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THE ROLE OF MOLLUSKS IN THE EPIZOOTIC PROCESS OF HELMINTHOSES

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Abstract: мақолада қишлоқ хўжалиги ва ёввойи ҳайвонлар орасида кенг тарқалган трематодозларни ривожлантиришида оралиқ хўжайин вазифасини бажарувчи моллюскаларни тур таркиби, уларни трематода личинкалари билан зарарланишининг мавсумий динамикаси, турли биогеоценозларда тарқалиши бўйича республикамиз олимлари, МДҲ ва хорижий олимларнинг адабиёт маълумотлари таҳлили келтирилган.
Keywords: моллюска, мирацидий, спорацисита, редия, церкарий, адолескария, паратеногония, L.trunkula, L.auricularia, L.bactriana, Planorbis planorbis.

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Abstract: в статье представлен анализ литературных данных ученых нашей республики, стран СНГ и зарубежья по видовому составу моллюсков, сезонной динамике их заражения личинками трематод, распространенности в различных биогеоценозах, выступающих промежуточными хозяевами в развитии распространенных среди сельскохозяйственных и диких животных трематодозов
Keywords: mollusk, miracidium, sporacisita, Redia, cercariae, adolescaria, paratenogony, L. drongola, L. aurisularia, L. bastriana, Planarbis planarbis.

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Abstract: the article presents an analysis of the literature data of scientists of our republic, CIS countries and abroad on the species composition of mollusks, the seasonal dynamics of their defeat by trematode larvae, the prevalence in various biogeocenoses acting as intermediate hosts in the development of trematodes common among agricultural and wild animals.
Keywords: mollusk, miracidium, sporacisita, Redia, cercariae, adolescaria, paratenogony, L. drongola, L. aurisularia, L. bastriana, Planarbis planarbis.

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Introduction: Particular attention is paid to meeting the demand of the population of our country for livestock products, ensuring the production of high-quality and environmentally friendly food products, and developing all areas of animal husbandry. For the development of the industry, first of all, it is necessary to create its scientific basis. Among farm animals, trematodes are common, especially fasciolosis, paramphistomatosis, dicroseliosis, and orentobyl', which are considered diseases of great importance and cause great economic damage to the

development of livestock. In the spread of these diseases, mollusks that act as intermediate hosts have great importance.

The purpose of the study: It consists of analyzing the species composition of mollusks, the degree of damage caused by trematode larvae, the density of biotopes, the period of activity in the different seasons of the year, and acting as an intermediate host in the distribution of trematodes, which are common among farm and domestic animals.

Literature information: The fact that the second larval (parthenogenetic) development of trematodes occurs in the mollusk organism indicates that they are widely distributed in the territories inhabited by these soft individuals. In the epizootic process of trematodes, taking into account the importance of their intermediate host mollusks, the analysis of literature data on the study of mollusks by our republic, MHD, and foreign scientists is of significant theoretical and practical importance.

According to the development of paramphistoms, which are biogelmines, they develop with the participation of two bosses: definitive bosses, large and small horned animals; and intermediate bosses, which are considered to be freshwater mollusks with gizzard shells belonging to the Planorbidae family.

As a result of many years of research carried out by specialist scientists around the world, the progress of the causative agents of paramphistomatoses was fully studied, and it was determined that their tragedies, like those of the fasciolas, consist of 4 periods: the I-period embryogony, the II-period partenogony, the III-period cystogony, and the IV-period maritogony.

The embryonic development of paramphistoms, like that of fasciolas, takes place in the external environment, that is, in the aquatic environment, in swampy places. In the felled eggs of parasites exposed to the external environment at the speed of the affected animal, the first-generation larva-ciliated Miracidium develops, and this larva leaves the egg. To go through the period of development of parthenogenesis, Miracidium actively breaks through into the body of the intermediate host of the causative agent of the disease, the freshwater mollusk, which undergoes metamorphosis in its liver, turning into a second-generation larva, Sporosista. From the embryonic cells of the sporosista, a third generation of larvae—Redia—is formed by a parthenogenetic pathway without being erupted. The Reds leave Sporosista. Tailed cercariae emerge from the embryonic cells of a group of redi in the mollusk organism via parthenogenetic reproduction, and upon maturation, leave the redi and exit the mollusk organism to the external environment. From the cells of the second group of redians, daughter redians are made; these redians, in turn, are also divided into groups that mature new generations of cercarians and redians. It is through this kind of parthenogenetic

reproduction that rediae develop again and again in the mollusk organism, and from a group of them, incessant cercariae go out into the external environment. For this reason, each affected mollusk produces several thousands of cercariae during its life cycle. Such cercariae, falling into the external environment, quickly begin to pass the period of cystogony, and for definitive masters, resistance to exogenous (external) and endogenous (main host organism) conditions becomes acquired adolescarium. Adolescaries are formed on the surface of solid objects in water, such as plants and other substrates. In the organisms of definitive masters (large and small horned animals) who consumed such adolescarians, the marittogony period of paramphistomates occurs. This period of development lasts up to 3–4 months and is completed by the appearance of adult paramphistomates in the large and partial mesh bellies of animals.

Hence, numerous studies have been carried out on the study of intermediate masters of paramphistomates in different regions of Uzbekistan. First, X. Nasimov (1967), E.A.A. Hurina, A.A. Tukhmanyans (1969), Sh.M. Roziev (1970), and O. While the Hyderovs (1974) were engaged, later from scientists in the field, B.S. Salimov, A.S. Daminav, and B. A lot of scientific research was carried out by the khoshimov, and significant results were obtained [1; 2; 3; 26; 37; 38; 39; 40; 43; 44; 45].

According to the author's research in the south of our Republic, the intermediate boss of the causative agent of calicophorosis is Planorbis planorbis, Sh.Ro, and in the north, in the western part of Zhev, the Republic of Karakalpakstan, G. Crumenifer determined that the intermediate boss of Planorbis sieversi (Moiss) was [43].

In his research in Syrdarya, Samarkand, and Navoi regions, the researchers found that the mollusks of Anisus ladasensis (Neville, 1878), Planorbis tangitarensis (Germaen, 1918), and Planorbis planorbis (1758) were damaged by paramphistom parthenites [13].

A major qualification scientist studied the species composition of trematodes, including intermediate hosts of paramphistoms, in the territory of the Carpatho-Ukraine region during 1950–1982 [16; 17; 18; 19; 20; 21; 22; 23; 24].

On the territory of the Moscow region of Russia and Ukraine, A.A. Kryukova (1957) identified 11 species belonging to the Planorbidae family in the process of studying the larval development of Raramphystomum cervi from paramphistomatosis pathogen mollusks: Planorbis planorbis, Anisus spororbi, A.vortex, A.cormetus, Guraulus albus, G.gredleri, G.erenbergerbergi, Armiger crista, experimentally P the mollusk, Choanopalus anapolus, and Segmentina niti. cervix was infested with miracidiums of trematodes, and this species scientifically

proved that soft-skinned people act as intermediate masters of paramphistomates [27].

On the detection of intermediate hosts of paramphistoms in this direction, V is on the banks of the Dnieper River in Ukraine. Budulina (1956), in its Polish territory, R.A. Kupriyanova (1957), R.A. Kupriyanova-Shakhmatova (1958), A.I. Mereminsky (1963), I.Ya. Gluzman (1966, 1967), in Belarus, I.S. Jarikov (1963), and in Kazakhstan. N. Bityukova, S.I. Ibrasheva, and V.A. Smirnova (1964) carried out research work. They indicate that the intermediate master of paramphistoms is mainly the mollusk Planorbis (1758). [5; 7; 8; 9; 14; 15; 28; 29; 30; 46].

The fourth generation of larval-tailed cercariae appears from the phloids in a group of Redia, and the second group from the phloids of Redia is the daughter Redia. In one group of these girl redians, there are more cercarians; in the other group, there are nevara redians [49].

Molluscs infected with Fasciola parthenites die during the winter. Molluscs in non-freezing water bodies hibernate [42].

Mollusks that overwintered in early spring at the expense of last year have little epizootic significance in spreading their helminthiasis. Starting in the second half of summer this year, mollusks infected with trematoda parthenites play a key role in the epizootic process of trematodes [12; 51].

According to the research results of the authors [25], when analyzing the density of mollusks in more than 30 biotopes in the Moscow region, their number ranged from 1 to 500 copies per m2. The place of residence of truncatula mollusks is conditionally divided into two types. Permanent (rezurvar) availability of water throughout the year and temporary (migratory) availability of water only seasonally [50]. Varanec ablastida L. reported that the density of truncatula molluscs was 20–94 copies per 1 m2 [30].

In foci with Fasciologen L., damage to truncatula molluscs ranged from 1.0 percent to 30.0 percent. The invasion of molluscs with S. prorosista averaged 45 copies, with Redia 1–5 copies, and with cercariae 75–131 copies [47].

The authors, who conducted research on the territory of the Kabardino-Balkarian Republic in 1996–1998 [4], found that when truncatula molluscs were examined, their incidence rate with Fasciola parthenites was 9.2 percent in July, 16.3 percent in August, and 26.1 percent in September.

In some regions of the Russian Federation, a long winter period, which is -10.08 oS of the davda temperature, kills mollusks infected with the parthenites of trematodes eggs, adolescariae, fascioles, and paramphistoms, and is not important in the epizootological process. However, the main danger in the spread of trematodes is considered to be corkscrew-returning animals that feed on pastures in the spring month without deworming [25].

According to the research of the Georgian scientist, data were covered on the embryonic development of paramphistomatids in various biotopes and the fact that the process of parthenegenesis continues from the second half of April to October (miracidia 2-3 weeks, cercariae 8 weeks), monitoring the exit of miracidium eggs from the inside to the aquatic environment in July-August, and

In the 1980s and 1990s, the density of mollusks belonging to the family Planorbidae in the central zones of the Russian Federation was 98 copies per 1 m2 in the Moscow region, up to 120 copies in Yaroslavsky. In the mollusk organism, parthenites of paramphistomes were 2.1–3.3 percent. In 1991-2006, the density of mollusks in pastures in these zones increased by 15-20 percent, and their infestation with paramphistom larvae was 13–31 percent [35].

In the Kaliningrad region, the density of planorbis planorbis mollusks was 52-108 copies per 1m2 at the time of the beginning of summer, and by September-122-676 copies. Invasion extensibility of mollusk parthenites averaged 6.2 percent, with a maximum of 7-9.2 percent in August [33].

The authors note that despite many deaths of mollusks infected with trematode parthenites during the winter, damage to the main bosses at the expense of the remaining wintering mollusks (July-Avgus) does not pose much danger.

At the expense of the current year, mollusks infected with Fasciola and Paramphistom parthenites are dangerous for their defensible masters and play an important role in the epizootic process. This process falls in August–September of the year [33].

To monitor the epizootic processes of paramphistomatosis and fasciolas, it is noted the need to take into account the analysis of the stages of development at the parthenogenetic stage of malocological examinations in biotopes in which mollusks live permanently and temporarily [11].

According to the results of research by a number of authors, the indicator of damage to mollusks with Fasciola parthenites was 1.7–30 percent [10].

L. peregra, L. obbonga, while intermediate boss for L. truncatula, and F. in the tekist zones for gigantica L. auricle and L. euphratica are in the foothill zones of L. orocularia. The indicator of damage to mollusks in the plains zones was 15.8 percent, and in the foothills, 0.5 percent [34].

In biotopes in North Ossetian regions, the number of fasciolar parthenites in a single mollusk body was 120–196 copies, according to the bioecological characteristics of biotopes in the regions [6].

According to the conclusions of the researchers, mollusks infected with Fasciola parthenites in the upper mountain ranges of the Kabardino-Balkarian Republic all died during the harsh winter period. L. truncatula recorded that the infestation of molluscs with Fasciola larvae rose in July–October, reaching 1.58

percent to 12.5 percent. They note that the infestation of mollusks was recorded as being several times higher in the autumn than in the spring [48].

The damage to mollusks by Fasciola parthenites in the Kursk region of the Russian Federation was 3.1–3.8 percent in May–June and 2–12 percent in August–September [41].

According to the results of the examination of various types of water bodies, the authors identified more than 50 species of trematode larvae belonging to five families. They belong to the following families: notocotilide, paramphistomatide, echinostomatide, fasciolide, and schistosomatide. Researchers note that the parthenites of trematodes hibernate in the body of the mollusk in the form of sporasista, Redia, and completely unformed cercariae [22].

Conclusions

1.According to personal research and analysis of literature data, it was found that mollusks that overwintered at the expense of last year in the distribution of trematodoses among all types of animals are no less significant; at the expense of the current year, the main role is played by mollusks infected with Trematoda parthenites.

2.When analyzing the degree of damage to mollusks caused by Trematoda parthenites, it turned out that this figure is 0.5—30 percent.

3. When the period of activity of mollusks is analyzed by months, it is determined that in different ecological climates they correspond to March–October of the year.

4. When analyzing the density of mollusks in different biotopes, the average was from 1 to 500 copies per square meter.

USED LITERATURE:

1. Avezimbetov Sh.D., Bioecological and epizootological characteristics of cattle and sheep tremotodoses in the Republic of Karakalpakstan," // Vet. science. name. science. degree. written to get dissertation abstract, Samarkand, SamQXI, 2007.—B.19.

2. Azimov, D.A., Dadaev, S.D., Akramova, F.D., and Saparov, K.A.: helminths of ruminant animals of Uzbekistan. Fan Publishing House, Tashkent, 2015, 224 p.

3. Azimov, D.A. Helminths of sheep in the south of Uzbekistan. // Autoref. diss.,... Candidate of Veterinary Sciences. –M. 1963. –P. 19.

4. Bittirov, A.M. Factors of formation of pasture populations of fascioles / A.M. Bittirov, Z.A. Sokhrokov // Veterinary Bulletin. – M. – 1999. – No. 1. – pp. 118–120.

5. Bityukova V.A., Ibraneva S.I., and Smirnova V.A., To the study of trematode larvae in the vicinity of Alma-Ata," in Thematic Collection of Works on Biology and Geography (Collection of Articles of Graduate Students and Applicants), Issue 1, Alma-Ata, 1964, pp.

6. Bocharova, M.M. Distribution of Fasciola hepatica larvae in the population of the intermediate host mollusk Lymnaea truncatula / M.M. Bocharova // Proceedings of the scientific conference VIGIS "Theory and practice of combating parasitic diseases". – M. – 2004. – pp. 76–77.

7. Budulina N.A. Fauna of larval forms of trematodes in mollusca of the Dnipro. //Autoref.diss.Kiev. 1955. -p.18;

8. Gluzman, I. Ya.: Studying the biology of mollusks anorbis planorbis L. 1758, intermediate hosts of paramphistomatids," corresponding to the scientific conference VOG, part 3, 1966, pp. 93–94.

9. Gluzman, I. Ya., "The method of obtaining paramphistomatid adoleskarii for experimental purposes," Veterinary Medicine, Repub. Scientific Sat., Issue 11.1967 Kiev. -p.44-46.

10. Guryeva, S.S., Malysheva, N.S., Gorokhov, V.V., Romanenko, N.A. Helminthological assessment of pastures (fasciolosis) on the territory of the Kursk region/SS.S. Guryeva, N.S. Malysheva, V.V. Gorokhov, N.A. Romanenko/ Theory and practice of combating parasitic diseases: Materials from the Reports of the Scientific Conference VIGIS, M. 2006. pp. 122-123.

11. Gorokhov, V.V. On the issue of fasciolous invasion in Russia," by V.V. Gorokhov, T.G. Syskova, N.P. Sorokina, I.A. Molchanov, and A. Villacencio, Theory and practice of combating parasitic diseases: materials from the reports of the scientific conference VIGIS, M. 2004; pp. 119–122.

12. Gorchakov, V.V. The possibility of limiting the number of small pond fish in the channels of the reclamation network / V.V. Gorchakov // Abstracts of reports of the Congress of the All-Union Society of Helminthologists. – Tbilisi. – 1986 a. – V. 43-.

13. Daminov A.S., "Epizootological and immunological characteristics of cattle trematodes in various biogeochemical regions of the Republic". Vet.science.dock...., diss. Samarkand: Samvmi, 2016. - 200 b.

14. Zharikov I.S. Ecological and parasitological studies of Planorbis mollusks in the Minsk region and parasitic diseases of agricultural animals and birds. //Sb.nauchn.trudov Belorussk.NIVI.Minsk, 1963, pp. 99–102.

15. Zharikov I.S., "The use of pesticides for the prevention of fascioliasis of farm animals on farms in Belarus," Tr. Bel. NIVI, Minsk, 1963, pp. 102–113.

16. Zdun V.I., Dynamics of development of fasciole larvae in the western regions of the Ukrainian SSR and change of pasture areas as a method of fighting fascioles (Tez. dokl. scientific. conference. VOG., Part 1.1957, p. 123–126).

17. Zdun V.I. Larvae of trematodes in freshwater mollusks of Ukraine. – Kiev: Vidovo AN URSR, 1961.–p.43.

18. Zdun V.I. On the infection of mollusks in Transcarpathia with larval forms of the pathogens fascioliasis, decroceliosis, and paramphistamotosis. //N.Zap.Uzhgorod. T.25-S.123,133.

19. Zdun V.I. On the overwintering of larval forms of the hepatic sucker Fasciola hepatica L. in mollusks. Zool. Zh-L.T.38., pp. 1258–1259.

20. Zdun V.I. Examination of mollusks for infection with larvae of degenetic trematodes In the book, "Methods of the parasitological situation and the fight against parasites of agricultural animals," Kiev, 1957, p. 45.

21. Zdun V.I. Fauna of larval stages of trimatodes in mollusks of the Transcarpathian Academy of Sciences of the Ukrainian SSR, vol. 1.195, pp. 167–169

22. Zdun V.I., Forester V.V., "Succession of trematodofauna of mollusks of Polessky reservoirs," Mat-Li X Conf. of the Ukrainian Society of Parasitologists, Kiev, Naukova Dumka, 1986, S-218.

23. Zdun V.I. Sources and ways of invasion of animals by fascioliasis pathogens and control of them. // Kiev, 1960.-p. 127.

24. Zdun V.I. On the Infestation of Shellfish Sem. Planorbidae from Reservoirs of Ukraine with Larvae of Paramfistomum Cervi Zeder, 1790 and Others. // Collection on the Work of Helminthology M., Publishing House of the USSR Academy of Sciences, 1959, p. 135–138

25. Zubov, A.V. Fasciolesis and paramphistomatosis of cattle in the conditions of the Moscow and Nizhny Novgorod regions and a comparative test of anthelmintics / A.V. Zubov, M.Sh. Akbaev // Theory and practice of combating parasitic diseases: Materials of the reports of the scientific conference VIGIS. – M. – 2001. – pp. 96–99.

26. Kozhaboev M., "Association of bovine fluke invasion in the Aral Sea region" // Abstract. dissertation. cand. biol. sciences. Institute of Zoology of the Academy of Sciences, Uzbekistan, 2001, p. 24.

27. Kryukova K.A. Biology, Paramfistomum cervi Tez. dokl. scientific. conf. VOG. 1957, part 1.—p. 162-165.

28. Kupriyanova and Shakhmatova R.A., "Trematode larvae parasitizing in freshwater mollusks of the Middle Volga region," Tez. dokl. nauch. conf. VOG., 1958, p. 74

29. Kupriyanova R.A. Larvae of trimatodes in freshwater mollusks of some areas of the Middle Volga region. //Tez.dokl.9th meeting. M-L., Publishing House

of the ANSSR, pp. 127–128,
30. Maltsev, K.L. "Epizootology of fasciolous invasion of cattle in the Central Chernozem zone of Russia" / K.L. Maltsev, A.N. Aksenov, and I.D. Shelyakin // Theory and practice of combating parasitic diseases: Materials of the reports of the scientific conference VIGIS. – M. – 2001. – pp. 151–153.

31. Mereminsky, A.I. The influence of low temperatures on the vital activity of paramphistomatids and their intermediate hosts, the mollusks Planorbis planorbis (L) and Anisus leucostoma (Millet) / A.I. Mereminsky // Veterinary medicine. - 1967. – V. 2. – pp. 48–50.
32. Muromtsev, A.B. Epizootology, treatment, and prevention of paramphistomidosis of ruminants and wild ungulates in the Kaliningrad region / A.B. Muromtsev // Theory and practice of combating parasitic diseases: Materials of the reports of the scientific conference VIGIS. – M. – 2008. – pp. 303–306.

33. Novak, M.D. Complex diagnostics of fascioliasis of cattle / M.D. Novak, T.S. Zolotkova // Theory and practice of combating parasitic diseases (zoonoses): Materials of the reports of the scientific conference VIGIS, 2002, pp. 226-229.

34. Oshkhunov, A.K. Features of epizootology of dicroceliosis and fascioliasis of yaks in Kabardino-Balkaria / A.K. Oshkhunov, B.M. Shipshev, and E.M. Meshev // Theory and practice of combating parasitic diseases: Materials of the reports of the scientific conference VIGIS. – M. – 2006 a. – pp. 283-285

35. Petrov, Yu.F. Epizootology of trematodoses of ruminants in the Non-Chernozem zone of the Russian Federation / Yu.F. Petrov, H.S. Abdullaev, V.M. Kuznetsov, K.M. Sadov, and V.V. Kuzmichev // Theory and practice of combating parasitic diseases: Materials of the reports of the scientific conference VIGIS"

36. Potshveria, Sh.O. On the issues of epizootology and therapy of paramphistomidoses in Georgia / Sh.O. Potshveria // Theory and practice of combating parasitic diseases: Materials of the reports of the scientific conference VIGIS, M. 2001, pp. 205-207.

37. Ryziev Sh.M. Epizootology of bovine gastrotelaxosis and the development of measures to combat it in the conditions of the Karakalpak ASSR.: autoref. diss., candidate of veterinary sciences. - Samarkand; SamSHI, 1970. - p. 17.

38.Trematodes of animals and poultry Monograph, Samarkand, 2016, 219 b.Salimov B.S., Khashimov B. "Strengthening the pilots of cattle thermatodoses in the Zarafshan Oasis." Collection of scientific articles" Animal Ecology and Morphology,". Samarkand, 2006, B 105-108.

39. Salimov B.S., Efimov S., and Taylakova.M.: New information about paramphistomatosis of sheep. // Journal of Veterinary Medicine, Tashkent, 2015, No. 1, 14–16 P. Subbotin, T.F. Epizootology, course, and treatment of fascioliasis of sheep / T.F. Subbotin, S.T. Karelin // Veterinary Medicine. – 1979. – No. 8. – p. 46

40. Filippov, V.V. Epizootology of Helminthiasis of Animals / V.V. Filippov. – M., Kolos, 1988. – 227 p.

41. Khaydarov U., "Colicophrosis of cattle in Uzbekistan," abstract, dissertation, cand. vet. sciences, Samarkand, SamSHI, 1974, p. 17.

42. Khashimov B., Selimov B.S. "Strengthening the pilots of cattle thermatodoses in Zarafshan Oasis". scientific practical conference of graduate students and masters on the topic" prospects of agricultural development of Uzbekistan". Materials. Samarkand, 2006.B. 136–132.

43. Hashimov B., Salimov B.S. "Epizootology of Paramphistomatosis in Large Horned Animals," Journal of Veterinary Medicine, I. No. 4, 2009, B.20. Shakhurina E.A., Tukhmanyants A.A., Biological features of pathogens of paramphistomatosis of cattle," in Parasite animal and man of the lower reaches of the Amu Darya," Tashkent: Nauka, 1969, pp. 282-296.

44. Shelyakin, I.D. The main trematodes of domestic animals in the Voronezh region / I.D. Shelyakin // Actual issues of theoretical and applied trematodology and cestodology: Materials of reports of the scientific conference VIGIS. – M. – 1997. – pp. 168–170.

45. Shelyakin, I.D. The state of antioxidant protection in cattle with fascioliasis / I.D. Shelyakin, V.N. Kuzmicheva, and I.Y. Kushnir // Theory and practice of combating parasitic diseases: Proceedings of the scientific conference VIGIS. – M. – 2006. – pp. 447–449

46. Kotbal, R.L., Modern text book of zoology: invertebrates (Animal diversity-I). A text book for university students. 11th Edition (First Reprint): 2015–2016 India. P. 980.

47. Oviedo, J.A. Distribution and ecology of Lymnaea truncatula, intermediata host of fasciolosis in the island of Corsica / J.A. Oviedo, M.S. MasComa // 6th Evr. Multicolloq. Parasitol., the Hague. Sept. 7–11, 1992: Programme and Abstr. – The Hague, 1992. – P. 218

48. Rondelaud, D. Fasciola hepatica Linne: Les caractéristiques de l'infestation chez Limnaea truncatula Muller en relation with its age during exposure / D. Rondelaud, P. Vignoles, and G. Dreyfuss // Bull. Soc. fr. parasitol. – 1997. – 15, 32. – P. 177-184.