STUDIES OF CYCLOPIDAE THAT ARE INTERMEDIATE HOSTS OF FISH IN RESERVOIRS OF THE SOUTHERN ARAL SEA

[1]Turemuratova Gulistan Ismailovna, [2]Nagmetov Hamid Salavat uly
[1]Candidate of Biological Sciences, Associate Professor of the Department of General Biology and Physiology, Karakalpak State University named after Berdakha, Nukus
[2]4th-year student of the Bachelor's degree program "Water Resources and Aquaculture" of Irkutsk State Agrarian University named after A.A.Yezhevsky Russia
https://doi.org/10.5281/zenodo.7908736

Abstract. *The article presents the results of hydrobiological studies of Cyclopidae crustaceans that are intermediate hosts of parasitic helminths - cestodes and nematodes of fish, waterfowl and mammals, including such a common human and animal pathogen in the recent past in Central Asia as guinea worm -Dranunculus medinensis. There is extensive information, larvae of 6 species of cestodes were found in cyclops and infection with larvae of the fish parasite Botriocephalus acheilognathi was noted.*
Keywords: *cyclops, parasite, helminth, cestode, nematode, fish pathogen, larva.*

Currently, measures are being taken in the Republic of Karakalpakstan to restore and increase fish stocks of inland reservoirs by creating lake-commodity farms. A set of measures is being implemented, including the fight against dangerous parasites and fish diseases, which determines the need to study the ichthyoparasitological situation of the reservoirs of the Southern Aral Sea in the changed environmental conditions.

The qualitative and quantitative composition of the parasitofauna largely depends on the frequency of occurrence of the host itself. The high number of the host provides the possibility of contact even with rare species of parasites (Dogel, 1962) In the studied regions, as a result of the anthropogenic pressure, the number of fish becomes smaller from year to year. Apparently, this is the main reason for the weak infection of fish with many types of parasites. According to our data, Cyclopidae are intermediate hosts of parasitic helminths - cestodes and nematodes of fish, waterfowl and mammals, including such a common human and animal pathogen in the recent past in Central Asia as guinea worm - Dranunculus medinensis.

In 2018-2021, different types and temporary reservoirs were studied in Muynak, Kungrad, and Nukus districts. The infestation of cyclops with helminth larvae was noted in ten different types of reservoirs (Table 1).

The following cyclops species have been noted as intermediate hosts of helminths (listed in descending order of infestation frequency): Acanthocyclops robustus, Thermocyclops vermifer, Macrocyclops albidus, Thermocyclops crassus, Thermocyclops dybowskii, Cyclops vicinus, Eucyclops serrulatus. In cases of detection of cyclops infestation, it was relatively small, but it covered how all types of cyclops inhabiting this reservoir were melting.

Larvae of 6 species of cestodes were found in cyclops (Table 2). Infection with larvae of the fish parasite Botriocephalus acheilognathi Yamaguti was most often (11 cases). Previously, this parasite was absent in Central Asia, but it was brought here together with the Chinese fish Hypophthalmichthys molitrix, H. nobilis, Ctenopharingodon idella, introduced in the 1960s, etc.

(Osmanov, Urazbayev, Arystanov, 1980). In 22 cases, cyclops were infected with larvae of helminths of waterfowl - Diorchis inflata (Rudolphi), D. ransoni Schultz, Cycloprhida omalancristrata (Wedl), Fimbraria fasiolaris (Pallas), Confluaria capillarioides (Fuhrmann). The definitive hosts of these helminths are sandpipers, ducks, pheasants, etc. There was no infection of cyclops with nematodes. (Turemuratova, Nagmetov, 2022)

Among the registered species of fish parasites pathogenic are parasitic protozoa Eimeria carpelli, Myxobolus pseudodispar, Trichodinella epizootica monogenea Dactylogyrus extensus, cestodes Caryophyllaeus fimbriceps, Bothriocephalus opsarichthydis, Gryporhynchus pusillum, trematodes D.spathaceum, Posthodplostmum cuticola, nematodes Raphidascaris acus, Contracaecum microcephalum, leeches Piscicola geometra, crustaceans Ergasilus sieboldi, Lernae elegans. These types of parasites can be considered as potential pathogens of fish diseases in our region. When favorable conditions arise. Especially dangerous are representatives of specific types of dactylogiruses and widespread diplostomatids, for which a high prevalence of infection is constantly recorded.

To develop measures to combat them, it is necessary to have factual data on the biology and ecology of parasites at the population level. This is an urgent issue of parasitological research today.

In general, cases of cyclops infection with helminths were more often noted in autumn than in summer and spring. The degree of infection was also higher in summer (3.5-4.4%) and autumn (4.1-6.2%) than in spring (2.2%) (Table 1). A slightly higher infection of cyclops was noted in a low-water year. Probably, an increase in the density of fish and waterfowl in reservoirs leads to an increase in the intensity of helminth infestation of both crustaceans and vertebrates.

If we compare with the data of Allaniyazova (1977, 1980), then two more species of cyclops – intermediate hosts of cestodes - are added to the 15 species of cyclops noted by her in Karakalpakstan - Acanthocyclops robustus and Thermocyclops vermifer. However, it is possible that this researcher also dealt with these species, failing to distinguish them possibly from similar species. The levels of infection noted by Allaniyazova (0.1-0.6%) were significantly lower than those noted by us. This may reflect either differences in methods or differences in the study areas - we studied mainly the northern regions of Karakalpakstan, and Allaniyazov - the central regions.

If compared with other regions, the infestation with Diphyllobotrium latum larvae of Cyclops strenuus in a lake in Scotland according to M.Dorucu (1999) was 2.6%, which is close to the values noted by us. However, it is known that the infestation of cyclops can be much higher - for example, A.Guttowa (1961) found the infestation of some populations of Cyclops strenuus and Thermocyclops oithonoides in Finland reaching values of 40% and 18.5%, respectively.

Regarding the types of helminths, we found in cyclopes all those species that Allaniyazova (1980) cites in his work. Allaniyazova discovered an additional 7 species.

Table 1.

The level of infection (%) of cyclops with larvae of helminths of the reservoirs of Karakalpakstan.

Reservoirs		2018			2021	
		may	july	September	august	September
1	Ponds of the Nukus fish farm	-	1,5	6,0	-	6,2

2	A ditch near Muynak	1.8	2.2	4.5	-	5.0
3	A ditch near p .Shagyrlyk	-	-	3.6	3.6	4.8
4	Kungrad canal near Kokdarya	3.5	3.0	4.0	-	-
5	Nukus artificial houses	1.4	3.6	-	2,3	-
6	Lake Shegekul	-	2,5	-	3,2	-

Table. 2.

Infestation of cyclops species with larvae of various types of helminths (numbers indicate the number of cases of infection).

№		Bothrio cephalus acheilo gnathi	Dior chis inf lata	Dior chis ran soni	Cyclo prhida omala crist	Fimbr aria fasci olaris	Conflu aria capilla rioides
1	Acanthocyclops robustus	3	-	1	2	2	1
2	Thermocyclops vermifer	4	1	-	-	1	1
3	Thermocyclops crassus	-	2	1	1	1	-
4	Thermocyclops dybowskii	1	1	-	-	1	-
5	Macrocyclops - albidus	-	-	1	2	2	-
6	Cyclops vicinus	2	2	-	-	-	-
7	Eucyclops serrulatus	1	-	-	-	-	-

CONCLUSIONS

1. Infestation of 7 cyclops species with larvae of 6 cestode species was found in the examined different types of reservoirs; the level of invasion increased during the growing season and was higher in the low-water year.

2. Cyclopes occupy a significant place in the structure of zooplankton cenoses of Karakalpakstan reservoirs, usually accounting for 25-60% of zooplankton biomass and 16-24% of zooplankton biodiversity of lakes and ponds.

3. Cyclopidae are intermediate hosts of parasitic helminths - cestodes and nematodes of fish, waterfowl and mammals, including such a common pathogen of humans and animals in the recent past in Central Asia as guinea worm -Dranunculus medinensis.

4. The following cyclops species have been noted as intermediate hosts of helminths: Acanthocyclops robustus, Thermocyclops vermifer, Macrocyclops albidus, Thermocyclops crassus, Thermocyclops dybowskii, Cyclops vicinus, Eucyclops serrulatus.

5. In cases of detection of cyclops infestation, it was relatively small, but it covered all kinds of cyclops inhabiting this reservoir.

6. Infection with the larvae of the fish parasite Botriocephalus acheilognathi Yamaguti was noted most often (11 cases). In 22 cases, cyclops were infected with larvae of helminths of waterfowl - Diorchis inflata (Rudolphi), D. ransoni Schultz, Cycloprhida omalancristrata (Wedl), Fimbraria fasiolaris (Pallas), Confluaria capillarioides (Fuhrmann). The definitive hosts of these helminths are sandpipers, ducks, pheasants, etc. Infection of cyclops with nematodes has not been canceled.

To develop measures to combat them, it is necessary to have factual data on the biology and ecology of parasites at the population level. This is an urgent issue of parasitological research today.

REFERENCES

1. Bykhovskaya-Pavlovskaya I.E. Parasites of fish. Study Guide. Leningrad . 1985. 120 p.
2. Gavrilova N.G. Formation of the parasitofauna of the fish of the Kairakkum reservoir. Author's thesis. cand. diss., Leningrad, 1969, 25 p.
3. Dogel V.A. Problems of fish parasitofauna research. Proceedings of the Leningrad Region Naturalist., 62 (3), 1933.
4. Karaev R.M. Epizootic state of the studied reservoirs. Collection: Reservoirs of Uzbekistan and their fishery significance, volume W. Tashkent: Fan. 1994, pp. 33-41.
5. Karimov S.B. On changes in the parasitofauna of the fish of the Kayrakkum reservoir over a long period. zh. Parasitology, volume 23 issue-e, Leningrad, 1988, pp. 250-260.
6. Kurbanova A.I., Urazbaev A.N., Yusupov O.D. Changes in the parasitofauna of some fish of the Southern Aral Sea under the influence of anthropogenic press. Bulletin of Zoology of the Academy of Sciences of Ukraine, volume 36, N q, Kiev, pp. 29-34.
7. Osmanov S.O., Arystanov E., Ubaydullaev K.K., etc. Parasites of fish and aquatic invertebrates of the lower reaches of the Amu Darya. Tashkent: Fan. 1980, 156 p.
8. Yusupov O., Urazbaev A.N., Parasitic infusoria (Peritricha: urceolariidae) of fishes of the Aral Sea. zh. Parasitology, volume 14, issue y, 1980, pp. 504-510.
9. Turemuratova G.Nagmetov H. Parasitofauna of fish in some reservoirs of the Republic of Karakalpakstan. The journal "Economics and Society" Modern Sciences and Education, Russia, Saratov No.4(34)-2018 (April
10. Turemuratova G.I., Nagmetov H.S. The species composition of Cyclopoida in the reservoirs of Karakalpakstan. ISSN: 2311-5459 U55.Universum: Chemistry and Biology. Scientific Journal No. 10 (100).Part 1.M.Ed.MCNO.2022-72s. Universum: Chemistry and Biology : electron. scientific. journal. 2022. 10(100). URL: Russia. https://7universum.com/ru/nature/archive/item/14354
11. Turemuratova G.I., Nagmetov H.S. The significance of cyclopes and other important components in aquatic ecosystems of the southern Aral Sea region. Innovation in the modern education system: a collection scientific works of the International scientific conference (25th April, 2021) – Washington, USA: "CESS", 2021. Part 5, Issue 1 – p.2021
12. Turemuratova G.I.,Nagmetov H.S. Parasitic state of hydrobionts of the Southern Aral Sea region. Uzbekiston Republikasi “Khorazm Mamun akade-misi akhborotnomasi” https:// mamun.uz /uz/page-/56/.№8/1/(92)2022.