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Epidemiology of *Plagiorchis elegans* in small rodents from wet and dry biotopes of the Republic of Moldova

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Abstract. The aim of the study was the bioecological study on the role of small rodents (Muridae, Cricetidae) in the transmission of parasitic species in the zoonotic and epizootic chain, within the wet and dry biotopes of natural and anthropized ecosystems. The studies were performed in 2015-2018 in various types of biotopes from the central area of the Republic of Moldova. *Plagiorchis elegans*, found in investigated small rodents, is a trematode characterized by a cosmopolitan spread and increased incidence in a wide variety of vertebrate animals (amphibians, reptiles, fish, birds, mammals) and invertebrates (insects, mollusks, amphibians). This helminth develops in 3 hosts, following the model of the trixene evolutionary cycle. In the adult stage it parasitizes the small intestine of the definitive hosts (reptiles, birds, bats, insectivores, rodents, carnivores, humans), in the larval stage the digestive tract of aquatic gastropods (*Lymnaea stagnalis*) as first intermediate hosts, then in aquatic insects (larvae, imago) and crustaceans as second intermediate hosts. In rodents from wet biotopes the level of infections with *P. elegans* parasite was recorded as follows: in yellow-necked mouse (*Apodemus flavicollis*) - 12.8%, in wood mouse (*Apodemus sylvaticus*) - 19.2%, in the stripped field mouse (*Apodemus agrarius*) - 11.8% and in the bank vole (*Clethrionomys glareolus*) - 3.8%. The absence of the causal trematode *P. elegans* in the host species *Apodemus uralensis*, *Mus spicilegus*, *Mus musculus*, *Cricetulus migratorius*, *Microtus arvalis*, *Microtus rossiaemeridionalis* from dry biotopes is due to the absence of ecological conditions (swamps, ponds, streams) specific for the development of intermediate hosts (aquatic gastropods, fish) and complementary ones (aquatic insects, crustaceans), involved in the biological cycle of the parasite.

Keywords: *Plagiorchiselegans;* Trematode; Hosts; Muridae; Cricetidae.

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Epidemiologia parazitului *Plagiorchis elegans* la rozătoarele mici din biotopurile umede şi uscate ale Republicii Moldova

Rezumat. Scopul cercetărilor vizează studiul bioecologic privind rolul rozătoarelor mici (Muridae, Cricetidae) în transmiterea speciilor parazitare în lanţul zoonotic din biotopurile umede şi uscate ale ecosistemelor naturale şi antropizate. Cercetările au fost efectuate in diferite biotopuri ale zonei de centru a Republicii Moldova. *Plagiorchis elegans* identificat la rozătoarele mici, este un trematod caracterizat de o răspândire cosmopolitană şi incidenţă sporită la o varietate largă de animale vertebrate (amfibieni, reptile, peşti, păsări, mamifere) şi nevertebrate (insecte, moluşte). Helnmitul se dezvoltă în 3 gazde, cu ciclul evolutiv după model trixen. În stadiul adult parazitează intestinul subţire al gazdei definitive (reptile, păsări, chiroptere, insectivore, rozătoare, cornivore, om), în stadiul larval se localizează în tractul digestiv al gasteropodelor acvatice (*Lymnaea stagnalis*) ca gazdă intermediară, apoi în insectele (larve, adulte) şi crustacee acvatice, ca a doua gazdă intermediară. La rozătoarele mici din biotopurile umede, infecţia cu parazitul *P. elegans* a fost înregistrată după cum urmează: şoarecele gulerat (*Apodemus flavicollis*) - 12.8%, şoarecele de pădure (*Apodemus sylvaticus*) - 19.2%, şobolan de câmp (*Apodemus agrarius*) - 11.8% şi şoarecele scurmător (*Clethrionomys glareolus*) - 3.8%. Absenţa tremaodului causal la speciile gazde *Apodemus uralensis*, *Mus spicilegus*, *Mus musculus*, *Cricetulus migratorius*, *Microtus arvalis*, *Microtus rossiaemeridionalis* din biotopuri uscate ar fi din cauza lipsei condiţilor ecologice (mlaştini, iazuri, pâraie) specific gazdelor intermediare (gasteropodelor acvatice, crustaceelor), implicate în ciclul de dezvoltare ale parazitului.

Cuvinte cheie: *Plagiorchis elegans;* Trematode; Gazde; Muridae; Cricetidae.

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Introduction

Parasitism in natural ecosystems is considered an ecological phenomenon, representing at the same time a form of interspecific relationship. Due to the diversity of ecological links, the parasites are an important factor in the numerical regulation of host populations and in thefunctioning of parasitic biosystems (Beklemishev, 1970; Kontrimvichus, 1982).

The human infection may occur by ingesting of freshwater fish or aquatic insect larvae, both infected with the metacercarial stage of the parasite. In total have been described 12 cases of natural human plagiorchiasis (Ghobadi and Farahnak, 2004; Guk et al., 2007). Two of them are reported as infection due to *Plagiorchis muris* (Keiser and Utzinger, 2005). Other *Plagiorchis* species which caused human plagiorchiasis, are *P. philippinensis* (Sandground, 1940)*, P. javensis* (Sandground, 1940), *P. harinasutai* (Radomyos, 1989), and *P. vespertilionis* (Guk et al., 2007). The most recent human case has been reported in the Republic of Korea, where *P. vespertilionis* has been identified in a 34-year-old man with culinary preferences for eating raw fresh fish meat (Guk et al., 2007).

The representative species identified in a large variety of host species is *Plagiorchis elegans*, which is characterized by a morphological diversity, with considerable variations within the same species as well as from one host species to another. As a result of this peculiarity, several authors (cited by Ryzhikov et al., 1978; Krasnolobova, 1987) recognize several names as synonymous: *Plagiorchis blathensis* (Chaplulsky, 1954), *P. castoris* (Orlov et al., 1953), *P. cirratus* (Rudolphi, 1802), *P. eutamiatis* (Schulz, 1932), *P. laricola* (Skrjabin, 1924), *P. massino*

(Petrow et al., 1927), *P. phokeewi,* (Panin, 1956), *P. raabei* (Furmaga, 1956), *P. stefanckii* (Furmaga, 1956), *Fasciola elegans* (Rudolphi, 1802), *F. cirratus* (Rudolphi, 1802), *P. Notabilis* (Nicoll, 1909), *P. loossi* (Massino, 1927), *P. potanini* (Skrjabin, 1928). The name of *P. elegans* it is currently accepted (Fauna europea 08.06.2020).

The trematode *P. elegans* is a heteroxeneous biohelminth, with alternating development in 3 hosts (definitive, first and second intermediate hosts) (Stycznska-Jurewicz, 1961; 1962; Krasnolobova, 1970; 1971; Ilyushina, 1973; Pavlyuk, 1975; Greiman et al., 2015). ***Definitive hosts*** are the reptiles, birds, bats, rodents, insectivores, carnivores (Yamaguti, 1958; Hong and Chai, 1996; Waikagul, 1991; Waikagul et al., 1997) and man (Radomyos et al., 1989; Hong and Chai, 1996; Sohn and Chai, 2005). ***First intermediate hosts*** are the aquatic gastropods of the genus *Limnaea.* ***Second intermediate hosts*** are the larvae and imago of aquatic insects (*Culex, Libellula, Anax, Aeshna*), crustaceans and fish (Tanabe, 1922; Asada et al., 1962; Komiya, 1965; Hong and Chai, 1996; Chai and Lee, 2002; Skirnisson et al., 2004).

The adult fluke lives in the small intestine of the definitive host and releases eggs into the lumen. The unembryonated eggs are subsequently reaching the aquatic environment passed via the host faeces. Following miracidium maturation within water, it becomes infective in 30-50 days (temperature dependent) for the first intermediate molluscan host (Bock, 1984). The infection of *Lymnaea* sp., may occur via ingestion of the embryonated egg containing the miracidial infective stage (Gorman, 1980; Bock, 1984; Zakikhani and Rau, 1992). The miracidium hatches and penetrate the epithelium of the snail alimentary tract, where it undergoes differentiation into the mother sporocyst stage, within the molluscan intermediate host. Each mother sporocyst can be divided into several lobes, and each lobe can be divided into about 500 daughter sporocysts (Cort and Olivier, 1943). Within the daughter sporocyst, germ balls develop into cercariae that eventually escape via the terminal birth pore, reach the aquatic environment and live freely (Cort and Ameel, 1944). The cercariae actively penetrate in the second intermediate host (larvae of aquatic insects, crustaceans, fish), and turn into metacercariae. The definitive hosts (reptiles, birds, rodents, insectivores, humans) are infected by consuming the parasitized second intermediate hosts. In their definitive hosts, *Plagiorchis* spp. become adults and are located in the small intestine. They eliminate about 8,000 eggs daily, which reach the aquatic environment and begin a new biological cycle (Greiman et al., 2015).

P. elegansis a parasite with global distribution andwas identified in Greenland (Kapel and Nansen, 1996), Canada (Hoberg and McGee, 1982; Kinsella et al., 2007), USA (Macy, 1960; McMullen, 1937; Cort and Ameel, 1944; Secord and Canaris, 1993), Mexico (Perez-Ponce de Leon et al., 1996), Iceland (Skirnisson, 1993), Ireland (Langley and Fairley, 1982; Montgomery and Montgomery, 1990), Finland (Tenora et al., 1983; Väyrynen et al., 2000), Germany (Faltynkova et al., 2007), Lithuania (Mazeika et al., 2003; 2009), Belarus (Shimalov, 2002), Poland (Faltynkova et al., 2007; Hildebrand and Zales´ny, 2009), Russian Federation (Romashov, 1969; Ryzhikov et al., 1978; Kontrimvichus, 1982; Romashova, 2003; Kirilov and Kirilova, 2010), Ukraine (Sharpilo, 1975; Tkach et al., 2000), Moldova (Andreyko, 1973; Chihai et al., 2018), Romania (Guabanyi et al., 2015), Hungary (Kriska, 1993), Austria (Faltynkova et al., 2007), Spain (Manga Gonzalez et al., 1994), and Japan (Saito et al., 1995; Yamada, 2000; Sato and Suzuki, 2006).

The **aim** of the study was the bioecological study on the role of small rodents (Muridae, Cricetidae) in the formation and maintenance of parasitic outbreaks and their involvement in the zoonotic and epizootic chain of wet and dry biotopes of natural and anthropized ecosystems.

Materials and methods

The parasitological studies were performed in the laboratory of Parasitology and Helminthology of the Institute of Zoology, Repubic of Moldova. Small rodents were captured in 2015-2018 from natural and anthropized ecosystems with wet and dry

biotopes. The natural ecosystems of the "Plaiul Fagului" Nature Reserve were represented by forest biotopes (oak and hornbeam forest stands) and wetland biotopes (lake shore), including the ecotone area (forest-paludous, forest-wet meadow) with leisure places for visitors and tourists. The anthropogenic ecosystems included dry biotopes represented by various types of bioocenoses (corn, alfalfa, abandoned orchard, fallow ground).

The trapping of rodents was carried out by live traps, placed in line, at a distance of 5 m from each other. This methodology is recommended for biotopes with a well-developed shrub vegetarion and abundant grass layer (Pelikan et al., 1975). The relative abundance (%) was calculated according to the formula: A = 100n/N, where n – the number of individuals of one species, N – the total number of individuals.

The diversity of small rodent parasite communities was established on a total sample of 232 specimens, including 143 individuals from the Muridae family and 89 individuals from the Cricetidae family. The collected rodents were euthanized under the laboratory niche, causing easy death without suffering. The local review board approved the study protocol by following the rules of the Ethics Commission and Scientific Council of the Institute of Zoology (nr. 02/23.01.2015).

Laboratory parasitological investigations were performed by total dissection of rodents in order to establish the structure of the trematode helminth fauna and to determine the parasitological indices. Species identification was performed after Ryzhikov, by morphometric measurements (length, width) of the morphological components (body, oral sucker, ventral sucker) (Ryzhikov et al., 1978). The parasitological evaluation was performed by determining the prevalence (%) and intensity of infection.

Results

The bioecological study on the role of small rodents in the family Muridae and Cricetidae, in the transmission of parasitic species in the zoonotic and epizootic chain, of natural and anthropogenic ecosystems, highlighted *P. elegans*in the investigated host species. The genus *Plagiorchis* includes potentially zoonotic species, with a cosmopolitan distribution and infects a wide variety of vertebrate animals (amphibians, reptiles, fish, birds, mammals) and invertebrates (insects, mollusks) (Guk et al., 2007; Boyce et al., 2014; Soldánová et al., 2017).

Our research is based on parasitological and epidemiological study, performed on a sample of 232 specimens of rodents of 10 species, which belong to 2 families: Muridae and Crecetidae (table 1). The sample of rodents from the Muridae family consists of 143 individuals and includes 6 species: *Apodemus flavicollis* – 39 ind., *A. sylvaticus* – 26 ind., *A. uralensis* – 20 ind., *A. agrarius* – 17 ind., *Mus musculus* – 24 ind., *M. spicilegus* – 17 ind. The family **Cricetidae** was represented by 89 individuals that belong to 4 species: *Microtus arvalis* – 31 ind., *M. rossiaemeridionalis* – 13 ind., *Clethrionomys glareolus* – 29 ind., and *Cricetulus migratorius* – 16 ind.

The identification of the causative parasite species was performed by determining the morphological characteristics of *P. elegans* in the investigated rodents has a **body length** of 891 – 1732 µm, a **width** of 297 – 577 µm. The **oral sucker** is usually larger than the ventral one, with a lenth 120 – 223 µm, and a width 115 – 220 µm. The **ventral sucker** has a length of 113 – 117 µm, and a width of 111 – 117 µm (table 2).

Laboratory parasitological investigations indicated that infection in the studied host species is caused by *Plagiorchis elegans*, which taxonomically (table 3) falls into the class Trematoda, family Plagiorchiidae (Fauna europea 08.06.2020).

Ecoparasitological research in wild rodent populations in wet and dry biotopes was based on helminthological investigations to determine the level of spread (prevalence) of the causative parasite *P. elegans*, the degree of host infestation (intensity) and abundance within the host populations.

Table 1. Taxonomic structure of investigated rodents

Order	Host species	Ind.	%	♀	♂	Total
Rodentia	*A.flavicollis* (Melchior, 1837)	39	16,8	27	12	4 species
	A.sylvaticus (Lineus, 1758)	26	11,2	17	9	
	A.uralensis(Pallas, 1771)	20	8,6	15	5	
	A.agrarius (Pallas, 1771)	17	7,3	10	7	
	M.musculus(Lineus, 1758)	24	10,3	14	10	2 species
	M. spicilegus(Petenyi, 1882)	17	7,3	9	8	
	Total Muridae	**143**	**61,5**	**92**	**51**	**6 species**
	M.arvalis (Pallas, 1778)	31	13,4	22	9	2 species
	M.rossiaemeridionalis (Ognev, 1924)	13	5,6	10	3	
	C.glareolus (Schreber,1780)	29	12,5	18	11	1 species
	C.migratorius (Pallas, 1773)	16	6,9	11	5	1 species
	Total Crecetidae	**89**	**38,4**	**61**	**28**	**4 species**
Total Rodentia		**232**	**100**	**153**	**79**	**10 species**

Table 2. Morphologycal characteristics of *Plagiorchis elegans*

Characteristics	Measurements (n = 10)		Mean (µm)
Body	Length (µm)	891-1732	1263±289
	Width (µm)	297-577	420±96
Oral sucker	Length (µm)	120-223	173±44
	Width (µm)	115-220	137±39
Ventral sucker	Length (µm)	113-117	115±2
	Width (µm)	111-117	113±2

Table 3. Taxonomy and morphology of the trematode *Plagiorchis elegans*

Regnum Animalia (Linnaeus, 1758)
Phylum Plathelminthes (Gagenbaur, 1859)
Class Trematoda (Rudolphi, 1808)
Subclass Digenea (Carus, 1863)
Order Plagiorchiida (La Rue, 1957)
Family Plagiorchiidae (Lühe, 1901)
Genus *Plagiorchis*(Lühe, 1899)
Species *Plagiorchis elegans* (Rudolphi, 1802)

In **wet biotopes**, 111 individuals were captured, of which 82 from fam.Muridae (*Apodemus flavicollis*, *A. sylvaticus*, *A. agrarius*) and 29 from fam. Cricetidae (*Clethrionomys glareolus*). For understuding will be shown bioecological characteristics of host species.

The results of the investigations showed that the yellow-necked mouse (*A. flavicollis*) had the abundance of 16.8%, which indicates the dominance of this species in the studied biotopes (table 1). This species is common in oak and beech forests and prefers sparse forests or the forest edge. It is a stronger and more aggressive species and forces the species with which it coexists to move to other sectors or to change their activity (Munteanu and Lozan, 2004; Savin et al., 2011; Nistreanu et al., 2015). In this species the prevalence with *P. elegans* was 12.8%, the intensity - 4.4 specimens and the abundance - 0.6 ind (table 4).

The wood mouse (*A. sylvaticus*) had the abundance of 11.2% and inhabit the forest ecosystems, the forest edge, but also the cultivated lands (Munteanu and Lozan, 2004; Savin et al., 2011; Nistreanu et al., 2015). In this species the prevalence with *P. elegans* was 19.2%, intensity – 3.4 sp. and the abundance of 0.7 sp.

Table 4. Level of infection with *Plagiorchis elegans* in small rodents

Biotope	Hosts species	Prevalence %	Intensity sp.	Abundance sp.
Wet	*A. flavicollis*	12.8	4.4	0.6
	A. sylvaticus	19.2	3.4	0.7
	A. agrarius	11.8	5.5	0.6
	C. glareolus	13.8	3.8	0.51
Dry	*A. uralensis*	-	-	-
	M. spicilegus	-	-	-
	M. musculus	-	-	-
	C. migratorius	-	-	-
	M. arvalis	-	-	-
	M. rossiaemeridionalis	-	-	-

The stripped mouse (*A. agrarius*) had abundance of 7.3% and prefers the forest glades, forest edge, meadows, forest shelter belts and acacia plantations, the river and ponds banks (Munteanu and Lozan, 2004; Savin et al., 2011; Nistreanu et al., 2015). The prevalence with *P. elegans* was 11.8%, the intensity - 5.5 sp.and the abundance - 0.51 sp.

The bank vole (*C. glareolus*) had abundance of 12.5% and is a forest species that occurs in light forests and glades, in areas with shrubs and at the forest edge, in wet habitatsnear the ponds (Munteanu and Lozan, 2004; Savin et al., 2011). The parasitological investigation of the species highlighted a prevalence with *P. elegans* of 13.8%, the intensity by of 3.8 sp., and the abundance of 0.51 sp.

In **dry biotopes** 121 small rodent individuals were collected, including 61 from fam.Muridae (*A. uralensis*, *Mus spicilegus*, *M. musculus*) and 60 from fam.Cricetidae (*Cricetulus migratorius*, *Microtus avralis*, *M. rossiaemeridionalis*). Next, will be present the bioecological aspect of the host species.

Ural field mouse (*A. uralensis*) usually inhabit pastures, agrocenoses (forest shelter belts, cereal crops, perennial crops), but can also be found at forests edge or grasslands with abundant vegetation (Munteanu and Lozan, 2004; Savin et al., 2011; Nistreanu et al., 2011). The trematode *P. elegans* was not been identified in this species.

The mound building mouse (*M. spicilegus*) prefers agrocenoses (wheat, corn, sunflower, sugar beet, perennial herbs) and shelter belts (Munteanu and Lozan, 2004; Savin et al., 2011). The trematode *P. elegans* was not been identified in this species.

The house mouse (*M. musculus*) differs from other rodent species by a high ecological plasticity, which can inhabit a wide variety of open type habitats. It is a species highly adapted to synanthropic conditions and can be met in people houses, in warehouses, basements (Munteanu and Lozan, 2004). In natural conditions it inhabits various agrocenoses, sectors with ruderal plants, shelter belts, water basin banks, haystacks. This species was captured from dry biotopes (residential block, maize), which is why the parasite *P. elegans* was probably not identified.
The gray hamster (*C. migratorius*) is a species that inhabits different habitats from the forest-steppe zone to the desert and semi-desert areas, found more in agrocenoses on perennial crops (alfalfa, clover), cereal crops, forest belts, abandoned orchards (Munteanu and Lozan, 2004). This host species has a rather high ecological plasticity, but being captured from dry agrocenosis (wheat), the trematode *P. elegans* was not identified.

The field vole (*M. avralis*) inhabit different open type biotopes with natural vegetation or agricultural crops (alfalfa, clover, grass, corn, sunflower) in the steppe and forest-steppe areas (Munteanu and Lozan, 2004; Nistreanu et al., 2011). In our research this species had the highest share (31 ind.), but it was collected from dry biotope (fallow ground and grassland with rich herbaceous vegetation), therefore no *P. elegans* invasion was found.

The Eastern European vole (*M. rossiaemeridionalis*) inhabit natural open type

biotopes, pastures, meadows with shrubs, weed lands, in agrocenoses it is found mainly in forest shelter belts, fields with perennial fodder plants. (Munteanu and Lozan, 2004; Nistreanu et al., 2011). The specimens subjected to parasitological research were collected from dry biotope (fallow ground), for which reason, probably, the trematode *P. elegans* was not identified.

After comparing the results of parasitological indices between biotopes, the absence of *P. elegans* trematode in host rodent species (*Apodemus uralensis, Mus spicilegus, M. musculus, Cricetulus migratorius, Microtus avralis, M. rossiaemeridionalis*) from dry biotopes was registered. This finding may be due to the bioecology of the parasite, which depends on intermediate hosts (aquatic gastropods, fish) and complementary ones (imago and larvae of aquatic insects) that live in wet biotopes (swamps, ponds, streams, rivers, lakes).

The epidemiological risk is confirmed by the presence of the parasite *P. elegans* in the humid biotopes and by its identification in the small rodents investigated. The studied wet biotopes umed are located at ecotone forest edge – wet meadows and near the ponds with recreational and fishing facilities for visitors of the reserve, including children. At the same time, rodents are important elements of the food chain of larger predators, which in turn are vectors of free parasitic forms in the environment. Thus, both links (rodents, carnivores) of the epidemiological chain contribute to the functional stability of parasitic biosystems and determine the natural foci character of biocenoses.

Discussions

Typically, *P. elegans* is considered a priority species of the genus *Plagiorchis* for infestation of birds (Shimalov, 2002) and several rodent species, including *Apodemus sylvaticus* (Romashova, 2003; Montgomery and Montgomery, 1990), *A. flavicollis* (Romashova, 2003; Hildebrand and Zales´ny, 2009), *A. agrarius* (Shimalov, 2002; Romashova, 2003; Chai et al., 2007; Hildebrand and Zales´ny, 2009), *Clethrionomys glareolus* (Romashova, 2003; Hildebrand and Zales´ny, 2009; Chihai et al., 2018), *Ondatra zibethicus* (Andreyko, 1973; Mazeika et al., 2009) and *Arvicola terrestris* (Andreyko, 1973).

The human risk was reported in 12 cases ofinfection. The plagiorchiosis was reported in several countries as Philippines (*P. philippinensis*) (Sandground, 1940), Japan and the Republic of Korea (*P. muris*) (Asada et al., 1962; Hong et al., 1996; Chai and Lee, 2002), Indonesia (*P. javensis*) (Sandground, 1940), and Thailand (*P. harinasutai, P. philippinensis*, *P. javensis*) (Radomyos et al., 1989; 1998; Eduardo and Lee, 2006).

The epidemiological potential of plagiorchiosis in wet biotopes is estimated on average at a prevalence of 14.4%, an intensity of 4.3 specimens/infested animal and an abundance of 0.6 specimens/investigated animal, and the level of risk can be estimated as moderate epidemiological risk, as the biotope is located in the area of interference between the natural ecosystem (forest) and the anthropogenic ones (agrocenoses), where the infestation of wild (*Vulpes vulpes*) and domestic (*Canis familiaris*) carnivores take place, while in the places of leisure and fishing infestationof human population can occur.

At global level there are 12 reported cases of human plagiarosis and in the Republic of Moldova this disease has not been reported in humans, but the lack of statistic data does not exclude the presence of this disease in our country, along with other dangerous parasitoses, which is why the monitoring of parasites with a potentially zoonotic impact is necessary, in order to strengthen ecological and epidemiological security.

The obtained results reveal the potential risk of parasitic pollution at the interference zone between natural and antropogenic ecosystems. The surveillance of parasitic zoonoses in small rodents in different areas is of bioecological and biomedical importance, aiming to prevent the transmission of pathogens to humans and other mammals involved in the biological cycles of parasites with zoonotic and epizootic role. In this context, it is inevitable to monitor biodiversity

in order to strengthen ecological and epidemiological security.

Conclusions

1. Plagiorchiosis found in small rodent species (Muridae, Cricetidae) is a zoonotic trematodosis, caused by the heterogeneous biohelminth *P. elegans* with alternating development in 3 hosts (definitive, first and second intermediate hosts), which is characterized by a cosmopolitan spread with low host specificity and increased incidence in a wide variety of vertebrate animals (amphibians, reptiles, fish, birds, mammals) and invertebrates (insects, mollusks).
2. In rodents from wet biotopes the level of infection with *P. elegans* parasite was recorded as follows: in yellow-necked mouse (*Apodemus flavicollis*) – 12.8%, in wood mouse (*A. sylvaticus*) – 19.2%, in the stripped field mouse (*A. agrarius*) – 11.8% and in the bank vole (*Clethrionomys glareolus*) – 3.8%.

The absence of the causal trematode *P. elegans* in the host species *Apodemus uralensis*, *Mus spicilegus*, *M. musculus*, *Cricetulus migratorius*, *Microtus avralis*, *M. rossiaemeridionalis* from dry biotopes is due to the absence of ecological conditions (swamps, ponds, streams) specific for the development of intermediate hosts (aquatic gastropods, fish) and complementary ones (aquatic insects, crustaceans), involved in the biological cycle of the parasite.

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