



CESTODES COMMON TO PREDATORY FISH AND WILD BIRDS AND THEIR CIRCULATION

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Abstract

Keywords: cestodes, wild birds, commercial fishes, classification, handling, International Fish Catalogue (Eschmeyer's Catalog of Fishes), endogenous, exogenous, adaptation, invasion, reservoir.

The article provides information on cestodes of different species of commercial fish and wild birds bred on the banks of the Topalang River and in the reservoirs of Degrez, Uch-Kizil and South Surkhan, as well as in artificial reservoirs, and their circulation. Information is given on life cycles of 3 cestode species found in the organism of harvested fish, their circulation routes, biocoenotic relations, classification of cestode affection of the main host.

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INTRODUCTION

Nowadays, the world's population is growing rapidly and the demand for agricultural products, especially fish and fishery products, is increasing rapidly. This means channelling existing water resources and irrigation networks towards developing fisheries and increasing the productivity of inland water bodies.

As of 4 April 2022, the International Catalogue of Fishes (**Eschmeyer's Catalog of Fishes**) announced an update on the number of fish species. According to him, **there are 36,450 fish species** on our planet. Not all fish species are capable of being caught and eaten. Fish meat has a high biological value and is considered a good food for human life because of its nutritional benefits.

In the developed world, Japan, Western Europe, North America, Australia, per capita fish meat consumption averages 25-45 kg per year. The global average weight is 22 kg. According to the World Health Organization, each person should consume an average of 12-16 kg of fish meat per year [13].

Unfortunately, one person in our country consumes an average of 7 kg of fish meat per year. Therefore, the development of intensive aquaculture in our republic has become by far the most important issue.

Aquatic organisms, mainly fish, account for 18-20 per cent of the proteins that humans obtain from the animal world. Fresh fish meat contains 15-22% protein, 0.2-30.8% fat and a small amount of carbohydrates. Sufficient consumption of fish meat, rich in amino acids and



especially vitamin D, supports metabolism. In particular, fish products are important for the mental development of young children, as well as for disease prevention.

The role of fish and fish products in meeting the protein needs of the population of our republic is very large. According to the recommendations of the Ministry of Health of the Republic, every person needs 33 g per day for healthy development. or that 12 kg of fish products should be eaten during the year. Fish meal is rich in protein, calcium and phosphorus and is fed to farm animals. It contains 50-55% protein, 10-20% fat, up to 30% calcium phosphate, up to 5% table salt and vitamins A, B, D. It is very easily digested in the body. Therefore, it is first given to young animals, chickens (in the amount of 10% of the daily feed), chickens, and sometimes to older animals. If a cow is given 1-1.5 kg of fish meal per day, the quality of milk and meat will not suffer and productivity will increase.

Parasitic diseases are one of the important factors limiting the growth of fish production and the development of fisheries. Infestation of many fish with these parasites leads to a slight decline in their numbers. Some fish species act as intermediate hosts for parasites and are involved in the stability of the epidemiological and epizootological process.

From this point of view, we aimed to study the cestodes common to fish and wild birds and their circulation.

OBJECT AND METHODS OF THE RESEARCH

During 2021-2022, it was conducted on fish of different species, in particular, on the banks of Topalang River and in water reservoirs Degrez, Uch Kyzyl and South Surkhan, as well as artificial water bodies of Surkhandarya province.

Material was collected and processed according to generally accepted methods [1, 3]. The degree of invasion (IE - percentage of infected fish from the total number of surveyed fish) and the intensity of invasion (AI - arithmetic mean of the number of parasites per one infected individual) were used to estimate the infestation of fish. To determine species composition of detected parasites we used information of detector "Identifier of parasites of piscivorous fish of the USSR fauna"[1].

RESULTS

The studies were carried out on cestode-infected fish of the carp family (Cyprinidae) kept in fish farms in Surkhandarya region.

One of the unique features of helminths is that they are affected by primary and secondary habitats[7, 10, 11].The interactions of the parasite with the host organism and the mechanisms of interaction with the habitat are very diverse.

K. Kennedy [6] interpreted the phenomenon of parasitism based on the ecological approach and reviewed in detail the population biology and ecology of parasitic organisms. The focus is on the influence of the host organism and environmental factors on the number and structure of populations of parasites and "parasite-intermediate hosts"; "parasite-main poikilothermic host"; the mechanisms of realization in "parasite-main warm-blooded host" systems were studied[12].

Based on the above, let us analyze the ways of formation of cestodofauna of fish and wild birds.

It is known that the parasite-host interaction is considered one of the special types of communication between species, which is based on parasitic systems occurring in certain biocenotic relationships. For example, ingestion by shrimp of the cestode *Ligula intestinalis* coracidis, eating shrimp infested with proceroid by fish and eating fish infested with plerocercoid by the main host, i.e. wild birds, is a condition for the development and



completion of the life cycle of this cestode individual.

As a result of our research, 3 cestode species have been recorded in the organisms of caught fish, which during their life cycle are influenced by different primary and secondary environmental factors. Accordingly, the factors controlling these processes are endogenous and exogenous. The first type of factors can include specific reactions of the host, immunological incompatibility of the parasite and the host, changes in fish behavior under the influence of various substances released from the parasite. The second type of factors may include all environmental factors in the aquatic cenosis where the fish is caught (ambient temperature, salinity and ionic composition of the aquatic environment, solar energy, air and aquatic movement, etc.).

The role of anthropogenic factors in the formation of the helminth fauna of commercial fish is very great. It can be considered that the formation of cestodofauna of fish found in natural water bodies of Surkhandarya region and grown in fish farms is a process going on since people began to engage in fishing and other economic activities. Direct human activities create favourable conditions for a number of parasite species and lead to an expansion of their range, while other species can create unfavourable conditions and lead to a relative reduction in their range. reduction in their range or the complete disappearance of certain species from the fauna of certain areas. For example, as a result of the drying up of the Aral Sea and the ecological crisis 50-60 years ago, the species composition of fish helminths in the water bodies of Karakalpakstan (Osmanov, 1971) is confirmed by modern studies[2].

In the course of long evolution, cestodes have developed complex adaptive mechanisms that ensure survival of parasitic worms in the external environment for a certain period of time and penetration of invasive material into the body of the main host. In this case, some of the cestode larvae independently migrate to places where they are likely to encounter certain host groups, and developmental stages are fully ensured. The larvae of the second group of cestodes find a favourable environment for growth and development in an intermediate or additional host.

It should be noted that the formation of parasitic worm fauna has its own peculiarities in comparison with the formation of fauna of free-living animals. These features are represented by the fact that in free-living animals the habitat can be air, water and soil, while in cestodes the habitat is also the host organism. Therefore, the formation of the helminth fauna is more complex than that of free-living organisms[5].

Some factors influence the qualitative composition of the cestode fauna, others only or mainly determine the quantitative characteristic of individual cestode species. Factors of the latter type are part of the epizootological factors and are analysed more in veterinary practice. However, it should be noted that a clear distinction between these two types of factors is often very difficult to draw.

The presented data show that one of the main factors determining the composition of the predatory fish fauna and its cestodes is the biocenotic kinship of parasites and hosts, which has manifested itself as a result of evolution.

The following aspects are taken into account to classify a helminth infestation of the main host [4, 7, 8]:

The helminth enters the host by eating another organism considered to be its food object, i.e. an intermediate or reservoir host;

The helminth or its invasive elements are mechanically mixed with the food or water;

Helminth larvae actively penetrate the host through its skin;

Primary hosts transmit helminths by feeding on intermediate hosts.

Table 1

Involvement of individual animal groups in the transmission of cestode infestation stages of prey fish

Helminthclass	Number of species	Host			
		Interim		Reservoir	Definitely
		First	Second		
Cestode	3	Oligochaetes, cyclops	Predatory fish	-	Predatory fish, birds

As shown in Table 1, cestodes of commercial fish are characterized by the first three routes of transmission.

Several invertebrate and vertebrate species are directly involved in the transmission of invasive commercial fish helminth larvae[12].

Analyzing the ecological relationships of prey fish with cestodes, we see that the damage is carried out through trophic relationships, which greatly influences the composition of their cesthodo fauna.

Therefore the food relations of fish to some extent determine the composition of cestodes parasitizing in their body, and they are undoubtedly one of the main factors in the formation of the helminth fauna.

All this may be the basis for the emergence of parasitic relationships towards strong cenotic relationships. This, in turn, ensures the movement and formation of the "cestode-fish-victim" parasitic system in the conditions of Surkhandarya reservoirs.

CONCLUSION

Thus, different species of fish cestodes and their circulation in Surkhandarya province, in particular, on the banks of Topalang river and in water reservoirs Degrez, Uchkizil and South Surkhan as well as in artificial reservoirs have been studied. Data on life cycles of 3 cestode species found in the body of commercial fish, their circulation routes, biocenotic relations, classification of the main host of cestodes are given. These studies can be used for continuous surveillance of cestodoses in fish farms and development of preventive measures.

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