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Parasites of the sprats of some zones of the Caspian Sea in the water area of Azerbaijan

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Abstract

During the period of research, 6 species of parasites were detected in the sprat. From the selected parasites 1 species refers to ciliates (*Trichodina caspioloza*), 1 species to monogeneans (*Mazokraes alosae*), two species to trematodes (*Pronoprymna ventricosa* and *Bunocotyle cingulata*), 1 species to acanthocephalans (*Corynosoma caspicum*) and 1 species to the nematodes (*Anisakis schupakovi*). Of these, *Trichodina caspiolosae* and *Mazokraes alosae* develop without a change of hosts. Among the parasites of sprats, predominantly, *Pronoprymna ventricosa* trematode, a specific parasite of herrings. More species of parasites were identified in ordinary sprat than in anchovy sprat. This is due to the habitat of ordinary sprat in the coastal waters, the environment of which favorably affects the development of the intermediate host of some parasites. Anchovy sprat inhabits far from the coastal zones of the sea, where the species diversity is lower than the coastal thickening. All the parasites found in the sprats are typical marine species.

Keywords: fish, sprat, parasites, ciliates, monogenea, trematode, nematode, acanthocephalans

Introduction

The Caspian Sea is of great importance from the point of view of ichthyology and ichthyoparasitology. Despite the fact that a sufficient number of research works are carried out here, the problem of collecting the latest data taking into account constantly changing modern conditions will always be in the center of attention. Even taking into account that research conducted in the Caspian Sea studies cover a wide variety of species, there are still some gaps. The presence of these gaps requires the carrying out of new research works.

Widespread in the Caspian Sea and of industrial significance, the sprats not well studied from the point of view of ichthyology and parasitology. The fact that they live mainly in saline waters, provides an opportunity to comprehend the current state of the ecological state of the sea. This reflected in the fact that the pollution of the Caspian Sea, which occurs under the influence of an anthropological factor, is the first to affect the composition of the parasitofauna of fish. For this reason, the study of the biodiversity of some parasites of relatively poorly studied herrings on the territory of Azerbaijan will in all cases be the focus of attention and will not lose its relevance. In this regard, the study of some species of sprats, widespread in the Caspian Sea in the territory of Azerbaijan, was deemed expedient. In the Caspian Sea are two species of sprats: *Clupeonella vø Alosa*.

There are three species of sprat (*Clupeonella engrauliformis*, *C.grimmi* v. *C.delikatule*) in the Azerbaijan part of the Caspian Sea ^[1]. Sprats are small, typically sea fish, which are widespread in the Caspian Sea. Their habitat is mainly the Middle and South of Caspian Sea. Various representatives of zooplankton are dominant in nutrition ^[2].

For the first time, the studies on the parasitic fauna of sprats were carried out by V.A. Dogel and B.E. Bychowsky ^[3]. By a method of complete parasitological autopsies 40 specimens of fish were examined. 7 species of parasites were noted. Further studies were carried out by T.K. Mikailov ^[4] and Sh. R. Ibragimov ^[5]. T.K. Mikailov studied 50 specimens of sprat belonging to 3 species and was found 7, while Ibragimov studied 310 fish marked only 14 species of parasites. In order to elucidate possible changes in the infestation of kills by endogenous and exogenous parasites, a real investigation was carried out.

To study the present state of the parasitic fauna of the sprat, we studied 58 specimens of fish belonging to two species (*Clupeonella engrauliformis* Borodin and *Cl. delikatule caspicus* Svetovidov) and six species of parasites found.

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Materials and Methods

The basis of the research was the parasites that collected from sprats from different coastal zones (Neftchala, Sangachal, Lankaran) of the Azerbaijani water area of the Caspian Sea (Figure 1). The freshly caught and fixed fish were used for research. The investigated fish were subjected to complete parasitological autopsies. The fixation, preservation, and processing of materials collected from the investigated fish were carried out according to the generally accepted method [6, 7].

All tissues and organs were examined by the compressor method using a binocular microscope (MBS-9, x25). From each organ, smears on slides were made and examined under a microscope (Amplival, x100, x200, x400, x1000). The processing of parasitic ciliates was carried out by impregnation in a 2% solution of silver-sodium [8]. Monogeneans were fixed and stored in 70% ethyl alcohol, and also glycerol-gelatin preparations without preliminary fixation have been prepared from them.



Fig 1: ▲ Places of research

Trematodes were fixed in a 70% solution of alcohol, were conducted through an alcohol battery at an ascending concentration, and were dyed with carmine. Nematodes and acanthocephalans consisted of Fora's fluid. For the diagnosis of all groups of parasites, measurements were taken and some of them were drawn using a RA-4 drawing device. Extensity

and intensity had been studied to assess the parasite invasion. To assess the degree of invasion of the kills by parasites, their extensity (EI) and intensity (II) were calculated. The extent of invasion was calculated using the formula given below in the work of IE Bychowskaya-Pavlovskaya [6]:

$$EI = \frac{X \text{ in fec.}}{X} \cdot 100\%$$

Where:

X infect. - number of hosts infected with a certain type of parasite,

X - the number of autopsied animals - the owners of a certain species.

Intensity of invasion was expressed within the limits of the number of a certain type of parasites on all individuals of a certain type of fish.

Results

As a result of research during the parasitological studies, 2 species of parasites were found in anchovy sprats, and 5 species of parasites in ordinary sprat (Table 1). We examined 34

specimens of anchovy sprat. In the pyloric appendages of 16 fishes, trematode – *P. ventricosa* was noted (invasive extent 47.0%, invasion intensity 20-55 specimens) and acanthocephalans – *C. caspicum* were marked in the body cavity of the other (E.I.-11.8%; I.I. 1-5 specimens). Apparently, in the anchovy sprat, frequent parasites were *P. ventricosa* trematodes. Infection with this parasite was accounted almost half of all fish. The frequent occurrence of a parasite in an anchovy sprat is related to its specificity for herrings.

Complete parasitological autopsies were exposed to 24 specimens of ordinary sprats. In the gills of one fish, the infusoria – *T. caspiolosae* (E.I. 4.2%), and in the gills of two with the monogenea – *M. alosae* (E.I.8.3%, I.I. 1-2 specimens) was noted. In the intestine of the other 6 fishes – *B. cingulata*(E.I.25.0%, I.I. 1-4 specimens), in pyloric appendages of 11 fishes –*P. ventricosa* (E.I.45.8%, I.I. 1-4 specimens) and in the body cavity of 1 fish the nematode – *A. schupakovi* (E.I.4.2%, I.I. 2 specimens) was found.

Table 1: Extensity and intensity of parasite infestation of fish *Clupeonella delikaturae caspicus* and *Cl. engrauliformis*

Sprats Parasites	<i>Clupeonella delikaturae caspicus</i>		<i>Clupeonella engrauliformis</i>	
	Extensity of invasion (%)	Intensity of invasion (specimen)	Extensity of invasion (%)	Intensity of invasion (specimen)
<i>Trichodina caspiolosae</i>	4,2±4,9	-		
<i>Mazocraes alosae</i>	8,3±5,6	1-2		
<i>Bunocotyle cingulata</i>	25,0±8,8	1-4		
<i>Pronoprymna ventricosa</i>	45,8±10,1	1-4	47,0±8,5	20-55
<i>Corynosoma caspicum</i>	-	-	11,8 ±5,5	1-5
<i>Anisakis schupakovi</i>	4,2 ± 4,9	2		

Discussion

During the research, the following parasites were noted in the tailpipes: 1 species of infusorians (*T. caspiolosae*), 1 species of monogeneans (*M. alosae*), 2 species of trematodes (*P. ventricosa* v. *B. cingulata*), 1 species of *C. caspicum* and 1 species of nematodes (*A. schupakovi*). A general analysis of the conclusions of previous authors showed that the majority of parasites noted in kills are its specific parasites. The parasites *Glugea lucioperca*, *Paracoenogonimus ovatus*, *Echinostomatidae gen.sp.*, *Agamonema sp.*, *Contracaecum squalii*, *Eubothrium clupeonella*, *Ascocotyle coleostoma* were

not detected by other authors [3].

Among the parasites of sprats, trematode – *P. ventricosa* is specific for herrings. Infection with this trematode, more likely, depends on nutrition of both sprats with plankton crustaceans. The percentage of infection with some parasites (*T. caspiolosae*, *A. schupakovi*) was insignificant.

It is noteworthy that species of parasites in ordinary sprat are larger than in anchovy. Obviously, this is due to the habitat of ordinary sprat in the coastal waters. So, in connection with shallow water in coastal zones, water is better heated by sunlight and increases aeration, and this in turn leads to

increase the species diversity in coastal condensations by organisms. Such an environment favorably affects the development of intermediate hosts of some parasites. Anchovy sprat inhabits far from the coastal zones of the sea. In these places, the species diversity of surface condensations is lower than in coastal condensations. Sometimes here lack of fish food, which feed on plankton, forces them to change food objects and switch to nutrition benthic organisms. This is evidenced by the finding acanthocephalan – *C.caspicum* in body cavities of four anchovy fishes. In all likelihood, infection of sprats with this parasite is associated with feeding benthic amphipods, which are the intermediate hosts of these parasites.

Among the parasitic protozoa in the gills of ordinary sprat was found parasitic infusoria – *T.caspialosae*, which is specific for herrings. Of the noted parasites trematode – *P.ventricosa* is a common and often found among parasites, that found in pyloric appendages. The infestation of sprats with parasites, which are specific for herrings, is associated with the use of identical food objects, i. e. planktonic crustaceans. The infestation of kits with parasites that are specific for herrings is associated with the use of identical food objects, i.e. planktonic crustaceans. The trematode – *B. cingulata* (E.I. 21%, I.I. 1-4 specimens) and the nematode – *A.schupakovi* (E.I.5,3%, I.I., 2) are characteristic for them, the intermediate hosts of which are copepods^[9]. The weak infestation of kiln by the nematode *A. shupakovi* shows that plankton occupies the main place in the composition of their nutrition.

The most found parasites of sprats have the complex development cycle. In this regard, their development occurs with the participation of an intermediate host. However, among the parasitic protozoans noted in the gills only *T. caspialosae* and monogeneans – *M. alosae* develop without the participation of an intermediate host.

Conclusion

In this way, in anchovy and ordinary sprats, only 6 species of parasites were found. The frequent infection of *P. ventricosa* trematode for both species of fishes was revealed. In comparison with other parasites, the predominance of this parasite in both species of fish is associated with their specificity for herrings and the feeding of planktonic crustaceans. Despite the fact that sprats feed on plankton organisms, they also have benthic organisms in their diet, which serve as intermediate hosts for some helminths. Thus, the presence of acanthocephala – *C. caspicum* in all probability is associated with the feeding of these fish by amphipods, which are intermediate hosts of this helminth.

In the gills of ordinary sprat of parasitic protozoa was found only the infusoria – *T. caspialosae*, in which the frequency of infestation was minimal. One of the rare parasites for ordinary sprat was the nematode – *A. schupakovi*. There is a possibility that this parasite belonging to the genus *Anisakis* is dangerous to humans. Almost all of the parasites, found in the sprats are typical marine species.

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