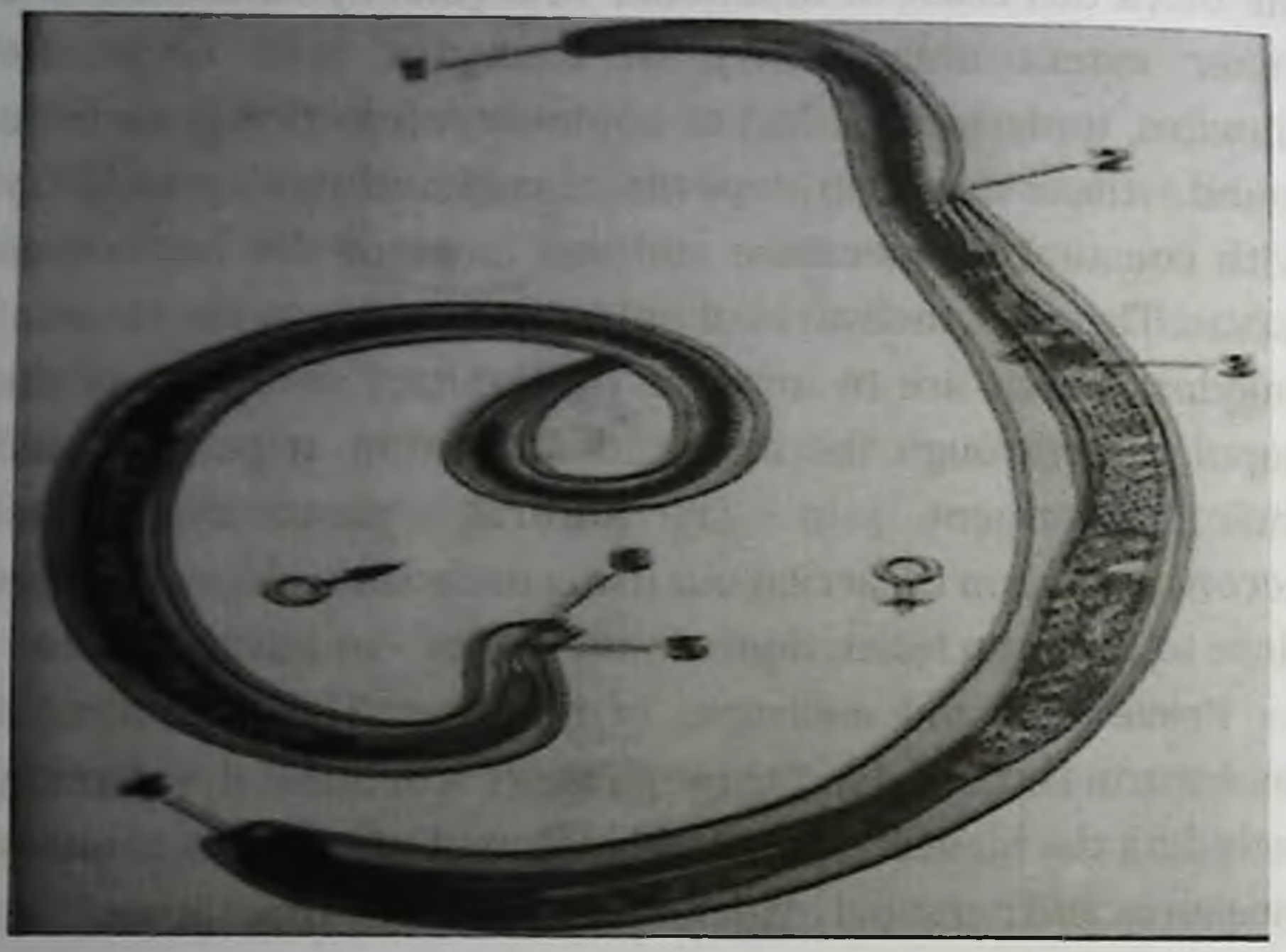
1000 mm and above, located in the northern latitude of the North 40o to 35o. Some areas have ankylostomidosis zones - the Black Sea coast of Krasnodar Krai (mainly nekatosis, to a lesser extent ankylomitis). In countries with temperate climates, underground foci of hookworm infection have been found - these are deep deposits of coal and mining industry with constant temperature and soil moisture for hookworm larvae. The main measures of public prevention in the zones of ankylostomosis are to improve the sanitary condition of the population through the active identification of patients and their treatment. In agricultural plantations, soil decontamination is carried out using potassium chloride, areas close to the open toilet, floors in the mines - sodium chloride.

Prevention and measures of infection. The fight against hookworm is carried out through mass scheduled deworming, including the identification and treatment of patients, sanitary measures and personal hygiene. It is forbidden to walk barefoot and lie on the ground in the foci of hookworm, the soil contaminated with helminths is covered with table salt every 10-15 days. Personal prophylaxis is provided by protecting food and water from accidental fall of larvae, protecting exposed skin from contact with soil.

● Trichinella spiralis (Trichinella) is the causative agent of trichinellosis, which is classified as a serious disease (Fig. 28). Trichinella spiralis is a small helminth (females 2.5 - 3.5 mm, males - 1.1 mm).

This is a biogelmint, but the developmental cycle is done without changing the cells. One individual (human, pig, rat, bear, etc.) acts as a clear and intermediate attacker. They have the same developmental cycle, which develops during the

developmental stages without going into the external environment.



Picture: 28. Trichinella spiralis. 1– mouth opening; 2 - opening of the female genitals; 3 - uterus; 4 - anus; 5 - male cloaca; 6 - genitals.

The invasive stage for humans and any other host is the encapsulated larva that resides in the muscles of the previous host and feeds on the next one. The main source of damage to humans is pig, wild boar, and bear meat, which cannot be neutralized by simple heat treatment.

A common source of infection is pork, wild boar and bear meat, the usual cooking heat treatment does not guarantee the death of larvae.

In the head of the intestine, mainly in the small intestine, the larva frees itself from the capsule, enters the mucous membrane and reaches sexual maturity after three days (Fig. 29).

A person or another host becomes the main host of helminths.

After fertilization, the females again enter the intestinal mucosa and begin to produce larvae on the fifth day of infection (live eggs - larvae hatch from eggs in the uterus). For a long time it was believed that men die shortly after copulation. However, it has now been found that they sometimes parasitize in the intestines for a longer period of time than their females.

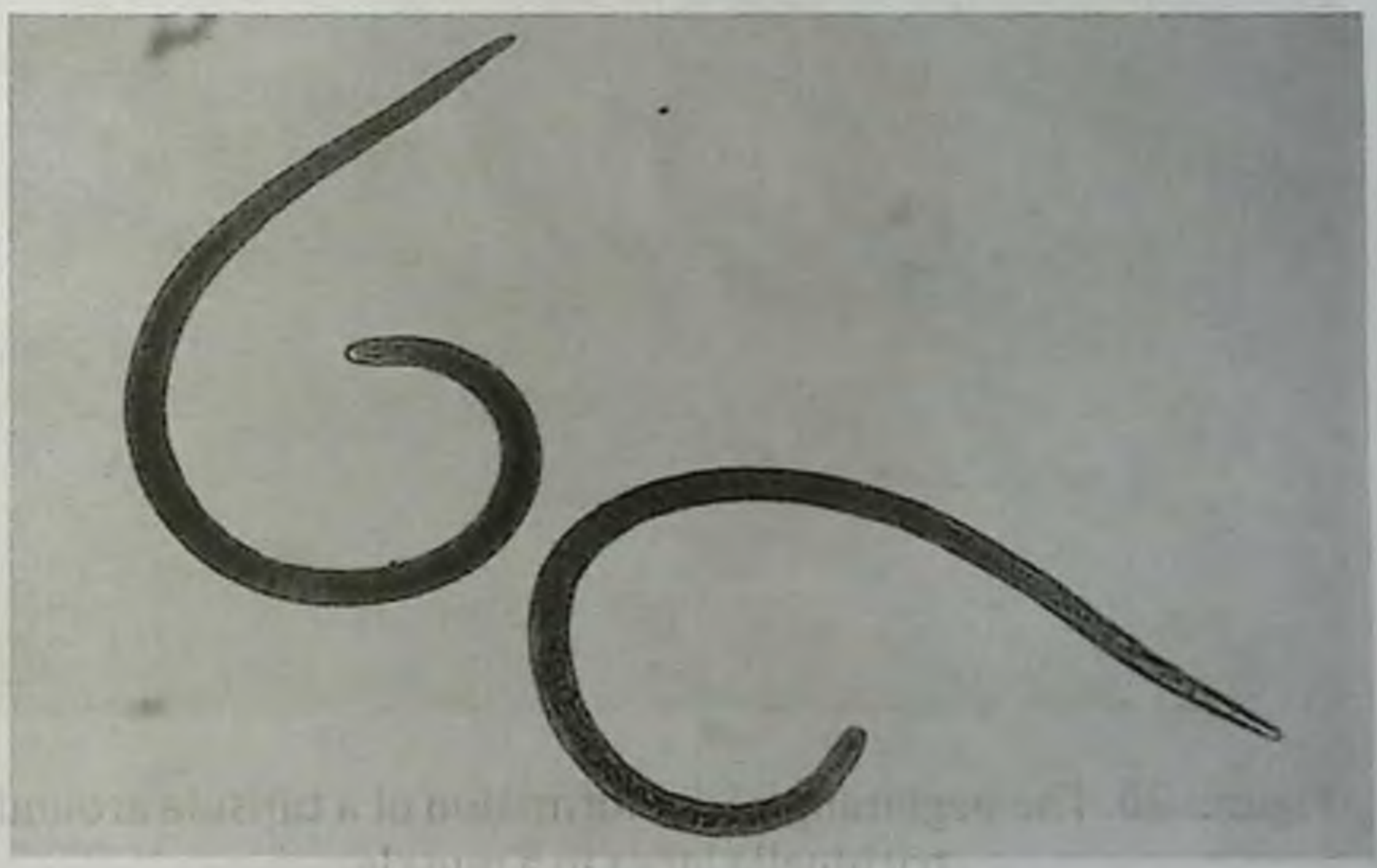


Figure: 29. Trichinella larvae emerging from capsules.

A female helminth that lives for about 50 days gives birth to up to 2,000 larvae during her lifetime, and then she dies.

Larvae enter the lymphatic system through the intestinal wall, then the circulatory system and spread throughout the body (therefore, a person, like any other infected organism, becomes an intermediate host). After some time, the larvae can be found in various organs. However, they are ultimately stored only in the musculature. Larvae begin to settle in muscles 6-9 days after infection.

Figure: 30. The beginning of the formation of a capsule around a trichinella larva in a muscle.

**Section of muscle tissue during mass damage by Trichinella larvae.**

Initially, the larvae are irritated, which causes muscle

pain. On the 17th-18th day after the injury, they calm down and spiral, and after 3 weeks they become invasive.

In 2-3 months, a connective tissue capsule is formed around the larvae (Fig. 30, 31). It protects the body of the host from the parasite and at the same time contributes to the latter's normal existence, because the walls of the capsule grow with blood vessels, through which the parasite receives nutrients and O2 and removes metabolic products.

**Figura.30**

Figura.31

From the sixth month, the capsule becomes calcified. In such a capsule, the larvae remain viable and invasive for many years.

Larvae live in muscles well supplied with a network of blood vessels. The first muscle groups preserved in larvae and found in large numbers are masticatory muscles, tongue muscles, oculomotor muscles, diaphragmatic legs, and diaphragm. Later it lives in the intercostal muscles, pectoralis major, neck, deltoids and calves, etc.

Larvae do not live in smooth muscle and heart muscle. But in severe forms of invasion, myocardial damage is often observed and is the main cause of death. Trichinella larvae entering the myocardium cause the appearance of many inflammatory foci, but they never remain there or fall into the capsule. Larvae do not develop in other organs.

With a sharp decrease in the resistance of the body, due to various reasons, the larvae produced by females do not start migration, but enter the hairs of the mucous membrane, develop rapidly, return to the head of the intestine, reach sexual maturity, and give birth to new generations of larvae. Such a specific autoinvasion leads to a sharp increase in the number of parasites in the intestine and, accordingly, to the occupation of the muscles. The medical importance of this phenomenon is extremely high.

Acute trichinellosis is characterized by the following three symptoms: high temperature (up to 40 C), pain in the affected muscles and allergic swelling of the face.

The main method of laboratory diagnosis of trichinellosis is immunodiagnosis based on serological reactions. Intradermal allergy test is positive compared to serologic

method, reactions last for a long time (6-10 years). A diagnostic biopsy is possible, for which parts of the deltoid muscle are usually taken.

Pathogenic results of Trichinella spiralis

- damage and irritation of the mucous membrane of the small intestine during the stay of sexually mature worms there;
- intoxication of migratory larvae;
- destruction of muscle fibers by skeletal muscles at the end of migration;
- causes strong sensitivity of the body with metabolic products and dying parasites.

Trichinellosis is an anthropozoonosis with a natural outbreak. Currently, two types of fireplaces are distinguished - natural and synanthropic.

Natural clearings (Fig. 32) are provided by wild animals (wolf, bear, fox, dogs, badger, wild boar).

In these foci there are always rodents, among which trichinellosis persists due to cannibalism. Birds of prey play an important role in the spread of Trichinella. On other continents, predators (leopard, lion, hyena, jackal) enter natural habitats.

Trichinella larvae that appear in the soil after the death of the host remain invasive for some time. They can be swallowed by some invertebrates (larvae of predatory flies, beetles, predatory beetles). In the digestive system, the larvae of these facultative hosts stay for about a week, and later in the food chains of biocenoses, these insects become an important epidemiological link in the spread of parasites.

In the Arctic, Trichinella circulation is provided by walruses, polar bears, foxes, wolves, arctic foxes.

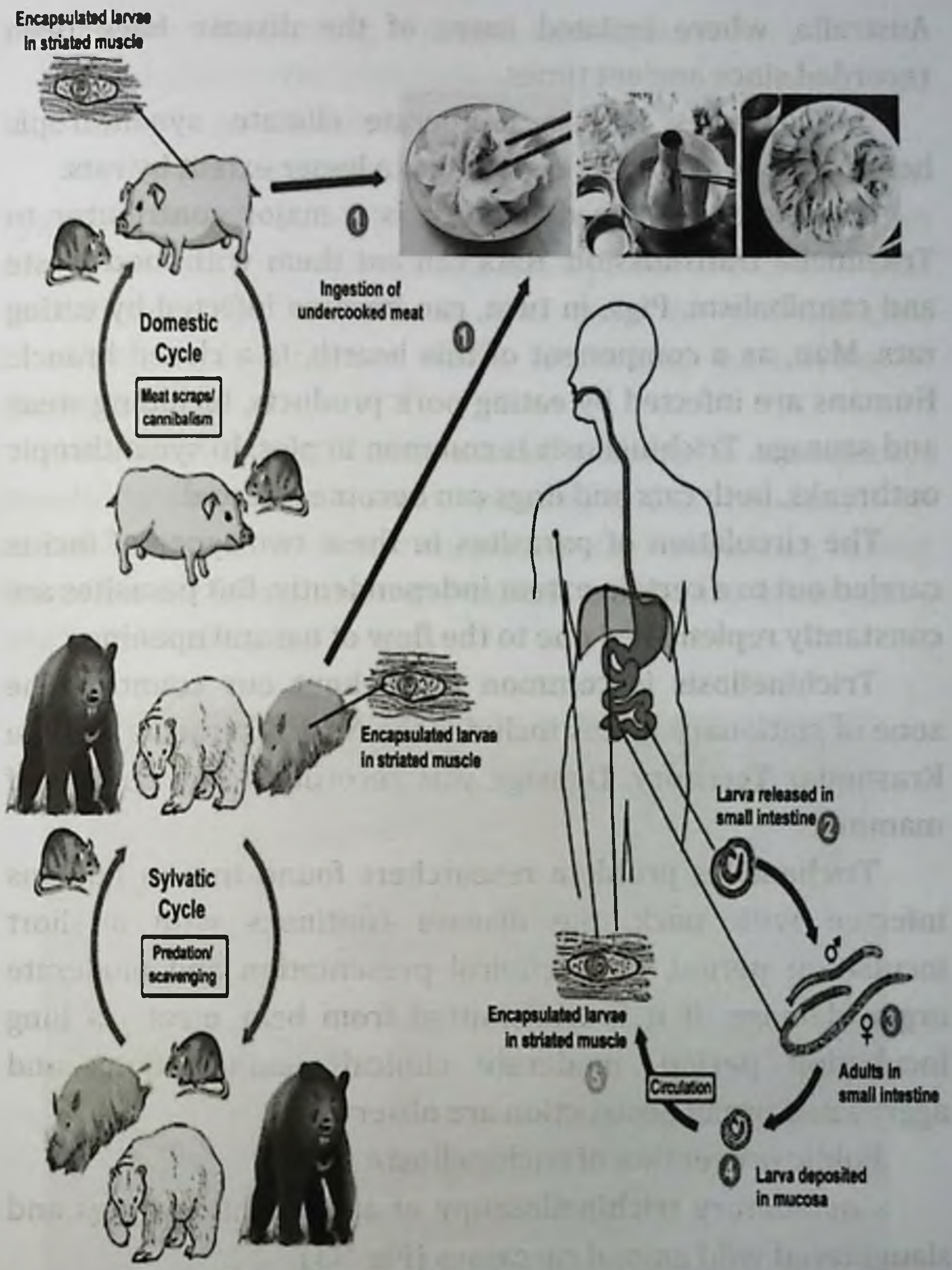



Figure: 32. Scheme of distribution of trichinellosis.

Trichinellosis is found almost everywhere, except for

Australia, where isolated cases of the disease have been recorded since ancient times.

In countries with a temperate climate, synanthropic hearths are provided by pigs, and to a lesser extent by rats.

Uncooked pork feed in pork is a major contributor to Trichinella transmission. Rats can eat them with food waste and cannibalism. Pigs, in turn, can become infected by eating rats. Man, as a component of this hearth, is a closed branch. Humans are infected by eating pork products, including steak and sausage. Trichinellosis is common in pigs. In synanthropic outbreaks, both cats and dogs can become infected.

The circulation of parasites in these two types of foci is carried out to a certain extent independently. But parasites are constantly replenished due to the flow of natural openings.

Trichinellosis is common throughout our country. The zone of stationary mines includes the North Caucasus and the Krasnodar Territory. Damage was recorded in 56 species of mammals.

Trichenelles problem researchers found that in humans infected with pork, the disease continues with a short incubation period, clear clinical presentation and moderate organ damage. If it is transmitted from bear meat - a long incubation period, moderate clinical manifestations and aggravated organ destruction are observed.

Public prevention of trichinellosis:

- mandatory trichinelloscopy of all slaughtered pigs and slaughtered wild animal carcasses (Fig. 33).

- destruction (burning) of all animal meat infected with trichenella;

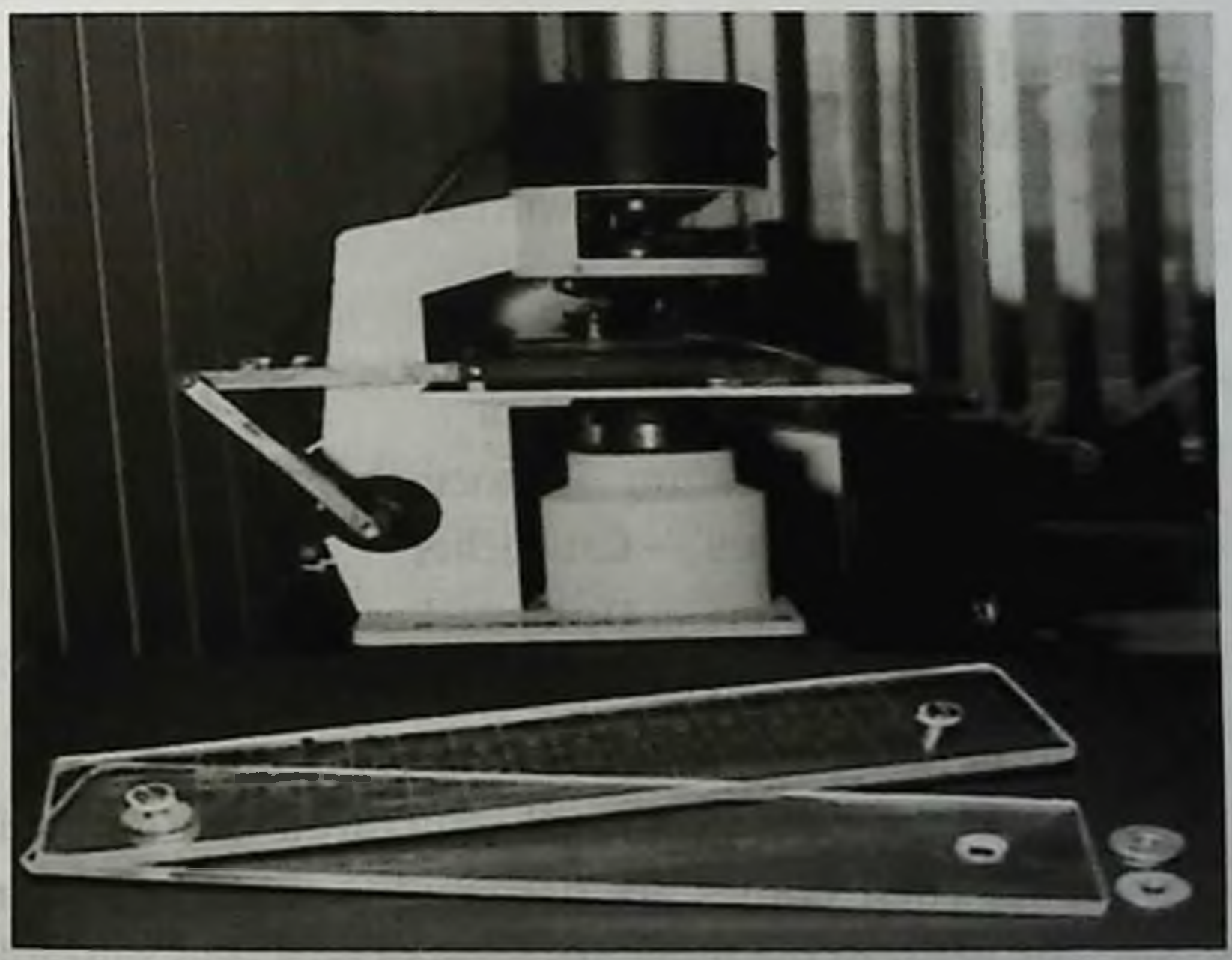
- regular deratization in places of slaughter and storage of

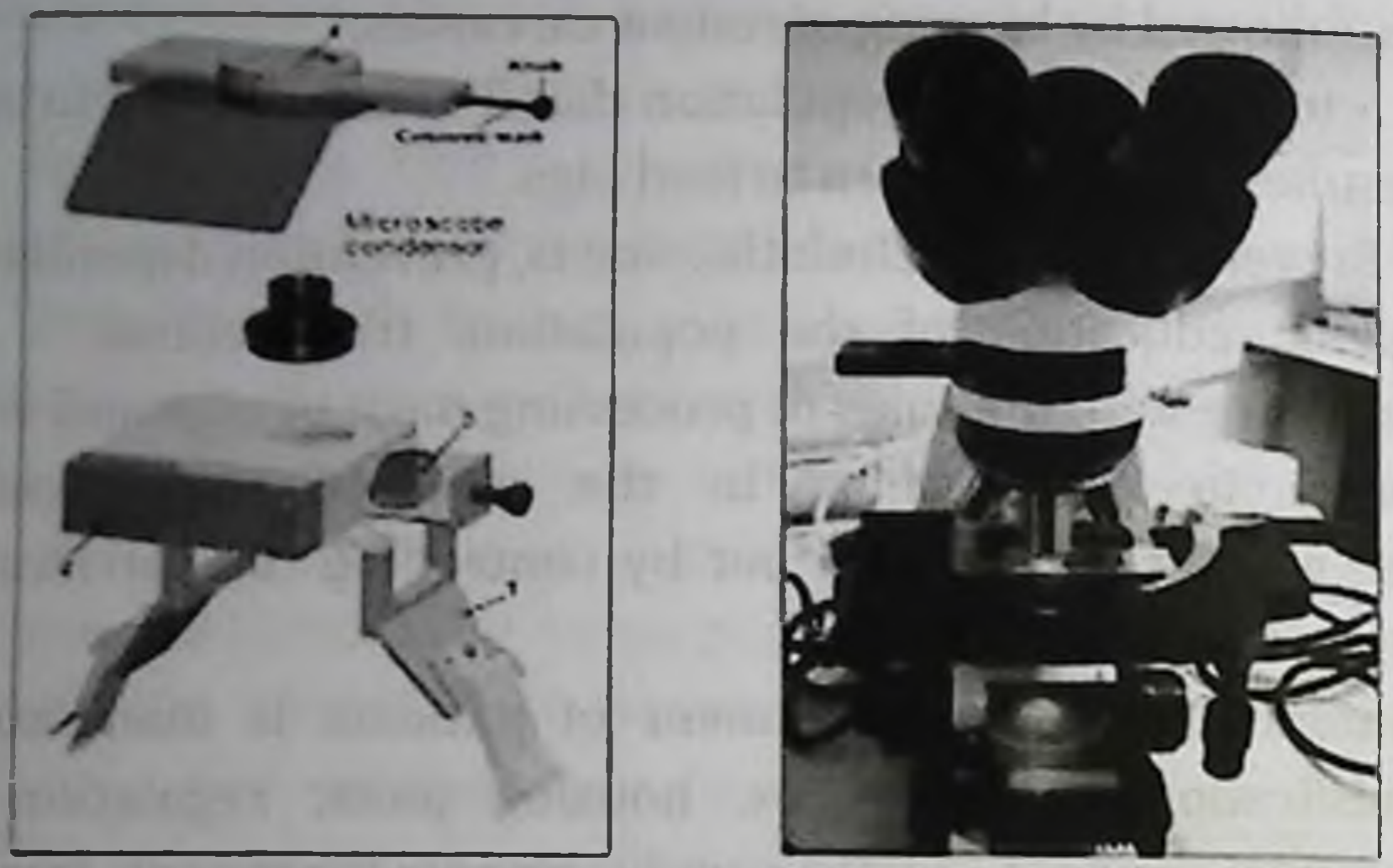
pigs, followed by burning of rodent carcasses;

- to explain to the population that it is not allowed to add intestines of animals taken to feed pigs.

Prevention of geohelminths, that is, prevention depends on hygienic education of the population, trichinellosis - on compliance with the rules of processing meat of pigs and wild animals in the kitchen. In the case of transmissible biohelminths, it is carried out by controlling the carriers of pathogens.

Identification and treatment of patients is mandatory; beautification of residences, housing plots; regulation of communal services - water supply, sewage treatment; raising the culture of horticulture and animal husbandry in collective and individual farms.





Picture: 33. Trichinelloscopy

**A type of flatworms**

**Group**:: Vermes

**Type**:: Plathelminthes –- flatworms

**Class**:: Trematodes –- Suckers

**Types:**

●Fasciola hepatica –- Liverworm

● Dicrocoelium lanceatum –- Lance-shaped sucker

●Opisthorchis felineus –- Cat sucker

● Paragonimus ringeri –- Ópka sucker

●Fasciolopsus baski - Fassiolopsus

General characteristics of flatworms (Plathelminthes)

Flatworms are the most well-structured of the entire Vermes group. Their bodies are flattened in the dorsoventral direction. The walls of the body are formed by a skin-muscular

bag consisting of an epithelium called tegument, and three layers of smooth muscle lying below it: circular, oblique and diagonal muscles. Tegument acts as skin.

This is an epithelial structure, cells lose their shell and merge into one layer.

Flatworms do not have a body cavity, the spaces between the organs are filled with connective tissue (parenchyma), where reserve nutrients accumulate. The following systems of flatworms are developed: nervous, subtractive, sexual, and digestive.

The last one is missing in the tapeworm. The alimentary canal is divided into anterior and middle sections and ends with the mouth, larynx, esophagus and branched intestine. Branched intestines are often differentiated. There is no anus. The mouth also performs the function of receiving food and excreting products.

There is a protonephridial type of excretory system. It consists of star-shaped terminal cells that produce urine, which are composed of cytoplasmic tubules that create fluid flow, and cilia that flicker like fire.

There is a system of branching collecting ducts from the terminal cells, from which widened collecting ducts emerge and drain into the excretory duct, which opens into the common excretory duct with a special excretory opening. Terminal cells are scattered among the parenchyma cells. It has a nodular nervous system. Nodes (ganglia) consist of a collection of neurons.

They are located at the front end of the body in the form of a supralaryngeal nerve node, and ciliates and sorghums also have a sublaryngeal nerve node. Nerve cells-nerve bundles

spread from the "head" ganglia throughout the body, of which lateral nerve fibers are the most developed. Among the ganglia there are bundles of nerves (commissures). All these structures form a nerve ring around the larynx, from which nerve fibers emerge.

Commissures are also present along nerve fibers. Sensory organs are receptors for chemical perception and emotion.

Flatworms do not have special respiratory organs. They breathe over the entire surface of the body.

There are also anaerobes from Sorgichli, which live in a low-oxygen environment. Genital system (Fig. 1). Almost all flatworms are hermaphrodites.

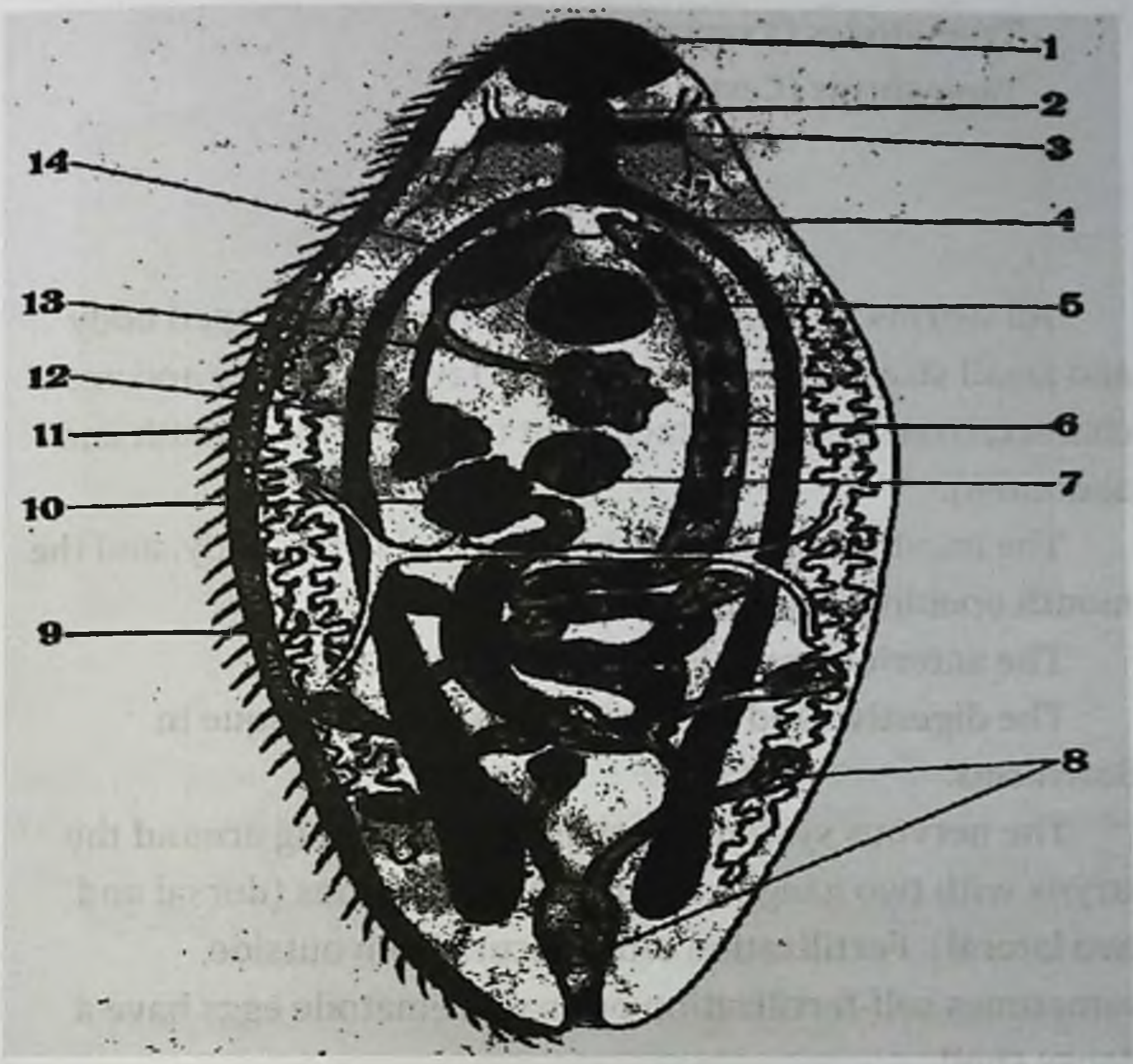
The female reproductive system consists of the ovary, uterus, ootype, seminiferous tubule, Melis corpuscle, yolk sac, and Laureus canal. Some species have a vagina, while others do not, and the seed is directly inserted into the uterus through the genital opening. Eggs released from the ovary fall into the fertilized ootype.

Melissa's body secretes a substance that fills the ootype and prevents the egg from sticking. In addition, it participates in the formation of the egg shell.

The yolk provides the necessary nutrients for the egg, and the exit of excess sexual products through the laurev canal.

Fertilized mature eggs contained in the ootype larva enter the uterus and are expelled from it.

The male reproductive system consists of testicles, ejaculatory duct, ejaculatory duct and copulatory organ - cirrus.




Picture. 1. Reproductive system of trematodes
1 - mouth sucker, 2 - larynx, 3 - oral nerve ring, 4 - midgut, 5 - stomach sucker, 6 - uterus, 7 - ovary, 8 - excretory system, 9 - jaundice, 10 - ootype , 11 - tegument, 12 - ovules, 13 - seed coat, 14 - cirrus.

Among flatworms there are free-roaming forms that live in water and soil, but more than 2/3 of flatworms are parasites of animals and humans. Trematodes are divided into the following classes:

- Ciliates (Turbellaria);

- Trematodes (Trematodes);
- Tapeworms (Cestoidea).

## CLASS TREMATODES

All worms are parasites. They have a leaf-shaped body and small sizes: from a few mm to a few cm (Fig. 2) and are characterized by their attachment organs - gills (mouth and abdomen).

The mouth is located at the front end of the body, and the mouth opening is located in its center.

The anterior probe is used only for fixation.

The digestive and excretory systems are unique in flatworms.

The nervous system consists of a nerve ring around the larynx with two ganglia and three nerve nodes (dorsal and two lateral). Fertilization often occurs from outside, sometimes self-fertilization occurs. Trematode eggs have a dense shell.

Their size is 27x11 mm in the cat's stomach, and 130-145x70-80 μm in the liver's stomach.

One of the poles of the egg has a cover, and the other has a bulbous or nipple-like sac due to the thickening of the shell.

The biceps can occupy a central position in the lower pole, but it can also be shifted to the side.

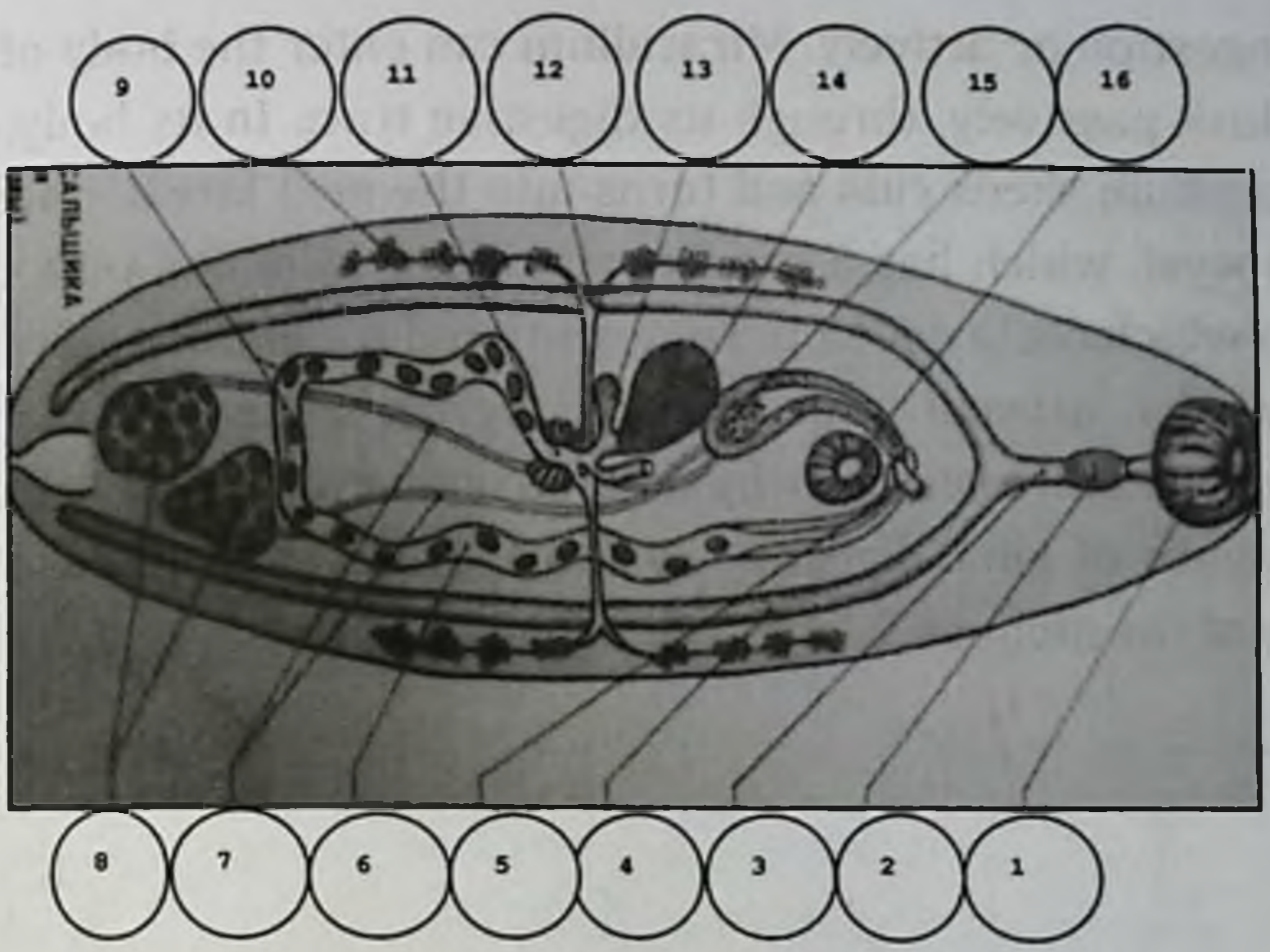



Figure 2. General view of suckers: 1-sucker mouth; 2nd nation; 3-red; 4th intestinal section; 5th genital opening 6th uterus; 7-seeds with 8-seeds; 9 – egg; 10 – jaundice; 11 – ootype; 12 – cirrus; 13 – seeding path; 14 – ovary; 15 – cirrus; 16 – stomach puller.

Trematodes develop with two intermediate hosts (Fig. 3). The first intermediate is always a mollusk, and the second is a variety of vertebrates and invertebrates. At the first stage, in all cases, the egg separated from the main host must fall into the external environment, into the water. Only in water can it find an intermediate host mollusk. An embryonic larva covered with cilia - a miracidia - hatches in an egg released from the uterus of a parasitic worm. This young lichen contains embryonic cells that ensure their parthenogenetic reproduction. After opening the lid, the miracidium leaves the egg shell and enters the water.

Then the larva in the water enters the body of the mollusk

by ingestion or actively. Miracidium can enter the body of the mollusk passively, through its digestive tract. In its body, the miracidium sheds cilia and turns into the next larval stage - a sporocyst, which has a sac-like shape and contains pink cells from which redia develop. They also produce mature cercariae larvae by asexual reproduction. Cercariae are similar to sexually mature cercariae by their structure and many features (presence of gills, digestive system). They actively leave the body of the mollusk.

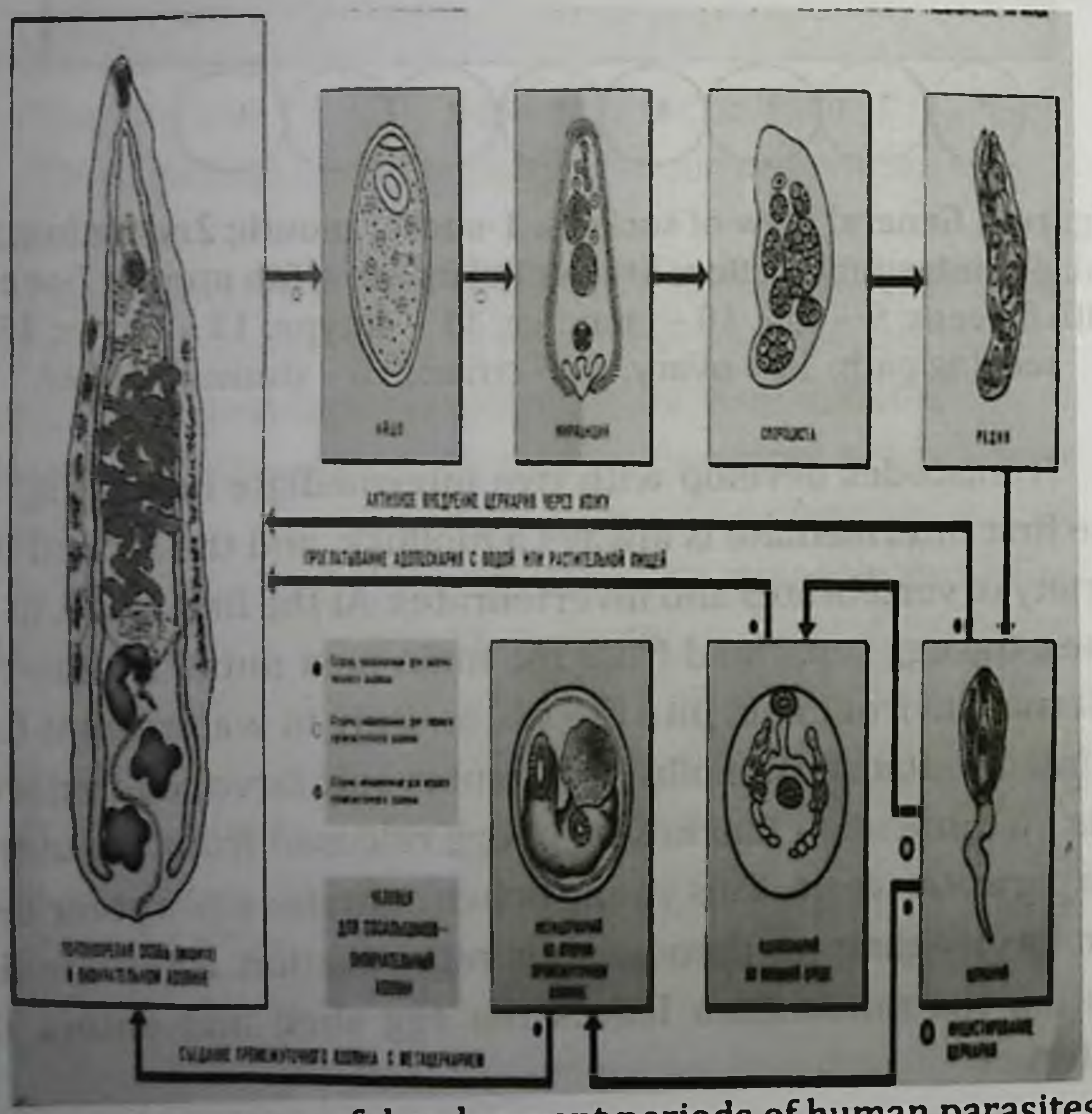


Figure 3. Diagram of development periods of human parasites

In addition, different types of trematodes develop in different directions. Cercariae of some species actively enter the main body of the host and can become sexually mature trematodes (bloodsuckers - schistosomes). Others lose their tails, and turn into cysts and become adolescaria. Parasites ingested by a definitive host develop into sexually mature parasites. This cycle is ideal for liver flukes. In another method of development, cercaria enters the body of the second intermediate host and turns into the next stage - metacercaria. The second (additional) intermediate are various types of fish and crustaceans. Together with the tissues of the second intermediate host, metacercariae fall into the body of the main host and reach sexual maturity (cat sucker, lung sucker). Thus, adolescaria and metacercariae enter the body of the main host through the mouth. Cercariae enter through the skin and mucous membranes, they do not have larval metamorphosis. The common name for diseases caused by parasites is trematodosis. The main causative agents of trematodes and their ways of entering the human body are different. In addition, the ways of development of different types of trematodes go in different directions. In some species, cercariae can actively enter the host's body and become sexually mature parasites (blood-sucking schistosomes). Others lose their tails, turn into cysts and become adolescents. In the body of the main host, they become sexually mature parasites. This cycle is characteristic of liver fluke, another method: cercaria enters the body of the second intermediate host and turns into the next stage - metacercaria. The second (additional) intermediate crustaceans are various types of fish and crustaceans. Together with the metacercariae in the

tissues, it falls into the body of the main host and reaches sexual maturity (cat sucker, lung sucker). Thus, adolescaria and metacercaria enter the body of the host through the mouth. Cercariae are introduced through the skin and mucous membranes, where they do not undergo larval metamorphosis. The main causative agents of trematodes and their ways of entering the human body.

The main causative agents of trematodes and their ways of entering the human body

| Helminthosis | Driver | Final transmission factors and entry routes of invasion |
|---|---|---|
| Opistorhosis | Opisthorchis felineus | Fish meat infected with metacercariae, mouth |
| Fascioliasis | Fasciola hepatica (liver fluke) | Fasciola qigantica (fasciola or giant sucker) Cercaria with water, aquatic plants, plants with adolescaria, mouth |
| Paragonimosis | Paragonimus westermani (worm) | Freshwater crabs and shrimps infected with metacercariae, mouth |
| Dicroceliosis | Dicrocoelium lanceatum | Accidental ingestion of ants infested with metesercariae |

Liverworm - Fasciola hepatica is the causative agent of a

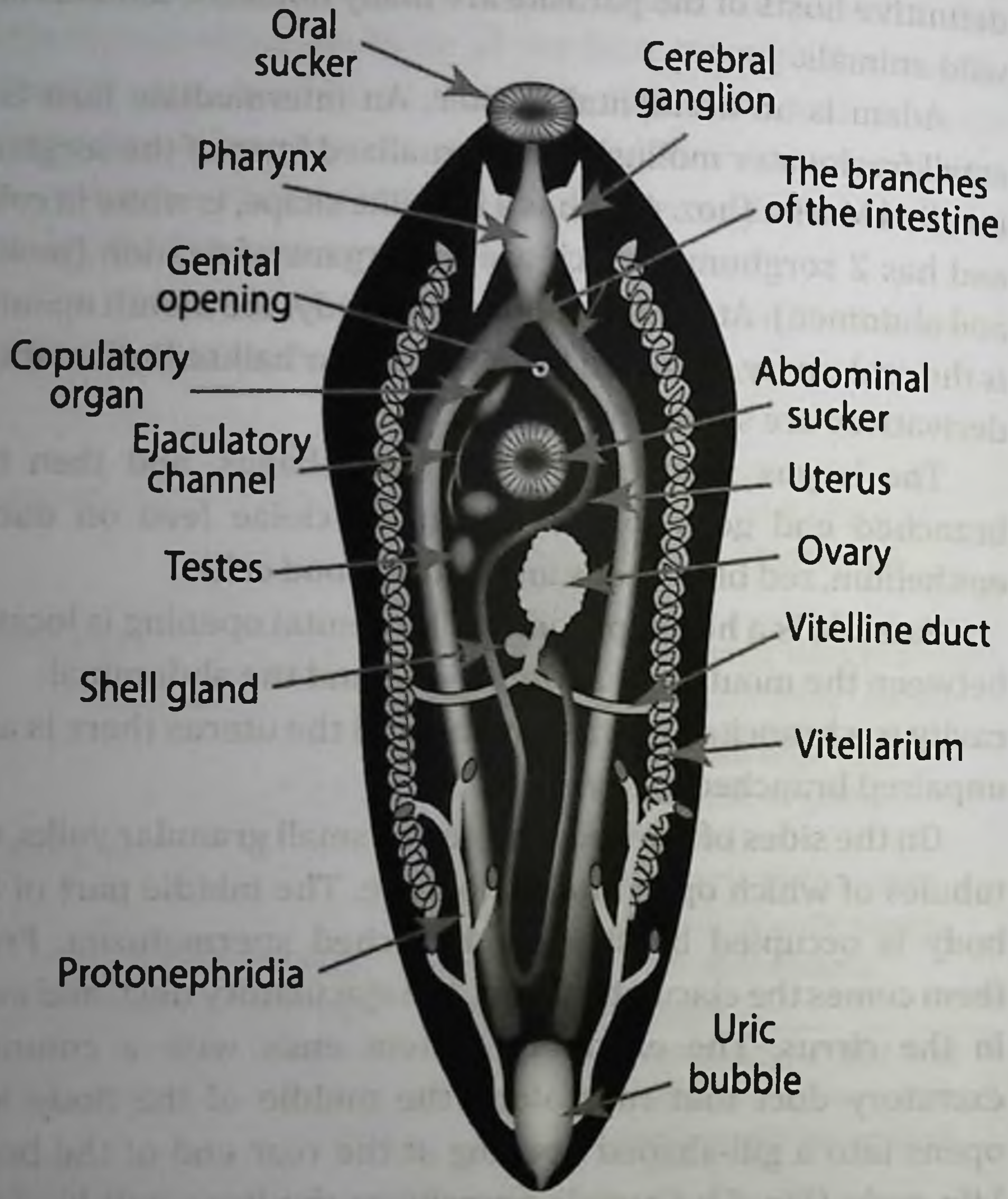
disease called Fascioliasis. It is found everywhere. The final, definitive hosts of the parasite are many domestic animals and wild animals.

Adam is an accidental master. An intermediate host is a small freshwater mollusk. The sexualized form of the sorghum is called Marita (hoz. 4), it has a leaf-like shape, is white in color and has 2 sorghums, which are the organs of fixation (mouth and abdomen). At the front end of the body, the mouth opening is the oral cavity, followed by the muscular hallux. Both of these derivatives are squealing devices.

The larynx reaches the short esophagus, and then the branched end goes to the cecum. Fasciolae feed on ductal epithelium, red blood cells and white blood cells

Fassiola is a hermaphrodite. The genital opening is located between the mouth and abdomen. Behind the abdominal cavity is a branched uterus, and behind the uterus there is an unpaired branched ovary.

On the sides of the body, there are small granular yolks, the tubules of which open into the ootype. The middle part of the body is occupied by strongly branched spermatozoa. From them comes the ejaculatory duct, the ejaculatory duct, and ends in the cirrus. The excretory system ends with a common excretory duct that runs along the middle of the body and opens into a gill-shaped opening at the rear end of the body. Life cycle (Fig. 5): Fasciola parasitizes the liver, gall bladder, intestinal tract, and rarely the pancreas of other mammals (cattle, horses, pigs) and humans. Lives 3-5 years/




**Picture 4: Liverworm**

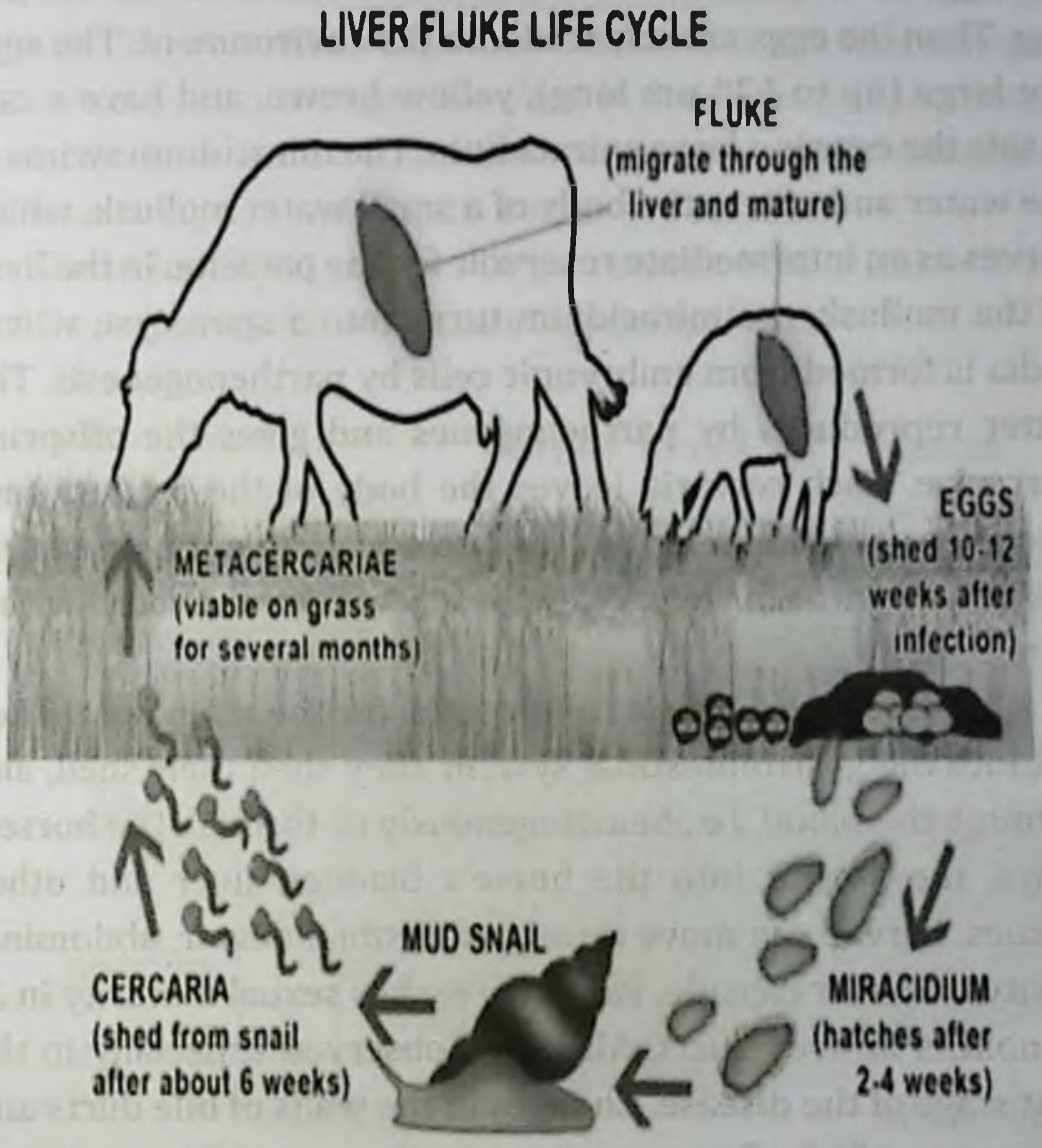



Figure 5. The development cycle of a liver sucker.

Egg division is observed in the small intestine of the last egg. Then the eggs are released into the environment. The eggs are large (up to 130 μm long), yellow-brown, and have a cap. Inside the eggs is a larva-miracidium. The miracidium swims in the water and enters the body of a small water mollusk, which serves as an intermediate reservoir for the parasite. In the liver of the mollusk, the miracidium turns into a sporocyst, where redia is formed from embryonic cells by parthenogenesis. The latter reproduces by parthenogenes and gives the offspring cercariae. Each cercaria leaves the body of the mollusk and becomes an adolescent, attached to aquatic plants. Up to 160 cercariae can be formed. They turn into a larva covered with a dense shell.

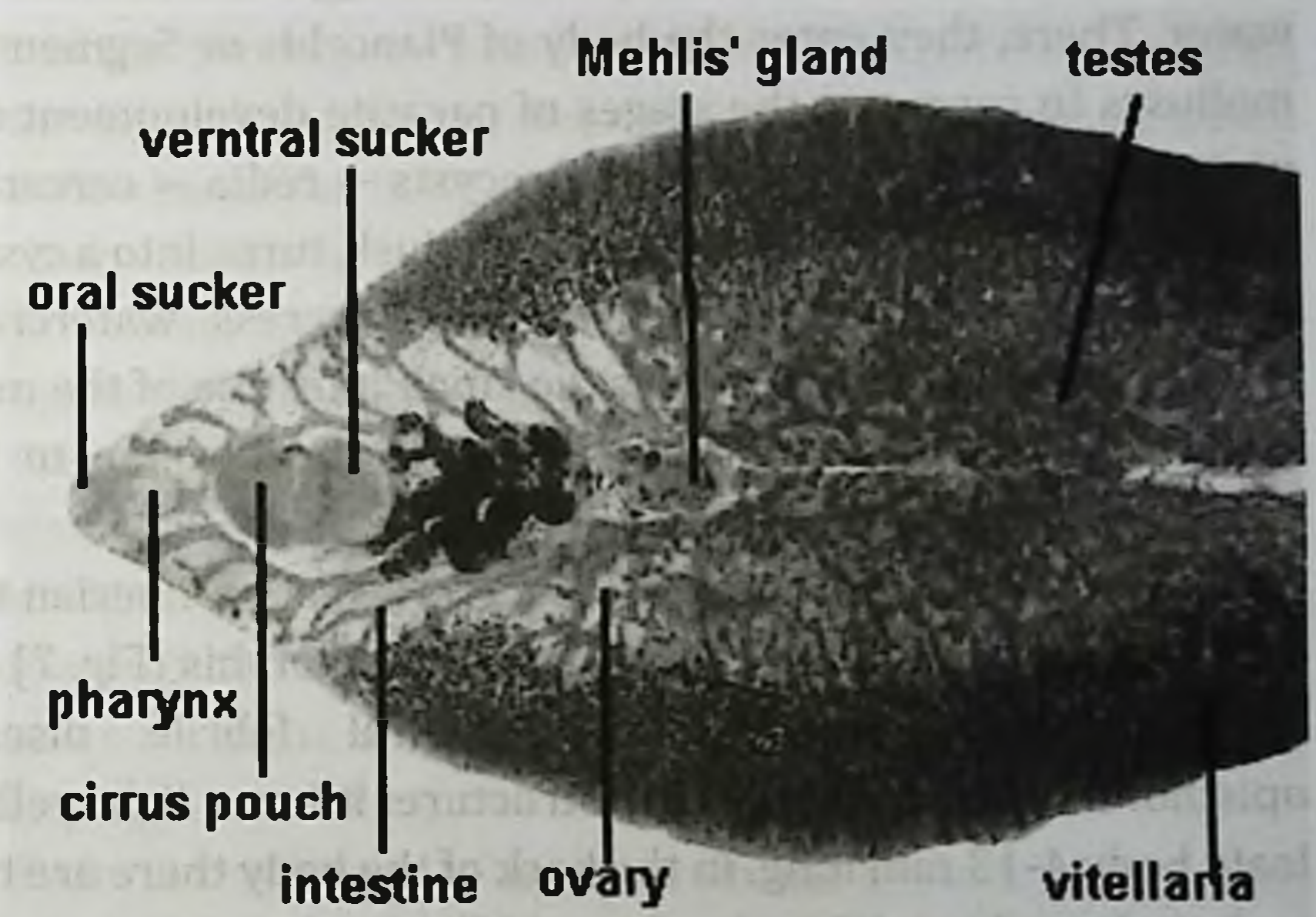
Adolescence is the invasion stage for the main host. They get into the gastrointestinal system, they shed their shell, and through the blood, i.e., hematogenously or through the horse's ways, they shoot into the horse's bladder, liver and other tissues. Larvae can move through intestinal devoir, abdominal cavity and liver capsule. Parasite reaches sexual maturity in 3-4 months in liver ducts. Allergy is observed especially in the first stage of the disease. Changes in the walls of bile ducts and disruption of bile flow contribute to the entry of bacteria and the development of secondary infection. As a result, complications worsen, purulent cholangitis, liver abscess, obstructive jaundice develop.

Prevention. It is not recommended to drink unboiled water from ponds where molluscs live, and to eat garden greens watered with water from stagnant ponds. Laboratory diagnosis of the initial stage of the disease is difficult. Eggs of the parasite can be detected in the feces of the patient, as well as in the

contents of the duodenal fluid after 3-4 months. When a person eats the liver or other organs and tissues of animals infected with fasciola, transit eggs are shed in the human feces. In this case, repeated examinations can rule out a person's disease.

Fasciolopsis Fasciolopsis buski

Fassiolopsis (Fig. 6) is a large tremado with a size of 2 cm to 7.5 cm. The causative agent of fasciolopsidosis




Oval or leaf-shaped body. The body is covered with a reddish-orange cuticle with rows of scales.

The gills are close to each other, the abdominal gills are 4-5 times larger than the mouth. Intestinal channels without lateral branches reach the posterior end of the body. The muscles are branched and located on the back of the body. In the middle part of the body, there is a branched ovary and Melis

body. The uterus lies in front of the ovary. The eggs are large (up to 130-140 μm), slightly asymmetric, yellow-brown, with a small cap, and a linear thickening of the shell at the rear end is observed. About 25 thousand fasciolopsis per day. lays eggs with a larva inside.

Development cycle. Fasciolopsis marita parasitizes the small intestine and stomach of pigs and dogs and rarely occurs in humans. For further development, the egg must fall into the water. There, they enter the body of Planorbis or Segmentina molluscs to carry out the stages of parasite development and undergo the following stages: sporocysts → redia → cercariae. The second, leaving the body of the mollusk, turns into a cyst in aquatic plants (fruits and leaves of watercress, watercress, lotus, etc.). With food, it enters the small intestine of the main host, the larvae emerge from the shell and develop to the sexually mature form.

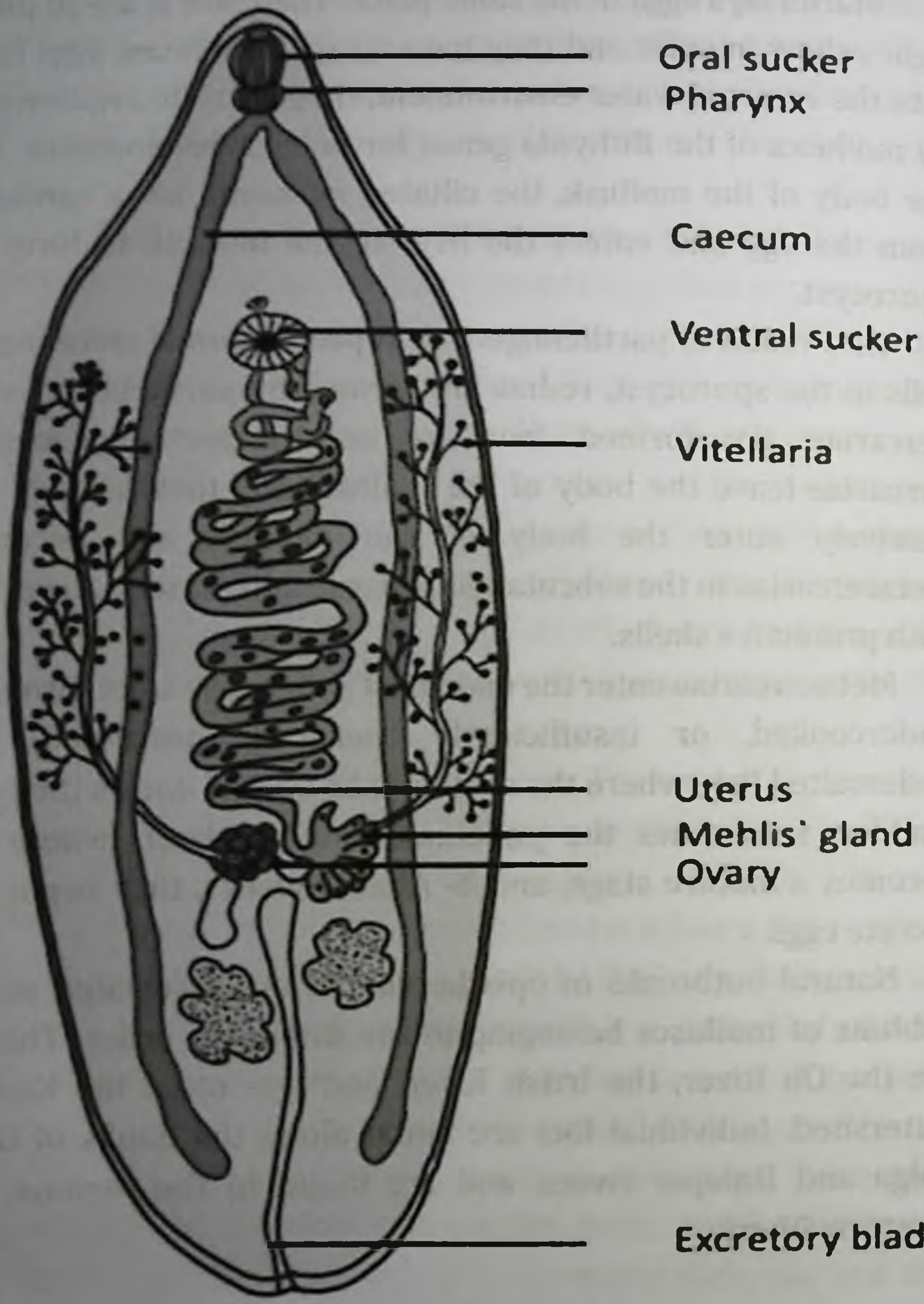
Cat sucker - Opisthorchis felineus. The cat or Siberian tick - Opisthorchis felineus, also known as opisthorchis (Fig. 7) - is the causative agent of the natural febrile disease opisthorchosis. Features of the structure: it has a light yellow leafy body 4-13 mm long. In the back of the body there are two socket-shaped testicles, in the middle - a branched uterus, behind which there are ovaries. Jaundice is located on both sides of the body. Opisthorchis biohelminth develops with host replacement. The main hosts are people, cats, dogs, fish-eating animals, etc. Among the intermediate hosts: the first includes freshwater molluscs belonging to the genus Bithynia, and the second includes fish belonging to the family Cyprinidae - carp. Marita parasitizes the horse's liver, gall bladder and, to a lesser extent, the pancreas.

Marita lays eggs in the same place. Their size is 26-30 μm, light yellow in color and they have a cap. With feces, eggs fall into the external water environment, they must be swallowed by molluscs of the Bithynia genus for further development. In the body of the mollusk, the ciliated miracidia larva hatches from the egg and enters the liver of the mollusk to form a sporocyst.

As a result of parthenogenetic reproduction of embryonic cells in the sporocyst, redias are formed by parthenogenesis. Cercariae are formed from redias by parthenogenesis. Cercariae leave the body of the mollusk and they actively or passively enter the body of the mollusk and become metacercariae in the subcutaneous tissue and muscles, covered with protective shells.

Metacercariae enter the main host's digestive tract through undercooked, or insufficiently thermally processed, or undersalted fish, where the shell breaks off and enters the gall bladder, sometimes the pancreas, and the liver, where it becomes a mature stage, and 3- After 4 weeks, they begin to secrete eggs.

Natural outbreaks of opisthorchiasis are associated with habitats of molluscs belonging to the Bithynian order. These are the Ob River, the Irtish River, and less often the Kama watershed. Individual foci are found along the banks of the Volga and Dnieper rivers, and are found in the regions of Western Siberia.




Wild animals that eat fish serve as a reservoir for

opisthorchis.

Prevention. It is considered to carry out sanitary preventive educational work with the population in the centers of natural diseases, to eat well-thermally processed and well-salted fish.

Lung sucker - Paragonimus ringeri

A disease with a natural focus of lung sucker (Fig. 8) causes paragonimosis. Found in East Asia and the Far East.

Marita are reddish-brown, egg-shaped, 7.5 to 16 mm long, and their bodies are covered with scales.

They parasitize in human lungs and a number of carnivorous animals (dogs, cats, pigs, etc.). With the blood stream, the eggs can enter all the organs of the main host, sometimes even the brain, causing inflammatory changes in the affected organs.

Eggs are removed from the human body with sputum. In addition, if sputum is swallowed, eggs are found in feces.

Eggs are 60 to 100 μm, golden-brown in color and quite large. When the eggs fall into freshwater bodies, they form miracidiums, which are actively introduced into the body of intermediate molluscs of the genus Melania. In the first intermediate body, the parasite develops from the following stages: sporocysts → redia - cercariae.

Finally, after leaving the body of the mollusk, they actively enter the body of the second intermediate host, crabs and freshwater shrimps, where they transform into metacercariae. Humans and animals (primary hosts) become infected by eating undercooked shrimp and crabs.

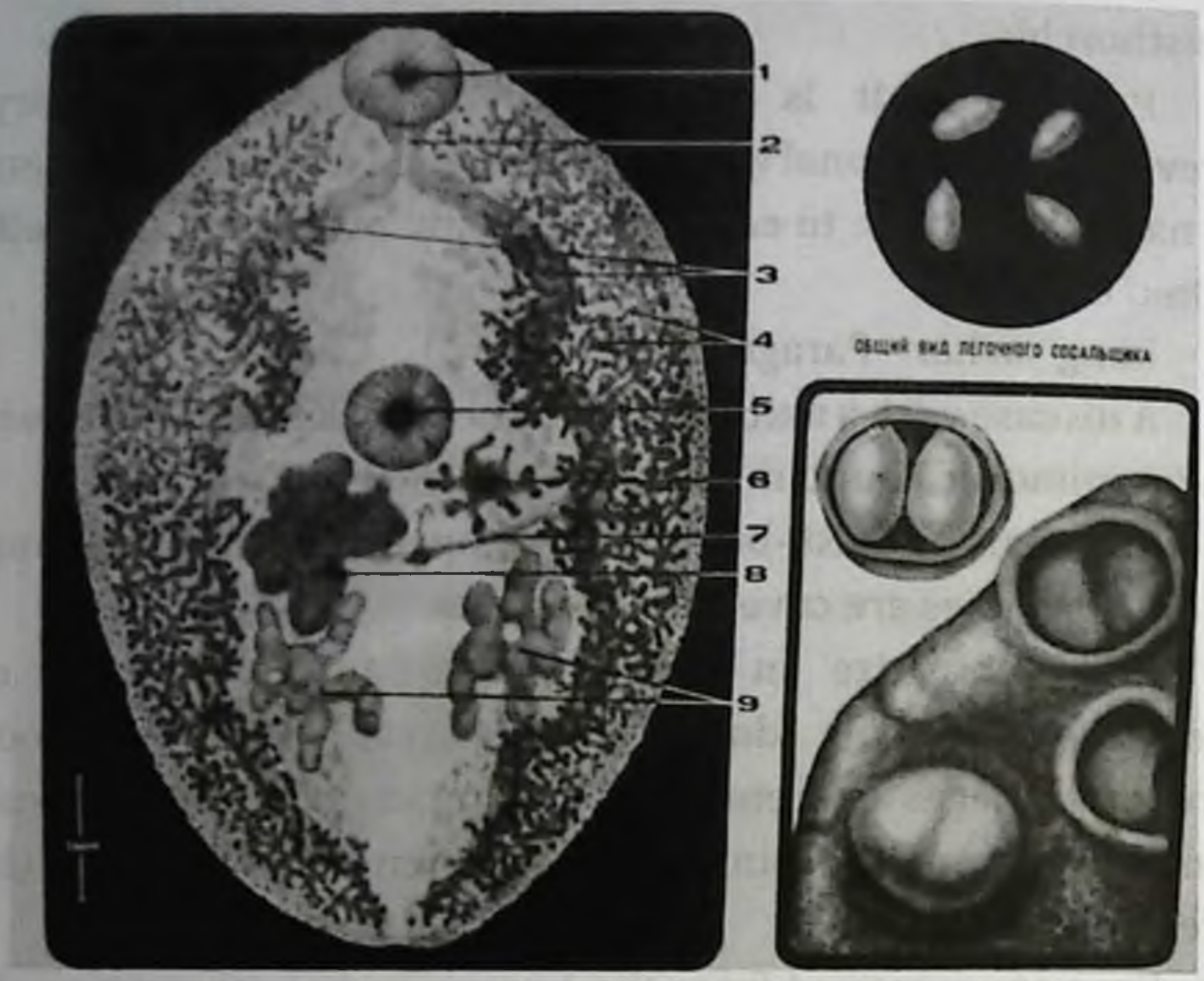



Fig. 8. Lung sucker. 1- mouth sucker; 2-red; 3-intestinal branches; 4-salmons; 5 - stomach sucker; 6- uterus; 7 – sorghum road; 8 – uterus; 9-seeds.

Prevention. Adherence to the technological methods of preparation of dishes prepared from crabs and crabs, adequate heat treatment. Prevention of contamination of water bodies with feces.

Dicrocoelium lanceatum

Dicrocoelium lanceatum - Lancet-shaped sucker (Fig. 9) is the causative agent of dicroceliosis. It is a parasite mainly in the liver of large and small cattle, sometimes in humans. It is 5-10 mm long, similar to opistorchis, in the Marita stage. For

differential diagnosis, testicles and the location of the uterus are checked. In the lanceolate sucker there are two-lobed spermatozoa, which are located near the front end of the body, and the uterus is at the back end.

Eggs are oval, yellow or brown, capped, 38-45 mm in size.

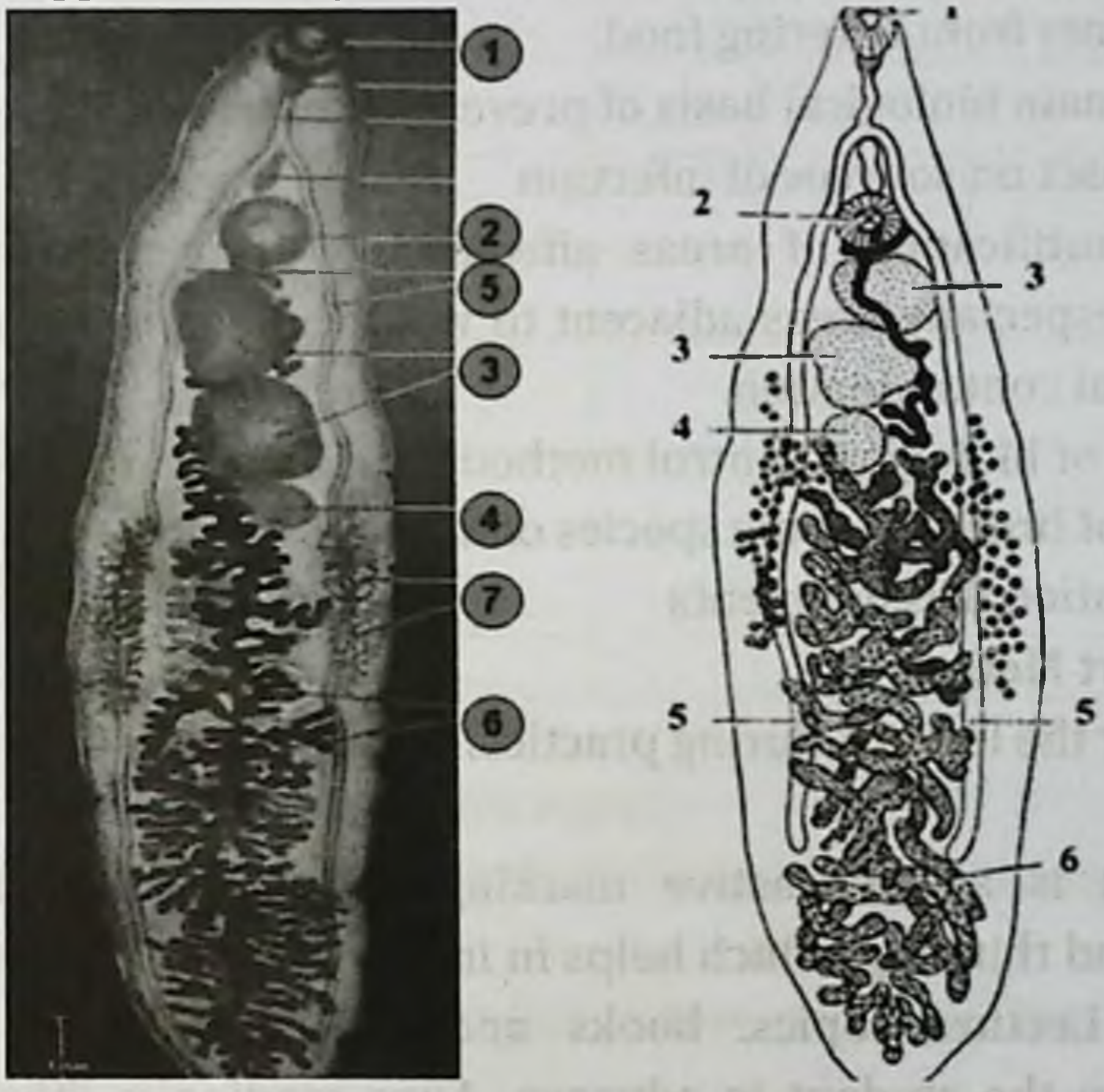



Figure 9. Lancet suction cup. 1- mouth sucker; 2-abdominal sucker; 3-seeds; 4- uterus; 5-intestine; 6-uterus; 7- yellow

Maritas parasitize the liver of animals, and rarely parasitize humans. Fecal eggs fall to the soil, where they can be ingested by land molluscs of the genera Zebrina and Helicela, in the liver of which the miracidium forms a first-order sporocyst. In it, a second-order sporocyst is formed, in which cercariae develop parphenogenetically. Cercariae shoot into the shell of the

mollusk, turn into a cyst and stick together to form a cyst. There they turn into metacercariae. The primary host is infected by ingesting ants infested with metacercariae.

Prevention. Carrying out sanitary and educational work with the population, mainly with workers in pastures, to prevent ants from entering food.

The main biological basis of prevention of trematodes:

- Impact on sources of infection

- beautification of areas affected by decontamination sources, especially areas adjacent to water bodies, to exclude their faecal contamination.

- Use of biological control methods of fighting mollusks in the form of breeding some species of fish and waterfowl.

Educational assignments

"Insert Method"

(After the lecture, during practical sessions, for homework and TMI)

Insert is an interactive marking system for effective reading and thinking, which helps in independent reading and learning. Lecture topics, books and other materials are assigned to the student in advance. After reading it, "V; +;?' expresses his opinion through signs.

Text markup system

"v" - confirms what I know.

"+" - new information.

- -contrary to what I know.

"?" - made me think.

I need more information on this.

**Insert schedule**

| Concepts | V | + | - | 9 |
|---|---|---|---|---|
| Devastation | | | | |
| Geohelminths | | | | |
| Biogelminth | | | | |
| Fasciola hepatica | | | | |
| Opisthorshis felineus | | | | |
| Paragonimus ringer | | | | |
| Ascaris lumbricoides | | | | |
| Enterobius vermicularis | | | | |
| Ovogelmintoscopy | | | | |

Rules for working with a group

Each member of the group should respect the opinions of their partners;

- should be active, collaborative and responsible for the issues given;

- can ask if they need help;

- to help those who ask for help;

- should be involved in the group evaluation process;

- They need to know the rule "We are on the same ship, sink together or go together."

Form the answer to the question.

1. Light up the parasitism of trematodes.
2. Ill highlight the specificity of Trixinella development.
3. Identify the disadvantages and advantages by comparing

the methods of ogelmintoscopy with one.

Assignments for groups.

1 - Group.

Reflect the morpho-physiological characteristics, vital cycle, paths of transmission, laboratory diagnosis and prevention of Ascaridos disease. Make a cluster of "helminths".

2 - Group.

Explain the morpho-physiological properties of enterobiosis, the vital cycle, the paths of transmission, laboratory diagnosis, pathogenesis and prevention.

| Group | 1.Prese-ction; | 2.Prirec-tion; | 3. Pssignments; (each question 0.2 points) | | | The sum of points |
|---|---|---|---|---|---|---|
| | (1,0) | (1,4) | Question 1 | Question 2 | Question 3 | (3,0) |
| 1 | | | | | | |
| 2 | | | | | | |
| 3 | | | | | | |
| 4 | | | | | | |

**Macropreparations:**

1. Formalin Fixed Fasciola Hepatica.
2. Fixed Opisthorhis Felineus
3. Fixed S.Haematobium
4. Fixed in Formalin S.mansoni.
5. Macropreparation of Ascaris Lumbricoids (male and Urgochi).
6. Macropreparation of Enterobius Vermicularis.
7. Macropreparation of Urgochi Dracunculus Medinensis.

**Micropreparations**

1. Liver Seeds Micropreparation

2. Liver Cirrhosis Injured Liver Cirrhosis Developed Liver Cells (Hemotoxylin and Eosin)

3. Liver Seed Eggs

4. Cat Suck microprreparation

5. Eggs in a 12-fingered fluid of a cat suckle 6. Dicrocelium lanceatum

7. Paragonimus Ringeri

8. Wounds and polyps in the organs (hemotoxylin and Eosin painted)

9. Ascaris lumbricoids Internal structure

10. Urg, open soldier Kondalalang cross section

11. Eggs and larvae in Soldier, AM larvae

12. Enterobius vermicularis perianal Eggs in the grease

13.Flilar bankrofti blood grease

Dissonstration of micropreparations on the monitor of vomiting eggs.

1. Liver SO, RG, Intrinsula

2. Liver cells with hepatic worm injured liver cells (dyed with hemotoxylin and eosin)

3. Opisthorshis felineus

4 Dicrocelium lanceatum

5. Paragonimus Ringeri

6. Ascaris lumbricoides internal structure

7. Urgochi soldier KO, Ndalang cuts

8. Eggs in soldier and larvae in Bugs

9. Enterobius vermicularis

10. Enterobius vermicularis Eggs in the grease in the perianal folds

11 Dracunculus medinensis

12 Washereria Bancrofti's blood ointment

Test Questions on the topic

1. For which helmet can a person be the main intermediate cell at the same time? A. Pakana Worm

B. Cattle Ribbean Worm

C. Wide Tape Worm

D. Alveococcus

2. What is the outer skin covering of round worms called?

A. Tegument

B. Cuticle

C. Pelicula

D. Cytoplasm

3. Body Shrack in Roundworms:

A. No

B. The Primary

C. The secondary is called

D. Mixed

4. How is the Multiplication System of Roundworms made up?

A. Single-celled skin glands

B. Methanephridia

C. Contraction vacuoles

D. Protonephridia

5. How does the digestive system of round worms differ from the digestive system of flatworms?

A. With the formation of the mouth

B. with the formation of the middle intestine

C. With the division of the posterior intestine

D. Which ends with the posterior output hole of the

6. From which folds of the hypoderma did the throwing

channels of round wormholes shoot?

A. Abdominal

B. Back

C. Side

D. Abdominal and Lateral

7. Specifications of the Round Worms:

A. The Division of Parthenogenesis

B. The Division of Hermaphroditism

C. The Galling of Sexual

D. Asexual Bugins Some sexes

8.Which of the following classes belong to the type of Nemathelmintes?

A. Cestodes

B. Nematodes

C. Trematodes

D. Sarkodina

9. What length is the adult Urgow Ascaris lumbricoides?

A. 15-25 cm

B. 0.3-1.5 cm

C. 40cm

D.2-5cm

10. What systems are not developed in the soldier?

A. Digestion and Multiplication System

B. Nervous and Multiplication System

C. Circulatory and Respiratory System

D. Nervous and Multiplication System

11. Which muscles are included in the skin muscle sac of the soldier along with the cuticle and hypodermis?

A. Paint Muscles

B. Damlang Muscles

C. Diogonal Muscles

D. Ring Muscles

12. In which organ of man does a person parasitize?

A. In the stomach

B. In the small intestine

C. In the intestine

D. In the liver

13. How many eggs in a day in the Soldier Soldier?

A. 24

B. 240

C.2400

D. 240000

14. The specificity of the structure of the oralis apparatus of the human soldier: A. 1 OGIZ SO,

B. with RGICHI with 6 cutting teeth

C. with 1 Cutting plate

D. 3 What is the structure of the egg in the

15. Soldier's 15.

A. Ovalid Tashki Side Gadir

B. Asymmetrical

C. With Barrow Structure

D. will have caps at one pole

16.What time will the invasive mature period of the Egasidida's eggs reach the Mature period?

A. 6-7 days

B. 21-24 days

C. 4-6 hours

D. 1 year

17. How does the larva in the soldier affect the human body?

A. Covers the lymphatic path

B. Causes pain in the muscles and swelling of the face

C. Inflammation of the intestinal tract

D. Close the intestinal tract

18. In the diagnosis of ascariasis:

A. Larvae in the litter are detected

B. Gadir-Badir oval eggs are detected

C. Adult forms are detected in sputum

D. Eggs are detected in urine

19. Determine the pathogenic effect of vomiting on the human body

A. Causes sleep disturbance

B. enters the intestinal wall Forms wounds equal to 2 cm in the wall

D. Forms connective nodules consisting of helminths under the skin

20. In the diagnosis of trichocephalus:

A. Larvae in the litter are detected

B. Adult forms are detected in the spawn

C. There are caps at one of the

D. Eggs in the urine are detected

21.Strisa Eggs specific features

A. Oval, thick, Gadir- Bodir layer

B. Asymmetrical

C. There are caps at one of the

D. poles with a barrel-shaped structure

22. Which parasite is an intermediate cell for which parasite?

A. Ostrisa

B. Soldier

C. Exinococcus

D. Cattle Solityori

23. Ostrisa's eggs are invasive in the day?

A. 6-7 days

B. 21-24 days

C. 4-6 hours

D. 1 year

24. How is enterbiosis transmitted to a person?

A. Invasion Eggs Water with food

B.Iniplos Kol, Toy, When swallowing their eggs through dishes

C.Lichinks with active skin access through active skin

D. By inhalation

25. What is a characteristic feature of egribosh vomiting:

A.The rug is a copulative hut

B. The mouth-to-mouth is trained with vesicle

C. The division of the odd genital tubes in the Ugazi

D. The head is in a strip form

26. How is the person damaged by ankylostomidosis?

A. Invasion Egg-infested water and food through

B.culex mosquito bites

C. Active shooting of Filariyasic larvae through the skin

27.What pathogen affects the body?

A. Sleep disorders

B. The intestinal wall is nourished by blood

C. forms wounds equal to 2 cm in the intestinal wall

D. forms the connective eggs that store the helminths

28. In which part of the human body is the larva of the trichinella parasites?

A. In a specific group of muscles

B. in the small intestine

C. in the subcutaneous fat layer of in the

D. lymphatic system

29. How is a person infected with trichinellosis?

A. Aedes by drinking Cyclopsic water with microphiliacs through the bite of the mosquito

B. In a specific group of muscles

C. through the entrance of helminth eggs with food through the gusht of the larvae

D. lymphatic system

30. What pathogen affects the body?

A. No practical effect

B. High temperature, strong pain in the muscles, swelling of the face

C. Inflammation in the muscles

D. Breaching of the intestines.

31.Determine the amount of Havli that Trixinella brings to the scientist for the man.

A. 100 larvae per 1 kg patient mass

B. 2 larvae

C. For 1 kg trichineliosis gusht 5 larvae for 1 kg patient mass

D. 1 kg of trichineliosis 10-15 larvae for gusht

32. Diagnosis of Trichinliosis:

A. Detection of larvae in the litter

B. Detection of gir-dudur eggs in the litter

C. Determination of adult forms in the spatula

D. In which part of the human body does it parasit

33. How is a person infected with vuxererosis

A. Aedes, Anopheles, Culex with the bites of mosquitoes

B. Detection of gir-dudur eggs in the litter

C. Determination of adult forms in the spatula

D. In which part of the human body does it parasit

34. How Wuhereria Bancroft has pathogenic effects on the human body

A. Causes sleep disturbance

B. With blood eroding the intestinal wall nourished

C. to damage the lymphatic system, develop elephant disease

D. feed on blood and form wounds 2 cm in diameter in the layer of intestinal mucus

35. Which parasite is associated with water in the life cycle of water

A. Ostrisa

B. Soldier

C. Exinococcus

D. Cattle Solityori

36. In the developmental cycle of which parasite is not the egg period

A. in the soldier

B. Ostrisa

C. Trixinella

D. Sharboshu Wigja

37. What is the disease called parasitic worms in humans:

A. Clonorchose

B. Enterebiosis

C. Helminthosis

D. Opistorchose

38. In which animal was the digestive system in connection with the shooting of parasitism?

A. In Trematodes

B. Soldier

C. Exinococcus

D. Cattle Solityori

39. Which of the following relations is an example of parasitism?

A. Between Bori and Rabbit

B. Between B. Echinococcus and Dog Between

C. Black and Malla Suvarak Between

D. Corps and Pasha

40.The Sexual Impaination in Parasite Worms, Which of the relations in the field of the intermediate mohit in the space and water of the 45.It is an example of parasitism?

A. Between Bori and Rabbit

B. Man and Cat SO, RGICHI

C.BUBRUT and YUMRONKEZIK

D. Black Rat

41. Human and Between Lice Attitude

A. Sinokia

B. Commensalism

C. Mutualism

D.Parasitism

42.Which single-celled animal lives with parasitics?

A. Normal Ameba

B. Infusoria

C.Evglena

D.Bezgak Parasite

43. What is the components of a natural source?

A. Fine, reservoir, complex of natural climatic conditions, carrier

B. complex of natural climatic conditions, carrier, reservoir

C. Fine, complex of natural climatic conditions, carrier

D. Container

44.What animal is called a carrier?

A. Parasite Ma,

B. Parasite MA, which carries one vital cycle,

C.Facultative Carrier

D.Framper D.Inogonistic Interaction Carrier D.

45.Antogonistic Interaction One Organism Source of Nutrition, Living using as an environment harms it?

A. Parasitism

B. Antibios

C. Kommensalism

D. Mutualism

Situational Issues

1. The helminths separated when a patient living in the Farqa was probed by a duodenal probe. Based on what can it be said that the opisthers are separated by clonors?

2. A patient with cystrode has lost his ability to build a single eye and has pain in the muscles in different parts of the body. What about that. Which parasite is this and how can the diagnosis be proven?

3. The hunter's wife cooked from the stuffed bear meat. After 1.5 months, 3 members of the same family had swollen lids and face, and the paramedic had a suspicion of which disease. What laboratory diagnosis should be made for this?

4. In a patient from Africa, a disease of the urinary tract was observed, blood was detected in the urine. Large-sized helminth eggs were found under a microscope. They are size 190 μm, yellow in color, thin. Determine the type of helminth, which looks like a large, diary cut of the egg at one of the poles?

5. In the subtropical zone of the Caucasus, workers of tea-growing planting will walk on the ground in the summer without clothes. Patients who consulted a doctor complained about the 12-finger bowel, the lack of food, and the fact that it felt bad. Which helminths are the workers affected by?

6. A patient who has lived in the Far East for many years came to the doctor. He complained to the pain in the liver. What helminthiasis does it contain and how to examine the patient to diagnose it?

7.The child who consumes unrequited strawberries in the market has observed intoxication and anemia with a breakdown of the nervous system for a month. Which nematodosis can be diagnosed and how can the diagnosis be confirmed?

8. A born baby was born with a "rabbit" defect. When the hereditary apparatus is examined by the cytogenetic method, which disease can be predicted in such a case where no hereditary pathology is detected?

9. The patient went to the doctor with a high temperature, pain, a swallow, shortness of breath, which goes with the separation of the spatula. Helminths were found in the microscopy of the spike. They have a lid formed as a result of the sinking of the shell in color, oval, large, surrounding it. Can helminths be detected in expectorant?

10. When the fisherman had eaten the caviar of the fish two weeks after consuming the caviar, he had to see a doctor and complained to his nausea, recording, diarrhea, and abdominal pain. How can the patient be diagnosed with helminth infections.?

11. As a teenager living in the village, he often consumes

unwashed vegetables and fruits in the summer. What type of helminthiasis is damaged by the guy and why?

12 Which of the following trematodos can be found in the urinary contents of opisthorx, fasciola, schistosome, clonorx?

13. A herdsman who grazes with dogs in the pasture complains of difficulty breathing and blood spitting. Round structures have been identified in Upka radiology. Which helminth is the patient with, how is the diagnosis made?

14. Nematodes have been identified from pereanal ointments for children in kindergarten. Which parasitic helium eggs were found, how children were infested with this helmet, what treatment options and what preventive measures should be taken?

15. Which of the following parasitic helminths: Fassiola, Clonorx, Paragonimus, Metagonimus infect opka?

16. A young girl living in one of the Siberian villages ate unwashed fruit picked in the woods in the summer, a heart disease similar to heart disease, and some time later brain and opka metastases were observed. Which cestodosis should be differentiated, taking into account the age and place of residence of the girl, and how is it done?

17. As a result of the hunter's consumption of wild dawn meat, symptoms of an allergic condition began to be observed in a month, with swelling of the face, high temperature, and eosinophelia with a strong pain in the muscles in various parts. Which nematodes and how is the diagnosis poured?

18. Which helminths are the following: Clonorchiasis, opisthorchiasis, dicroselosis, fascioliosis, paragonemosis, drinking water from boiling or using water plants or using freshwater shrimp and crabs for food Can the result be

infected?

19. As a result of degeneration, fragments of a large tape helminth separated from the patient. The length of their bugs is much smaller than the skim, and the black spot, which is slightly twisted between the stumps, is visible. Determine the type of helminth?

20. Patient litter was brought to the laboratory for "helminthiasis" testing. When the question was answered with the patient, it was discovered that he had ostris, the refuge was sent to the laboratory, what should the laboratory assistant do in this case?

21 High temperature Cough, which goes with a spatula separation in the chest, a patient with a lack of air complained to the doctor. The patient was identified with a golden-colored oval large, protracted helminth eggs formed due to the sinking of the surrounding shell. Can this patient have helminth eggs in the bulk?

22. The patient lives in Eastern Siberia He has complained of liver pain.

Can this patient be examined for helminth eggs and which gel region can be in it? 23. Can people infect malaria without mosquitoes?

24. Fassiola eggs were found in the litter of the patient being examined. Is this enough to diagnose fascioliosis?

25. Which of the following nutrients can be caused by diphyllobotriosis: beef, crab, raw caviar of chortan, fish (Olabuga, Churtan, Zogora)?

26. Eggs in the form of a cage or barrel were found in the drug. On the poles are colorless clear probes, the shell is thick, the inside of the egg is filled with fine-grained substances, the

sector is 50 μm. Determine which helminths the eggs belong to?

27. The patient was diagnosed with a vaginal trichomonade. Should a woman touch this parasite even if she has no symptoms in her husband?

28. Which of the following given trematodes parasites in the human gut: opisthorx, paragonim, fasciola

29. If the patient is diagnosed with anemia, which helminthosis should be married and what material should be checked?

30. The mother took the helminths to the laboratory, causing the child to shrink and discomfort. The gels are 1cm long, the ends of the body are white, and the ends of the body are turned at some sharpened bases. Determine the type of helmet?

31.When examined under a microscope, the patient found a helminth egg with a golden color, crunchy color, oval, large cap. Determine the type of helminth?

32. With the following helminthiasis, unboiled water, water plants can be transmitted by sov, clonorchiasis, opisthorchiasis, dichroseliosis, fascioliosis, paragonimosis.

33. A litter probe was brought to the laboratory to test the teniarhythm. Will a garbage probe be enough to confirm the diagnosis?

34. Why patients can sometimes be diagnosed with enterbiosis for several months, with ostris living for 1-2 months.

35. Which of the following trematodes can be identified from the urinary contents of opisthorx fasciola, schistosoma, clonorx?

36. A first-grader has been addicted to abdominal pain,

frequent diarrhea, nausea, and appetite for 2-3 months. Can these patients have symptoms of helminthiasis (which helminthosis and how is it diagnosed)?

37. Large oval-shaped helminths have been identified in the garbage. The eggs are thick-shelled, oddly covered, and the outside is a gadir. Inside the egg, an odd-colored round substance is visible, the poles of the egg are bright and clear. Which helminth species does these eggs belong to?

38. The patient brought to the laboratory almost every day, with an active separation of the tape. Which helminth are we talking about?

39. During microscopy in a patient with pneumonia (zotiljam) for one week, larvae were found in the spatula. Eosinophelia was erected in the blood. How can this be diagnosed?

40. Which can be infected with Teniarinhos through the following products: Pig gushti, vegetables, beef meat, canned fish?

41. Which of the following gelmentoses can be transmitted through contaminated vegetables: ascariasis, enterobiosis, trichocephalosis, trichinelosis, strongyloidosis?

42. Which of the following helminthiasis can be detected by: hymenolipidosis, teniorinchosis, diphyllobotriosis Echinococcosis?

43. Perianal grease is used to detect which of the following helminthiasis: ascariasis phyllaryrosis, enterobiosis, strongyloidosis, trichocephaloeosis?

44. Serological tests are used to diagnose the following helminthiasis: hymenolipidosis, diphyllobotriosis, exinococcosis, teniarinchosis, alveococcosis? 45. Which of the

following helminths can be infected through contaminated vegetables?

46. Patient brought to the laboratory the steam worms. Should I also check the rubbish and perianal greases to put the tashis?

47. Eggs with barrel, golden yellow, bubbly material at the poles were found in the patient's litter content. Which helminth can be detected in the patient?

48. Length 38-45mkm from the patient's litter composition, Dong on one side, flat on the other side, odd brown cap eggs. Which helminth is this?

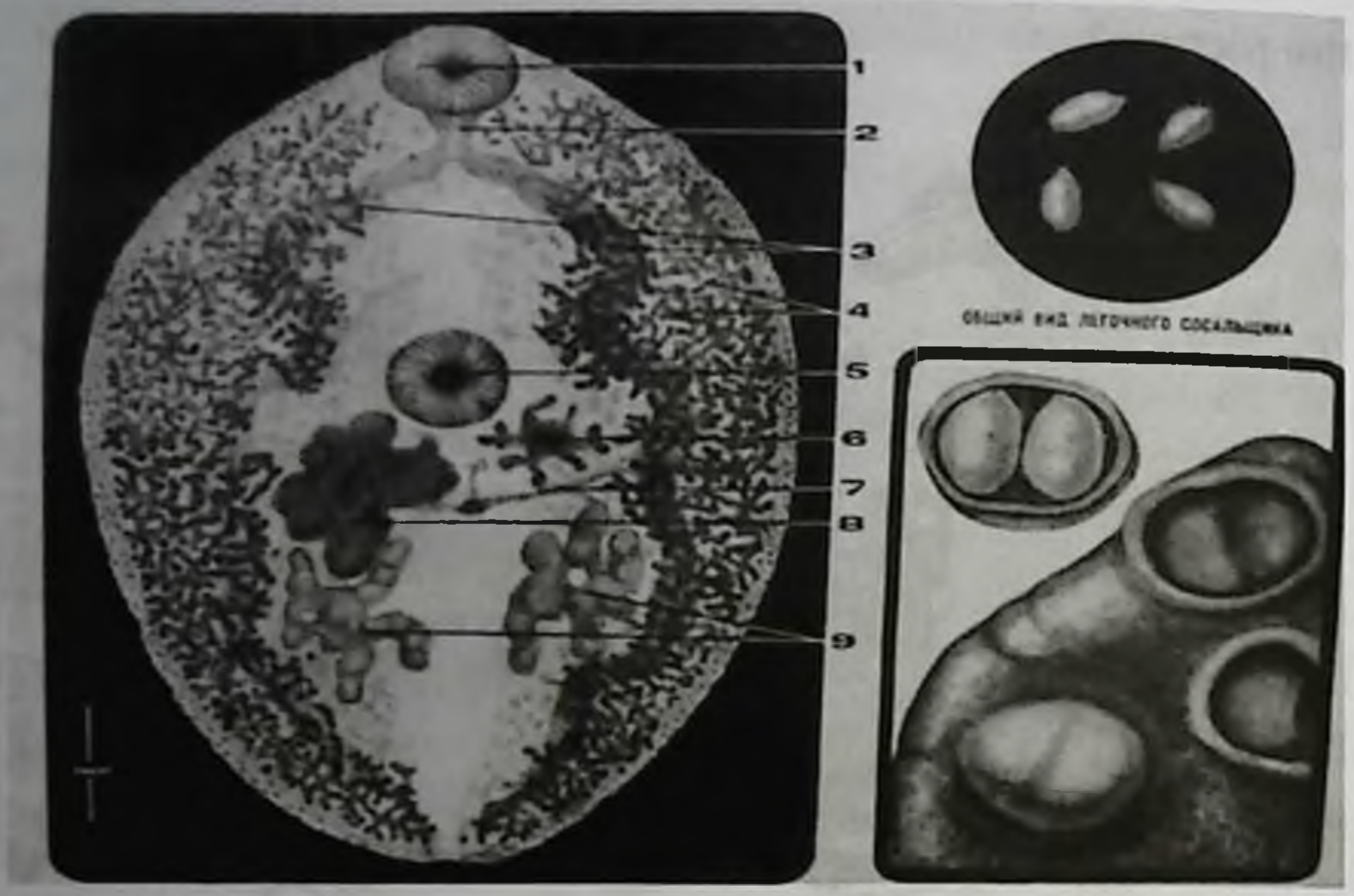
49. A patient with an allergic condition, high fever, edema and infiltrates in the tissues of the doctor.It is this helminth? 50. Worms were detected in the patient in the subcutaneous fiber, in the serrated heads, and under the conjunctiva. Which helminth is this?

## PRACTICAL SKILLS ON THE TOPIC (PICTURE TESTS)

1. The development cycle of which helminth is shown in the picture?

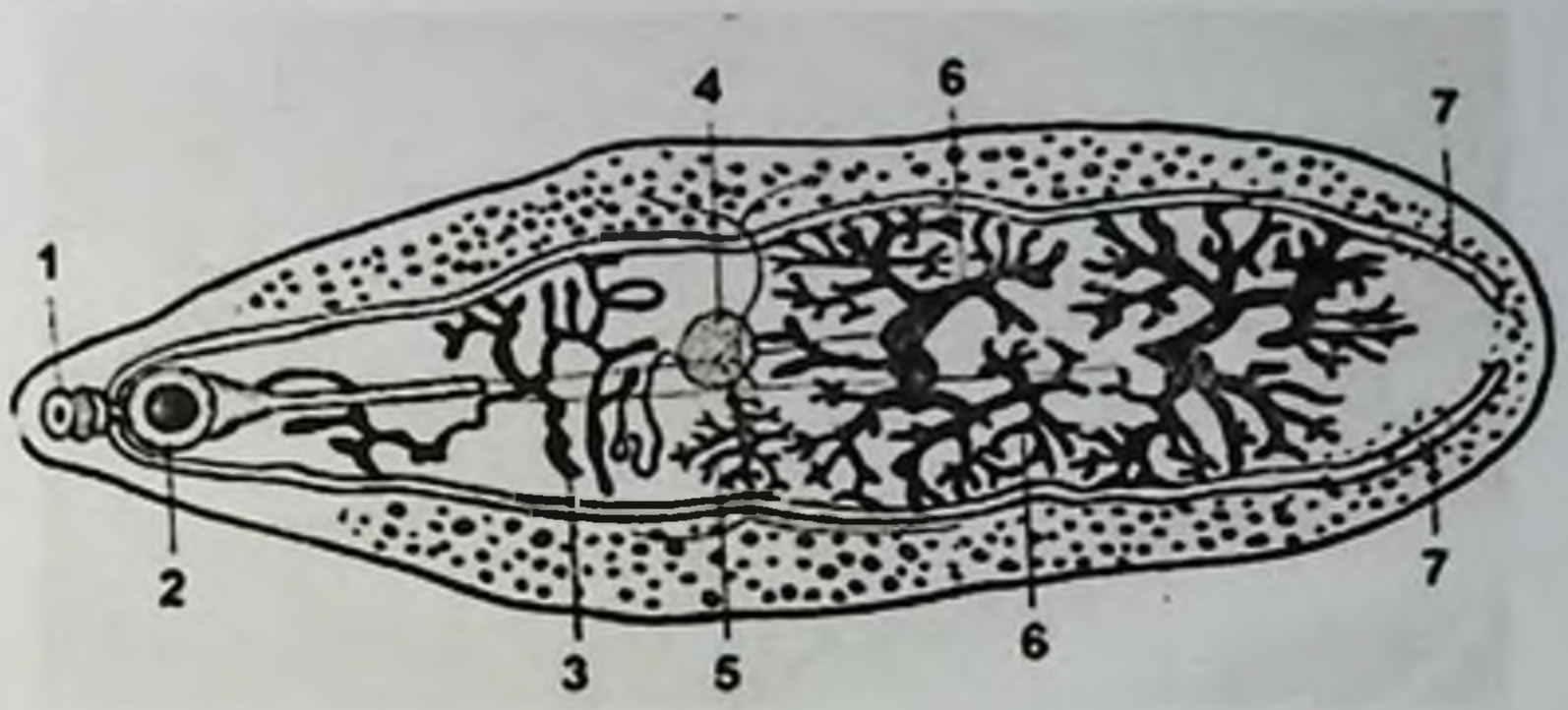
A) Fasciola hepatica
B) Enterobius vermicularis
C) Opisthorhis felineus
D) Trichinella spiralis

2.What part of the lancet-shaped suction is shown in the picture with the number 5?




A. yellow
B. uterus
S. stomach sucker
D. testicles

3.Which organ of Fasciola buski is shown in the picture with the number 2?




A. Oral suction
B. Abdominal suction
C. Melis corpuscle
D. intestine

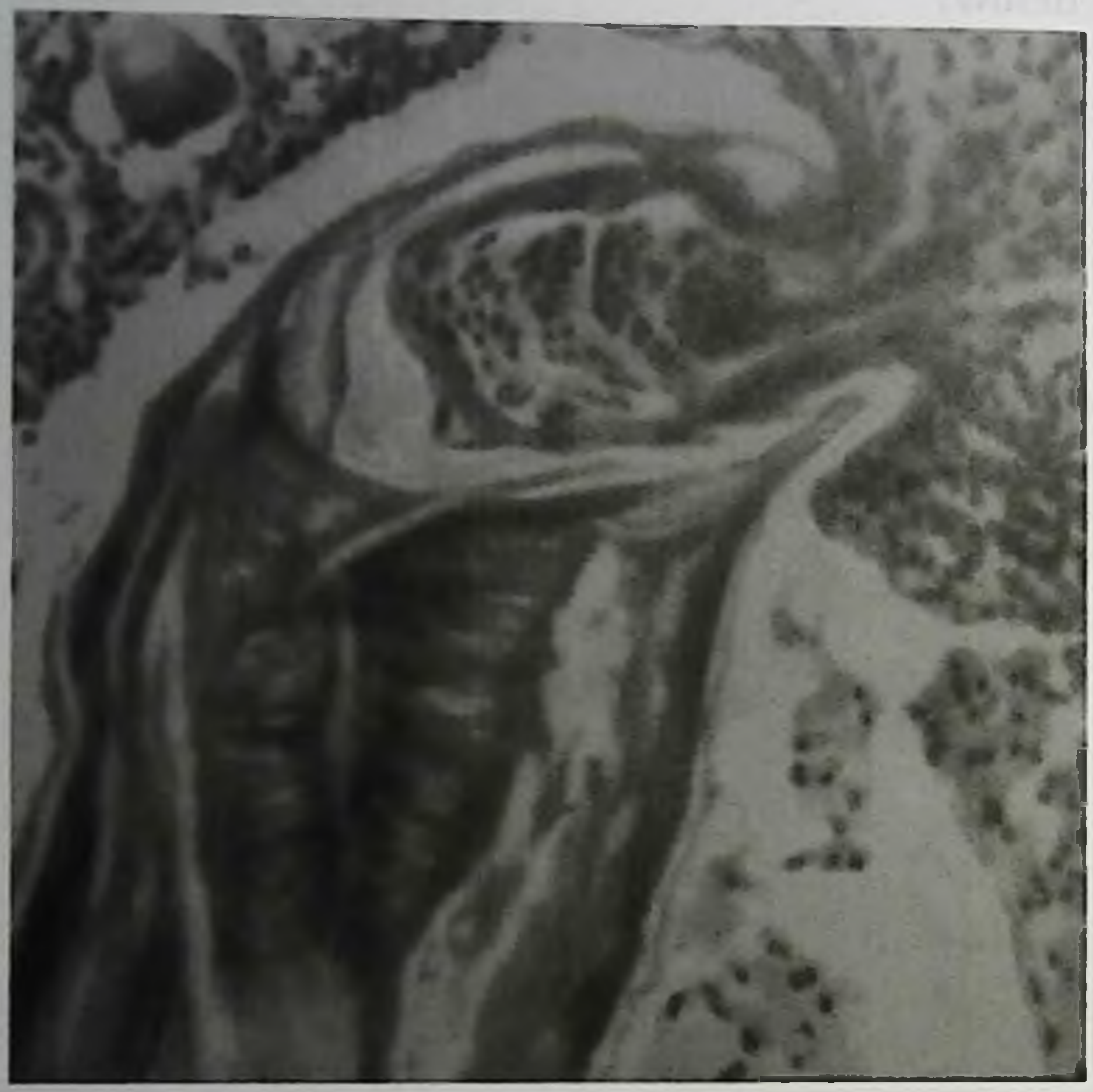
3. What is depicted in the given picture?

A. Eggs of Ascarida
B. Larval capsule of Trichinella
C. Ligament under the skin of the foot
D. Oysters in perianal smear

5.The development cycle of which helminth is shown in the picture below?

A. Fasciola hepatica
B. Opisthorchis felineus
C. Paragonimus ringer
D. Dicrocoelium lanceatum

6. What is depicted in the picture?



A. Liver cyst

B. Hookworm in the intestinal wall

S. Schistosoma haemotobium in blood

D. ostrisa in periahal folds

7. The oral capsule of which helminth is depicted in the picture?

A. Ancylostoma duodenali

D. Trichinella spiralis

S. Washereria Bankroft

D. Loa - Loa

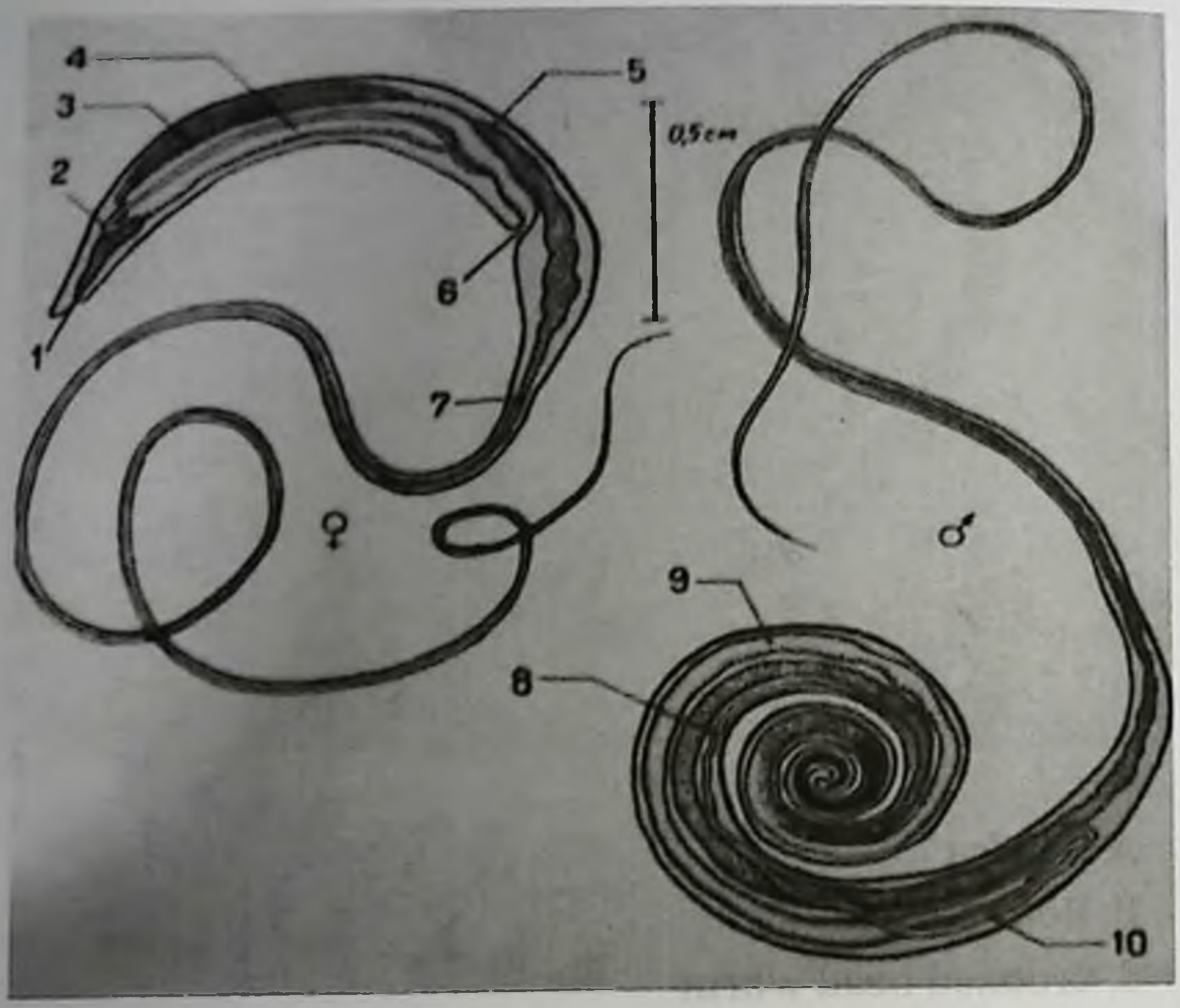
8. Which helminth is located under the skin in the picture?

A. Askari
B. Ostrisa
C. Toxocara
D. Bond

9. Which helminth egg is this?

A. Ostrisa
B. Roundworm
S. Crooked head worm
D. Askari

10. Which organ of the hookworm is shown in the picture with 2 numbers?

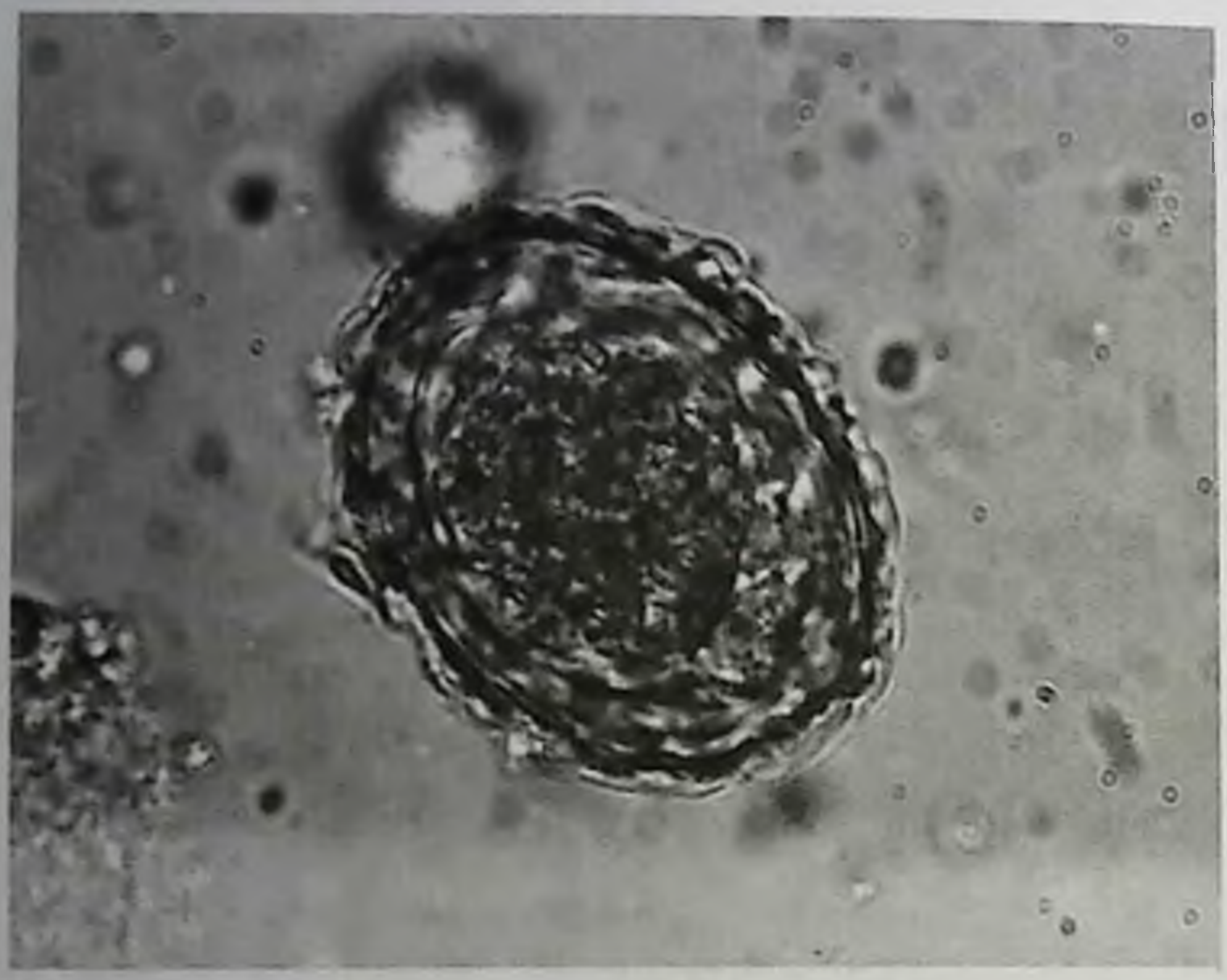



A. Sarigdon
B. Egg yolk
S. Anus
D. Cirrus

11. Which helminth in the intestinal wall is depicted in the picture?

A. Ostrisa
B. Ascarida
C. Trichinella
D. Crooked head worm

12. Which helminth egg is this?

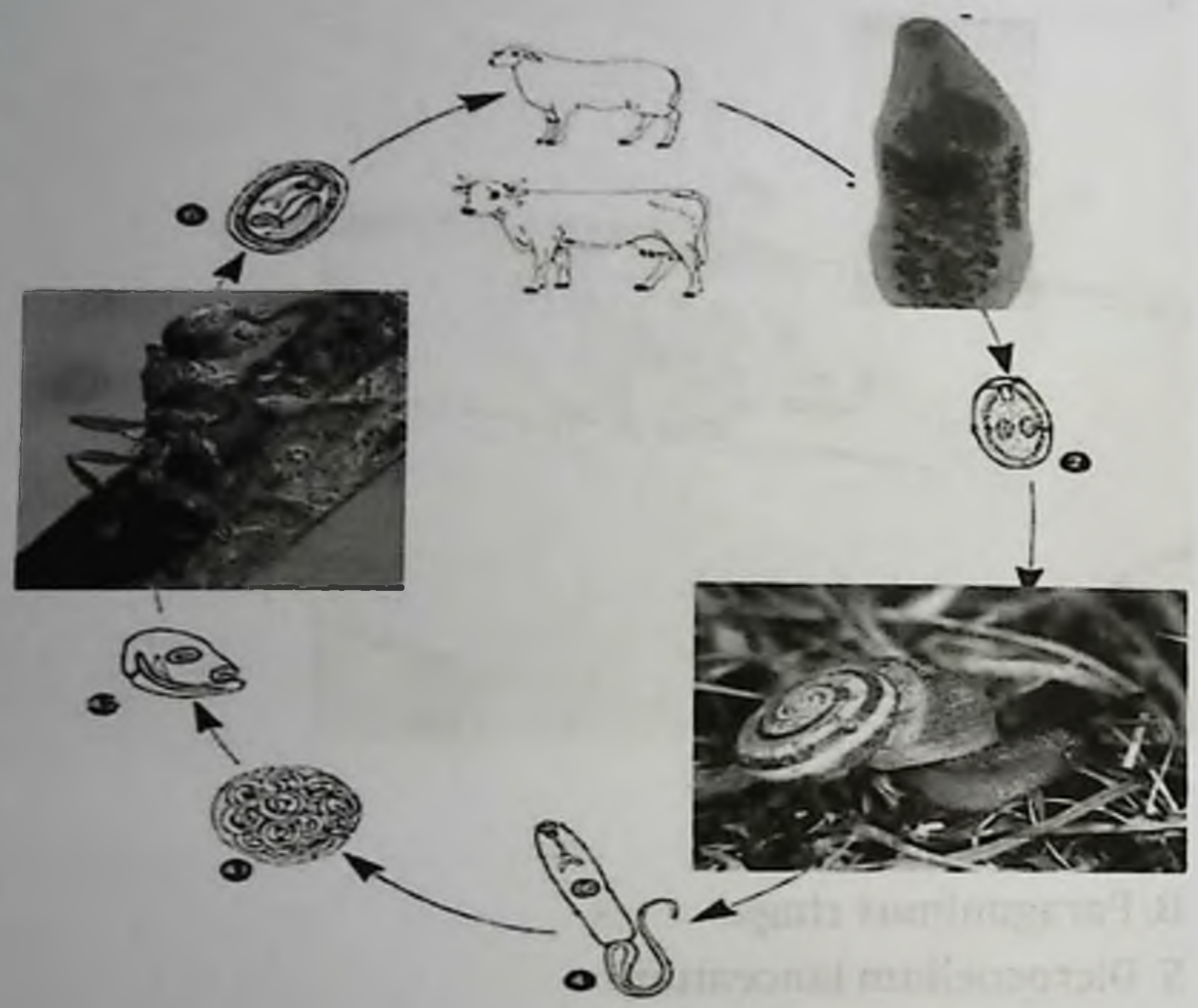


A. Ostrisa
B. Roundworm
S. Crooked head worm
D. Askari

13. Which helminth is depicted in the picture?

A. Fasciola hepatica
B. Paragonimus ringer
S. Dicrocoelium lanceatum
D. Opisthorschis felineus

14. The development cycle of which helminth is depicted in the picture?



A. Taeniarhunchus saginatus

B. Taenia solium

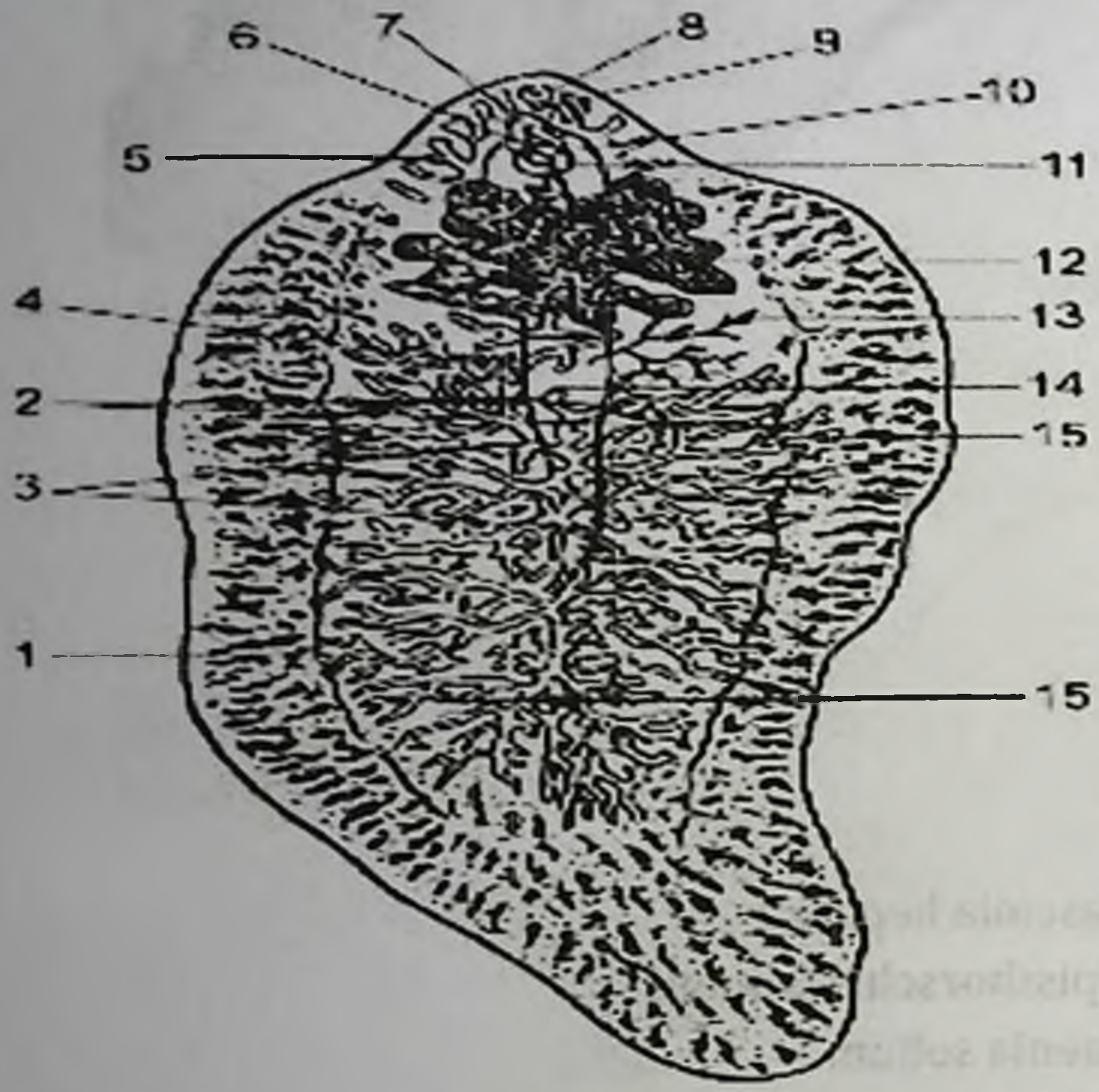
S Hymenolepis nana

D. Dicrocoelium lanceatum

15. Which helminth is depicted in the picture?

A. Fasciola hepatica
B. Opisthorschis felineus
C. Taenia solium
D. Schistosoma Haemotobium

16. Which part of Fasciola hepatica is represented by number 5?




A. jaundice
B. testicles
C. meliss corpuscle
D. intestine

## BENCHMARK OF ANSWERS

## Answers to practical skills (picture tests).

| № | Answers | № | Answers | Answers |
|---|---|---|---|---|
| 1 | A | 16 | A | B |
| 2 | B | 17 | D | Д |
| 3 | B | 18 | B | D |
| 4 | D | 19 | B | C |
| 5 | D | 20 | B | C |
| 6 | A | 21 | B | D |
| 7 | D | 22 | C | A |
| 8 | B | 23 | C | C |
| 9 | C | 24 | B | C |
| 10 | C | 25 | D | C |
| 11 | A | 26 | A | C |
| 12 | B | 27 | C | B |
| 13 | D | 28 | C | B |
| 14 | D | 29 | A | A |
| 15 | A | 30 | D | B |

| № | Answers |
|---|---|
| 1 | The rear end of its body is dilated, 0.5-1.0 mm long |
| 2 | Taenia solium, by checking mature bugs in the litter |
| 3 | Trichinella spiralis is a biopsy of a person by taking namyna using garpunchae from 2-headed or deltasimon muscles |
| 4 | Shistosoma haemotobium. |
| 5 | Ancylostoma duodenale |
| 6 | Paragonimus ringeri |
| 7 | Trichocephalus trichiurus |
| 8 | Toksoplazma gondi |
| 9 | Paragonimus ringeri |
| 10 | Diphyllobothrium latum |
| 11 | Ascaris lumbricoides |
| 12 | Shistosoma haemotobium |
| 13 | Echinococcus granulosus |
| 14 | Enterobius vermicularis |
| 15 | Paragonimus ringeri |

| | |
|---|---|
| 16 | Alveococcus multilocularis,immunologic usul |
| 17 | Trixinella spiralis |
| 18 | Dicrocoelium lanceatum |
| 19 | Diphyllobothrium latum |
| 20 | Notugri, ostrisani aniqlashda perianal surtmadan tashxis olinadi. |
| 21 | Paragonimus ringeri |
| 22 | Opisthorshis felineus |
| 23 | Yes |
| 24 | Yes, it will be. |
| 25 | Caviar and fish |
| 26 | Enterobius vermicularis |
| 27 | It doesn't hurt |
| 28 | Opisthorshis felineus |
| 29 | Diphyllobothrium latum |
| 30 | Ostrisa |
| 31 | Ascaris lumbricoides |
| 32 | Fasciola hepatica |
| 33 | Yes |
| 34 | Aytoreinvaziya |
| 35 | Shistosoma haemotobium |
| 36 | Askarida |
| 37 | Askaridoz |
| 38 | Taenia solium |
| 39 | Cattle goshti |
| 40 | Askaridoz |
| 41 | Diphyllybothrium latum |
| 42 | Ehterobius vermicularis |
| 43 | Alveococcos |
| 44 | Ascaridoz |
| 45 | No need for it |
| 46 | Hairy gijja |
| 47 | Dicrosoelium lanceatum |
| 48 | Vuxereriya |
| 49 | Loa-Loa |

## Answers to practical skills (picture tests).

| № | Answers | № | Answers | № | Answers |
|---|---|---|---|---|---|
| 1 | A | 6 | B | 11 | B |
| 2 | C | 7 | A | 12 | D |
| 3 | B | 8 | C | 13 | B |
| 4 | B | 9 | A | 14 | D |
| 5 | B | 10 | B | 15 | B |
| | | | | 16 | D |

## LIST OF USED LITERATURE


1. Akbaev M.Sh., Vodyanov AA, Koslinkov NV et al. Parasitology and invasive diseases of animals. M., 2008. - 776 p.

2. Akbaev M. Sh., Vodyanov A. A., Koslinkov N. V., and others. Animal parasitology and invasive diseases. Moscow, 2008. - 776 p.

3. Borzunov VM, Derevshchikov VK, Dontsov GI, Zvereva LI, Kuznetsov PL. Protozoal invasions and human helminthiasis. Publ.: GOU VPO Ural State Medical Academy of the Ministry of Health of the Russian Federation. Yekaterinburg, 2004. - 175 p.

4.Dzhumanova N.E., Nazarova F.S. Possible negative impact of genetically modified foods on human health// Thematic botanical journal. – 2022. – edition 6. – №1.

5.Dzhumanova N.E. The biological role of trace elements and their content in epidermal formation European Journal of Molecular and Clinical Medicine12. Doerfel. Statistics in analytical chemistry. 175-209.P.

6.Dzhumanova N. E. Nazarova F. Sh. Toshmamatov B.N. The biological role of trace elements and their content in epidermal formations. Scientist of the XXI century international scientific journal.2020.2(6). 2-36.P.

7.Dzhumanova NE Toshmamatov BN Macroscopic structure of the ileocecal valve in rats and rabbits. "Trends and prospects for the development of science and education in the context of globalization". 2017. 5(24). pp.370-372.

8.Dzhumanova N. E. Nazarova F. Sh. Toshmamatov B.N. Korzhavov Sh.O.Laborator hayvonlar terisi pathomorphology

whitefish kindik koni khuzhairalari preparation larining tasiri. 2020. Biology wa tibbiyot muammolari. 6 (124). p.169-174.

9. Chebyshev N.V. Infectious and parasitic diseases of developing countries. M., 2006

10. Cheb rootshev N. V. Rivivlana Rootgotgan mamlakatlarning rootgu rootgumli va parasitar kasalliklari. M., 2006 sectil

11. Human parasitic diseases (protozoanosis and helminthosis). Handbook for doctors, ed. V.P. Sergieva, Yu.V. Lobzin, S.S. Kozlov. St. Petersburg: Foliant, 2006.

12. Helminthosis. Textbook. manual, ed. Zryachkina N.I .. Publ.: GOU VPO Roszdrav Saratov State Medical University, Saratov, 2006. - 35 p.

13. Lysenko A.Ya., Vladimirova M.G., Kondratin A.V., Majorin D.Z. Clinical parasitology. Geneva, 2002. - 552 p.

14.Nazarova F.Sh., Dzhumanova N. E. Use of Azkamar bentonite to balance mineral nutrition. Hairy coat as indicators of environmental pollution by technogenic and geochemical sources // academic research in pedagogical science. – 2021. – Edition. 2. – № 9. –672-679.P.

15. Nazarova F.Sh ., Dzhumanova N. E. Hairy coat as indicators of environmental pollution by technogenic and geochemical sources //Thematic botanical journal. – 2022. – Edition. 6. – №1.

16.Nazarova F.Sh ., Dzhumanova N. E. Tashmamatov B.N., Sh. O.Korjavov.Ecological grouping of phytonematodes.Problems of biology and medicine. - 2020. № 6. Tome 124. - 258-261.P.

17.Nazarova F.Sh ., Dzhumanova N. E.Biological role of trace elements and their content in epidermal formations

.Economic and community.1-2 (92).2022. 94-103.P.

18.Toshmamatov B.N. and co-author. Macroscopic structure of the ileocecal flap in rabbits//International scientific and practical conference«World science. – POCT, 2017. – C. 5. – № 5. –58-59.P.

19.Toshmamatov B.N. and co-author. Macroscopic structure of the ileocecal flap in rabbits in postnatal ontogenesis / International scientific and practical conference«World science. / – POCT, 2018. – № 3. – № 5. –53-54.P.

20.Toshmamatov B.N. Morphological changes in the stomach with polypharmacy.Magazine home page Science LLC Submited to the editor 04.04.2021 Submited to the editor 20.04.2021

21.Toshmamatov B.N., TeshaevSh.J., Xudoyberdiev D.K. Effects of polypharmacy with anti-inflammatory drugs on the morphology Problems of biology and medicine 2022, №1 (134) 157-164.P.

22.Toshmamatov B.N. Morphalogical structure of the gastric mucosa in polypharmacy with anti-inflammatory drugs TeshaevSh.J,Xudoyberdiev D.K. Central European Scientific bulletin Tome 20, january2022., 32-38.P.

23.Toshmamatov B.N. TeshaevSh.J. Change in the morphological structure of the mucous membrane during polypharmacy (2021). American Journal of Medical Sciences and Pharmaceutical Research 3 (08), 51–57.P.

24.Toshmamatov B.N. TeshaevSh.J,Xudoyberdiev D.K. Change in the morphological parameters of the gastric mucosa as in polypharmacy.Problems of biology and medicine 6. 2022, №3 (136).190 -195.P.

25.Teshaev Sh.J. Toshmamatov B.N.Histological changes in the stomach during treatment with nonsteroidal drugs, Problems of biology and medicine (34) 2021.260-264.P.

26.Tashmamatov B.N. Morphological parametrs of the gastric mucosa in polypharmacy on anti-inflammatory drugs 9 (47) 2022.New day in medicine. 187-195.P.

27. Zueva L. P., Personnel A. T. Personnel Epidemiologists: - St. Petersburg, Publ.: Foliant, 2006. - 752 P.

28.Zergachkina N. I.Publ.: GOU VPO Roszdrav Saratov davlat Tibbi roott universiteti, Saratov, 2006. - 35 P.

## Contents

**Nazarova Fatima Sharipovna,**
**Jumanova Nargiza Eshmamatovna.**
**Tashmamatov Bakhtiyor Norbekovich**

**By science**

# MEDICAL BIOLOGY

## BASES OF MEDICAL PARASITOLOGY. HUMAN NEMATODOSES AND TREMATODOSES

Study guide for students of medical universities

**Toshkent - "METODIST NASHRIYOTI" - 2023**

Muharrir: Xolsaidov F. B.

Bosishga 28.09.2023. da ruxsat etildi.
Bichimi 60x90. "Cambria" garniturasi.
Ofset bosma usulida bosildi.
Shartli bosma tabog'i 9. Nashr bosma tabog'i 8.25.
Adadi 100 nusxa.

**"METODIST NASHRIYOTI"** MCHJ matbaa bo'limida chop etildi.
Manzil: Toshkent shahri, Yakkasaroy ko'chasi, 5-uy.

**+99893 552-11-21**