

**BIOECOLOGICAL AND EPISOTOLOGICAL CHARACTERISTICS OF LIVER
TREMATODES**

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ABSTRACT: In the article, scientific information about the results of many years of research dedicated to the study of important biological, ecological, pathogenic characteristics and distribution of liver trematodes in Uzbekistan has found its place. Among the trematodes of the liver, *Fasciola gigantica* is the first trematode, *Fasciola hepatica* is the second, and *Dicrocoelium dendriticum* is very low. All this is determined by the important biological and ecological aspects of each parasite, in which the passage of their maritogony development period is the most important. Among liver trematodes, it was observed that *F. gigantica* radii reproduce endlessly by parthenogenetic way, and because of them, a large number of cercariae are released every day until the mollusk dies.

Key words: Liver, trematode, biology, ecology, mollusk, ant, parthenites, redium, cercaria, juvenile, metacercaria.

Introduction. The fact that various infectious and invasive diseases are hindering the development of animal husbandry and increasing its efficiency, and many animals die due to the fact that helminthosis occupies one of the main places in them, productivity decreases, and young animals lag behind in growth and development, the ability of the animal body to fight other diseases, i.e. As a result of the decrease in resistance, reduction in the quality and quantity of the obtained products, livestock farms are experiencing significant economic losses. Due to the widespread distribution of helminths among animals, as well as the fact that they cause various diseases in farm animals and poultry, their research will undoubtedly create an opportunity to solve not only the problems of the veterinary field, but also wide-ranging socio-economic issues.

Trematodes differ dramatically from other parasitic worms in their morphological, biological and ecological aspects, and they are considered one of the most important branches of helminthology. The development of trematodes is very complex in most species and includes four stages of development: embryogony, parthenogony, cystogony, maritogony. Their embryonic development takes place in the external or internal environment, the stage of parthenogony development takes place in the internal environment - in the organism of the first intermediate host of the parasites, the period of cystogony development takes place in the external (water environment) or internal environment (in the second intermediate host), the stage of maritogony development takes place in the organism of the main (definitive) hosts.

Literature analysis and methodology. In the conditions of Uzbekistan, 27 types of trematodes have been found in various internal organs of domestic and wild mammals [1, 2, 3, 4, 5, 6, 9]. Their four species are liver parasites of small and large horned animals. They include *Fasciola gigantica* (Cobbold, 1856), *Fasciola hepatica* L., 1758, *Dicrocoelium dendriticum* (Rudolphi, 1819) and, very rarely, *Orientobilharzia turkestanica* (Skrjabin, 1913). Among them, *F.hepatica* is very common in the world, *F.gigantica* is prevalent in countries with a warm climate due to the slow development of ontogeny, *D.dendriticum* is found mainly in areas where both fasciolas are distributed, the first foci of *O.turkestanica* were studied in some regions of Uzbekistan and

Kazakhstan .

F.hepatica is distributed in many countries of the world. Its intermediate host is mainly the very common freshwater mollusc *L. truncatula*. But the wide spread of *F.hepatica* is that all the stages of its ontogenesis progress not only in the external environment (embryogony), but also in the organism of intermediate and definitive hosts. It was introduced to science by K. Linnaeus a long time ago (1758), and its biology and ecology have been studied by many scientists from Europe, America, and Asia for many years. For example, the development cycle of *F.hepatica* was first described by the German scientist Leukart and the English scientist Thomas in 1881. The Russian researcher A.F. Sinitsin found out the way of its larva reaching the liver of the main host. Professor R.S. Schulz and Acad. E.V. Gvozdevs showed in one of their great works that 600 copies of cercaria appear in 70-77 days from the miracidia of *F.hepatica* that penetrated into *L.truncatula* mollusk [10]. In general, it is true to say that the biological and ecological issues related to *F.hepatica* have been fully studied. It is difficult to make such a conclusion about *F. gigantica*. This trematode has a much slower ontogeny than *F.hepatica*, so it is distributed only in countries with tropical and subtropical climates, and it was introduced to science about 100 years after *F.hepatica*. For this reason, many aspects of *F. gigantica* trematode have not been fully studied. For example, until our research on its biology and ecology, the range of intermediate hosts was not very clear, there is no complete information on the development of the parasite in the organism of the intermediate and main hosts, in particular, the factors affecting the exit of cercariae in the organism of miracidia and molluscs are their daily rhythm and duration, the liver of preimaginal fasciolae. There is almost no scientific information about how long it parasitizes in its parenchyma (compared to *F.hepatica*), how long it grows to adulthood, whether it is damaged by cercariae while the mollusk is alive, the duration of cercariae emission, the comparative pathogenicity of *F.gigantica* compared to *F.hepatica*, etc. Among *F.gigantica* MHD, it is widespread in Central Asia, Trans-Caucasus countries.

Our scientific data on the parthenogenetic reproduction of redia in the intermediate host of *F.gigantica* and the delivery of many new generations in the intermediate host of *F.gigantica*, cercariae from each of them, and this process continues until the mollusks die according to our experiments, were published by R.L. Kotpal in 2015-2016. development has been confirmed.

The tests include the results of many years of experimental and field observations. The distribution of trematodes was studied by determining the livers of dead and forcibly slaughtered sheep and cattle infected with trematodes, and finding their eggs in the dung samples of living animals. The effect of environmental factors on the occurrence of *F. gigantica* in the mollusc organism and the release of cercariae in laboratory and field conditions, the duration of the cystogony period of these larvae and the period of the resulting adocariae becoming infectious for the hosts, the duration of the daily cercarial rhythm of molluscs infected with parasitic parthenitis and its stopping period, the infinity of parthenogenetic reproduction in radii was studied. Malaco-helminthological, myrmeco-helminthological investigations were carried out in order to find strong foci of *F. gigantica* in pasture conditions.

Based on this, it is important to study the stages of development of trematodes found in the animal body and conduct research aimed at developing modern improved methods of combating them and their anatomo-morphology, biology, ecology, epizootological status, diagnostics.

Results and their analysis. *F.gigantica* is very common in Uzbekistan. The main reason for this is that the range of intermediate hosts - pulmonate water molluscs is wide, and 4 species of

molluscs of rather large size are involved in the development of the parasite: *Lymnaea auricularia*, *L. bactriana*, *L. subdisjuncta*, *L. impura*.

F. hepatica develops not only in Uzbekistan, but also in many countries through the small-sized mollusc *Lymnaea truncatula* of the same species. According to our observations, it cannot live in waters with increased salinity. Accordingly, this trematode has not been found in the north-western part of the Republic for many years. *D. dendriticum* trematode is also not able to spread in this region, because the first intermediate host of this parasite is unable to thrive in its saline soil.

Both species, *Fasciola* is two-hosted and fasciolid, and *D. dendriticum* is three-hosted, and develops through dicrocoelid development types, and their development includes stages of embryogony, parthenogony, cystogony, maritogony, and they are hermaphrodite organisms. Although *O. turkestanica* is bi-hosted like *Fasciola*, it is a single-sex parasite, with a schistosomatid development type, which does not have a cystogony period. Infective larvae of all liver trematodes are transmitted to their hosts through the oral route, while cercariae of *O. turkestanica* must break through the host's skin to reproduce.

All developmental stages of *D. dendriticum* take place in internal, i.e., closed conditions: development of embryogonia in the parasite's uterus, reproduction of parthenogonia in the first intermediate host, cystogony in the second intermediate host. Embryogony and cystogony development of fasciolas takes place in open conditions (in water), and parthenogenetic reproduction takes place in an intermediate host. Only the maritogonia stage of development takes place in the organism of the definitive host of each trematode.

It should be noted that the larvae of all liver trematodes, including redia and cercariae, which develop in molluscs, overwinter in these intermediate hosts, and from the spring months they are the first source of infection for the damage of their main hosts. *D. dendriticum* cercariylarisesa is a source of infestation for ants, the cysts (metacercariae) formed by this insect also overwinter successfully. Our long-term research shows that the first intermediate host of *D. dendriticum* is in an anabiotic state for a long time (up to several months) not only in winter, but also often in summer. In both cases, the sporocysts and cercariae in them remain viable.

The intermediate hosts of *F. gigantica* generally thrive in lakes and springs of various sizes, especially reedbeds, luxuriant ponds, and drainage canals are their preferred biotopes.

The intermediate host of *F. hepatica*, *L. truncatula*, is abundant in small irrigation ditches in rural pastures and pastures.

The first intermediate host of *D. dendriticum* lives in wet places - along ditches and streams, in thickets, in fields planted with perennial crops, in and around gardens. And the ants involved in its development are widespread in biotopes of terrestrial molluscs.

Our long-term observations in natural conditions show that in most cases, *D. dendriticum* is the first and both species of *fasciola* are second in terms of distribution and invasion intensity among herbivorous domestic animals. But there is no equal to *F. gigantica* in terms of pathological features. In the pastures where animals are kept in nature, invasive material accumulates in large numbers in the biotopes of the oral hosts of this trematode. Therefore, all stages of development of both types of *fasciola* are the same, and the stage of maritogony is the same in the liver of each animal. Therefore, due to the acute flow of fasciolosis caused by *kshra F. gigantica*, the death of a whole flock of sheep and goats and hundreds of cattle was observed in some farms

during the autumn season. *F. hepatica* does not have the ability to kill large horned animals, some sheep and goats survive it.

Even when the intensity of *D.dendriticum* invasion is very high in some farms, sheep and goats can tolerate it to a certain extent, and cattle are not affected by it. Finding answers to such biological and ecological problems requires research from researchers.

In one field observation, we saw that the number of *L.auricularia* and *L.bactriana* molluscs in the habitat biotope is unlimited, and millions of adocariae from the cercariae isolated by them were gathered in the plants. We counted between 2,000 and 4,000 *F. gigantica* juveniles attached to the trunk of each lux plant growing by the millions. 9 out of 10 molluscs were found to be infected with cercariae of this parasite.

Let's move on to evaluate the pathogenic nature of three types of liver trematodes - *F.hepatica*, *F.gigantica*, *D.dendriticum*, which are spread in many areas and regions of our country. As we know, the development periods of both types of fasciolas pass in the same conditions, as we have shown above, the generality of the course of the diseases they cause, their spread, and the passage of the causative agents in the period of maritogony do not differ from each other. Therefore, let's pay attention to the fact that both types of fasciola go through the period of maritogony development. The length of adult *F. hepatica* in the hepatic bile ducts does not exceed 30-40 mm, and the width is 8-14 mm. *F. gigantica* at this age is 30-60 mm tall and 4-11 mm wide. According to them, the main difference between them is that *F.hepatica* is slightly wider and the shoulder is partially absent. This kind of morphological difference, in our opinion, cannot clearly indicate their pathological nature. In our opinion, the clarification of this issue depends on the determination of the period of parasitism of both types of fasciolae in the liver parenchyma and the extent to which they grow in the meantime. For example, *F. hepatica* lives in the liver parenchyma of sheep for about 60 days, while its young forms gradually grow to 18-20 mm in length and 6-7 mm in width. Parenchymal fasciolas of this size pass through the bile ducts of the liver to its cavity to mature. The growth of *F. gigantica* in the liver parenchyma of sheep is slower than that of *F. hepatica*, for example, the length of 50-day fasciolas does not exceed 6-7 mm, then their growth accelerates, and on the 70-80th day their length reaches 23-26 mm. But they still continue to grow in the liver parenchyma, and after 90 days they are 28-30 mm long, from day 93 they gradually pierce the bile ducts of the liver to mature (30-33 mm) and begin to mature in its path. If the intensity of the invasion is high, this process will last up to 120 days. These scientific data clearly show that *F. gigantica* is more acutely pathogenic than *F. hepatica*.

It can be considered that the high invasion intensity of *F. gigantica* is due to the fact that the biotopes of its intermediate hosts are wide, and most of them are reeds and luxuries. Many intermediate hosts of this trematode live in such small lakes and drainage channels. Adolescents, formed from the large number of cercariae they secrete, gather in millions during the summer and autumn months, and due to this, strong foci of *F. gigantica* occur in natural conditions. This situation is confirmed by the above information.

The intermediate host of *F. hepatica* lives in small, often small, streams. Some of the cercariae he isolated spread over long distances through running water. Its size is much smaller than that of intermediate hosts of *F. gigantica*, so it constantly secretes cercariae, the resulting juveniles of which are much less collected in its biotopes. *L. truncatula* is an amphibious mollusk, because it does not stay in water for long, you can find it a lot on the banks of wet water. In laboratory conditions, it is not difficult to observe that this mollusk begins to quickly emerge from the water.

Long-term parasitism of *F. gigantica* in the liver parenchyma leads to severe poisoning of animals with its waste products. We emphasize that *F. gigantica* 50 and a little more in number, the sheep will die from the sharp flow that it provokes. If there are hundreds of young fasciolas, they can kill a whole flock of sheep within a month. We have observed many cases of death and forced slaughter of cattle when several thousands of young fasciolae (*F. gigantica*) parasitize the liver of cattle. But in an acute course of fasciolosis caused by *F. hepatica*, the several hundred parasites in them will not kill the sheep unless there is an intestinal infection involved. Our observations showed that tens of sheep of a small business owner with good keeping and feeding conditions can pass from acute to chronic course of disease caused by *F. hepatica* without the use of drugs. It is very difficult to achieve a positive result in such a severe disease caused by *F. gigantica*. In addition to these, it can be shown that there has never been a death from fasciolosis caused by *F. hepatica* among large horned animals. All this indicates that trematode *F. gigantica* is highly pathogenic and the most dangerous helminth.

Conclusion. Among liver trematodes, the trematode *F. gigantica* takes the first place, and *F. hepatica* takes the second place with its pathogenetic features. *D. dendriticum* has a very low quality. All this is determined by the important biological and ecological aspects of each parasite, in which the passage of their maritogony development period is the most important. Among liver trematodes, it was observed that *F. gigantica* radii reproduce endlessly by parthenogenetic way, and because of them, a large number of cercariae are released every day until the mollusk dies.

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