

DOI: 10.26565/2075-5457-2021-37-7  
UDC: 576.895.121

## The trematodes of fish of the transboundary Aras Dam Reservoir Y.V. Shakaraliyeva

In 2015–2018, in three localities representing the main ecological conditions of the Aras Dam Reservoir, 233 fishes of 19 species were studied by the method of complete helminthological dissection: Caspian roach – *Rutilus caspicus*, Caspian asp – *Leuciscus aspius*, Kura gudgeon – *Romanogobio persus*, Aras khramulya – *Capoeta sevangi*, Chanari barbel – *Luciobarbus capito*, Kura barbel – *Barbus laserta*, South Caucasian bleak – *Alburnus hohensekeri*, Kura bleak – *A. filippi*, South Caspian spirin – *Alburnoides eichwaldi*, bream – *Abramis brama*, golden carp – *Carassius gibelio*, common carp – *Cyprinus carpio*, Angora loach – *Oxynoemacheilus angorae*, South Caucasian spined loach – *Cobitis satunini*, catfish – *Silurus glanis*, mosquito fish – *Gambusia affinis*, zander – *Sander lucioperca*, round goby – *Neogobius melanstomus*, and bighead goby – *Ponticola gorlap*. As a result, 20 trematode species of two orders, nine families and 12 genera were found: *Sanguinicola inermis*, *Bunodera luciopercae*, *Phyllodistomum elongatum*, *Orientocreadium siluri*, *Allocreadium isoporum*, *A. markewitschi*, *A. transversale*, *Acanthocreadium araxicum*, *Sphaerostomum bramae*, *Diplostomum chromatophorum*, *D. commutatum*, *D. helveticum*, *D. mergi*, *D. nordmanni*, *D. paracaudum*, *D. spathaceum*, *Tylodelphys clavata*, *Posthodiplostomum cuticola*, *Ichthyocotylurus pileatus*, and *Clinostomum complanatum*. Of these, seven species were found in the fish intestine, and seven species in the lenses of eyes. Other organs had one trematode species each. One species is a specific parasite of catfish, one is a parasite of various predatory fish, seven species are parasites of cyprinid fish, and 11 species are parasites of fish of different families. According to the flow rate and the development of aquatic vegetation, the Aras Dam Reservoir can be divided into three parts. Eleven trematode species were found in the upper part, 17 species in the middle part, and 14 species in the lower part. The species richness is facilitated by the slow current and aquatic vegetation development, which attracts intermediate and definitive hosts - mollusks, crustaceans, fish, and birds. Among the trematodes found, nine species are fish pathogens, and one species is dangerous to human health if released into the digestive tract.

**Key words:** Aras Dam Reservoir, fish, parasites, helminthes, Trematoda.

**Cite this article:** Shakaraliyeva Y.V. The trematodes of fish of the transboundary Aras Dam Reservoir. The Journal of V. N. Karazin Kharkiv National University. Series "Biology", 2021, 37, 79–86. <https://doi.org/10.26565/2075-5457-2021-37-7>

### About the author:

Y.V. Shakaraliyeva – Azerbaijan Medical University, Rashid Behbutov Str., 134, Baku, Azerbaijan, AZ1014, [bioloq@yahoo.com](mailto:bioloq@yahoo.com), <https://orcid.org/0000-0002-0653-7605>

**Received: 22.06.21 / 29.08.2022 / Accepted: 29.10.2021**

### Introduction

The Aras Dam Reservoir is located on the border of two states – the Republic of Azerbaijan and the Islamic Republic of Iran. It was created with the dam construction in 1971. The reservoir has a length of 52.0 km, a width of 6.1 km, a depth over 18.0 m, and a total displacement of 1150 million m<sup>3</sup> (National Atlas of the Republic of Azerbaijan, 2014). It is shared by the two countries for irrigation, commercial fisheries, and hydroelectric power production. More than 20 fish species occur in the reservoir; many of them are of economic importance (Kuliev, Mamedov, 2010; Mamedov, 2010). Although fish parasites are investigated well in the internal water bodies of Azerbaijan (Mikailov, 1975; Mikailov, Ibragimov, 1980, etc.), the Aras Dam Reservoir, which is of great fisheries and nature conservation importance, remained poorly studied. Helminthological research was conducted only in 1973–1979 by N.B. Agayeva, who found two trematodes: *Orientocreadium siluri* and *Diplostomum chromatophorum* (Agayeva, 1982). That was the only information on the fish trematodes of the reservoir before our research. In this regard, we set a goal to study the species composition and ecological characteristics of fish trematodes in the Aras Dam Reservoir.

### Materials and methods

The material was collected in 2015–2018 in three areas that represent the main ecological features of the Aras Dam Reservoir (Fig. 1). These areas differ in both hydrological conditions and hydrobionts composition. The upper area lies northwest in the reservoir near the mouth of Aras River. Here the water is the most turbid and its flow is clearly visible. It hosts a small number of fish-eating birds. The middle area is the shallowest, here the water is clear and the current is almost imperceptible; its conditions are favorable

for aquatic vegetation and for many aquatic birds, including fish-eaters. The third area is located in the southeast of the reservoir, the water here is also clear, but the current is noticeable. The vegetation is poorer and the number of fish-eating birds is lower than in the middle area. Moreover, it lies downstream of the city of Nakhichevan, which contaminates its water with organic matter.



Figure 1. Map of the Aras Dam Reservoir with the collecting localities.

Table 1. Species composition and the number of fishes examined in the Aras Dam Reservoir

English	Fish species names	Number of individuals
	Latin	
Caspian roach	<i>Rutilus caspicus</i> (Yakovlev 1870)	15
Caspian asp	<i>Leuciscus aspius</i> (Linnaeus 1758)	13
Kura gudgeon	<i>Romanogobio persus</i> (Günther 1899)	10
Aras khramulya	<i>Capoeta sevangi</i> (Filippi, 1865)	12
Chanari barbel	<i>Luciobarbus capito</i> (Güldenstädt 1773)	10
Kura barbel	<i>Barbus lacerta</i> Heckel 1843	11
South Caucasian bleak	<i>Alburnus hohenackeri</i> Kessler 1877	10
Kura bleak	<i>A. filippi</i> Kessler, 1877	15
South Caspian spirin	<i>Alburnoides eichwaldii</i> (De Filippi 1863)	17
Bream	<i>Abramis brama</i> (Linnaeus 1758)	15
Golden carp	<i>Carassius gibelio</i> (Bloch, 1782)	10
Common carp	<i>Cyprinus carpio</i> Linnaeus, 1758	11
Angora loach	<i>Oxynoemacheilus angorae</i> (Steindachner 1897)	17
South Caucasian spined loach	<i>Cobitis satunini</i> Gladkov 1935	12
Catfish	<i>Silurus glanis</i> Linnaeus, 1758	10
Mosquito fish	<i>Gambusia affinis</i> (Baird et Girard, 1853)	14
Zander	<i>Sander lucioperca</i> (Linnaeus, 1758)	10
Round goby	<i>Neogobius melanostomus</i> (Pallas, 1814)	10
Bighead goby	<i>Ponticola goralp</i> (Iljin 1949)	11

We examined 233 fishes of 19 species by the method of full helminthological dissection (Bychowskaya-Pavlovskaya, 1985; Pronina, Pronin, 2014) (table 1). All the trematodes found were processed and identified according to the relevant research methods (Shigin, 1986; Sudarikov et al., 2002).

A list of trematode species is given below. Each species is provided with the fish host name, localization in the fish body, prevalence (%) and intensity (number of individuals) of the infection in the study period, and brief information on their biology.

## Results

During our studies, 20 trematode species of 12 genera, nine families and two orders were registered in the fish of the Aras Dam Reservoir.

### Order SANGUINICOLIDA Skrjabin et Schulz, 1937

#### Family SANGUINICOLIDAE Graff, 1907

##### *Sanguinicola inermis* Plehn, 1905

Host: golden carp (20.0%); infection intensity: 2–4 specimens.

Localization: blood.

Parasitizes in the circulatory system of the fish of cyprinid family, the intermediate hosts are mollusks of the genera *Limnaea* and *Bithynia* (Kirk, Lewis, 1993).

### Order FASCIOLIDA Skrjabin et Schulz, 1937

#### Family BUNODERIDAE Nicoll, 1914

##### *Bunodera luciopercae* (Mueller, 1776)

Host: zander (30.0%); infection intensity: 1–14 specimens.

Localization: intestine.

Parasitizes in the intestines of pike perch, perch, pike, catfish and some other predatory fish; first intermediate hosts are freshwater mollusks of the genus *Sphaerium*, second intermediate hosts are crustaceans (Tyutin, 2001).

#### Family GORGODERIDAE Looss, 1899

##### *Phyllodistomum elongatum* Nybelin, 1926

Hosts: roach (26.6%) and chanari barbel (20.0%); infection intensity: 2–11 specimens.

Localization: ureters and urinary bladder.

Parasite of cyprinids' ureters and urinary bladder; the first and the second intermediate hosts are bivalve mollusks of the genera *Sphaerium* and *Pisidium*; juvenile fishes become infected by eating cercariae that imitate their food objects, and the adults by eating mollusks containing metacercariae (Zhokhov, 1987).

### Family ORIENTOCREADIIDAE Skrjabin et Kowal, 1960

#### *Orientocreadium siluri* (Bychowsky et Dubinina, 1954)

Host: catfish (60.0%); infection intensity: 8–23 specimens.

Localization: intestine.

The life cycle has not been studied.

### Family ALLOCREADIIDAE Looss, 1902

#### *Allocreadium isoporum* (Looss, 1894)

Hosts: Aras khramulya (8.3%) and Kura barbel (9.1%); infection intensity: 3–12 specimens.

Localization: intestine.

Parasitizes in the intestines of cyprinids, sometimes found in other fish, the first intermediate hosts are mollusks of the genera *Sphaerium* and *Pisidium*, the second intermediate hosts are the larvae of insects of the genus *Ephemera* (Ephemeroptera) (Moravec, 1992).

#### *A. markewitschi* Kowal, 1949

Hosts: roach (26.7%), asp (15.4%), Kura barbel (18.2%), South Caucasian bleak (20.0%), and Kura bleak (20.0%); infection intensity: 2–9 specimens.

Localization: intestine.

A parasite of the intestine of fish of the cyprinid family (Manfredi et al., 2003).

#### *A. transversale* (Rudolphi, 1802)

Hosts: Aras khramulya (25.0%), chanari barbel (10.0%), golden carp (20.0%), common carp (9.1%), and South Caucasian bleak (10.0%); infection intensity: 3–19 specimens.

Localization: intestine.

A parasite of the intestine of cyprinids, sometimes found in predatory fish of other families; first intermediate hosts are mollusks gastropods, second intermediate hosts are various crustaceans (Koval, 1966; Mitenev, Shulman, 2010).

*Acanthocreadium araxicum* Mikailov, 1969

Host: chanari barbel (10.0%) and Kura barbel (9.1%); infection intensity: 1–3 specimens.

Localization: intestine.

The life cycle has not been studied.

Family OPECOELIDAE Ozaki, 1925

*Sphaerostomum bramae* Mueller, 1776

Hosts: asp (23.1%), Aras khramulya (16.7%), South Caucasian bleak (100%), bream (20,0%), and common carp (18.2%); infection intensity: 3–17 specimens.

Localization: intestine.

A parasite of the intestines of cyprinids, sometimes found in predatory fish of other families; first intermediate host is a mollusk *Bithynia tentaculata*, second intermediate hosts are leeches (Koval, Kashkovsky, 1970).

Family DIPLOSTOMATIDAE Poirier, 1886

*Diplostomum chromatophorum* (Brown, 1931)

Hosts: roach (33.3%), spirilin (17.6%), bream (6.7%), Angora loach (17.6%), South Caucasian spined loach (25,0%), catfish (20,0%), mosquito fish (14.2%), zander (20.0%), round goby (30.0%), bighead goby (27,3%); infection intensity: 1–53 specimens.

Localization: lens of the eye.

Metacercariae parasitize in the lenses of eyes of the fish of various families; first intermediate hosts are freshwater mollusks of the genus *Limnaea*, definitive hosts are fish-eating birds of the gull family (Sokolov et al., 2011).

*D. commutatum* (Diesing, 1850)

Hosts: spirilin (11.8%) and mosquito fish (21,4%); infection intensity: 1-13 specimens.

Localization: lens of the eye.

Metacercariae parasitize in the lenses of the eyes of fish of various families; first intermediate hosts are freshwater mollusks of the genus *Limnaea*, definitive hosts are fish-eating birds of the gull family (Barskaya et al., 2008).

*D. helveticum* (Dubois, 1923)

Hosts: Kura bleak (6.7%), common carp (27.3%), and zander (20.0%); infection intensity: 2–9 specimens.

Localization: lens of the eye.

Metacercariae parasitize in the lenses of the eyes of fish of various families; first intermediate hosts are freshwater mollusks of the genus *Limnaea*, definitive hosts are fish-eating birds of the gull family (Lebedeva, 2008).

*D. mergi* Dubois, 1932

Hosts: Kura gudgeon (10.0%), spirilin (11.8%), golden carp (20.0%), and bighead goby (9,1%); infection intensity: 3–10 specimens.

Localization: lens of the eye.

Metacercariae parasitize in the lenses of the eyes of fish of various families; first intermediate hosts are freshwater mollusks of the genus *Limnaea*, definitive hosts are ducks (Faltýnková et al., 2016; Haarder et al., 2013).

*D. nordmanni* Shigin et Sharipov, 1986

Hosts: Kura gudgeon (30.0%) and Kura barbel (27.3%); infection intensity: 1–5 specimens.

Localization: lens of the eye.

Metacercariae parasitize in the lenses of the eyes of fish of various families;; first intermediate hosts are freshwater mollusks of the genus *Limnaea*, definitive hosts are fish-eating birds of the gull family (Niewiadomska, Laskowski, 2002).

*D. paracaudum* Iles, 1959

Hosts: Kura barbel (18,2%), bream (26,7%), golden carp (10,0%), common carp (9,1%), South Caucasian spined loach (16,7%), catfish (20,0%), zander (10,0%), and round goby (10,0%); intensity of infection was 2–53 specimens.

Localization: lens of the eye.

Metacercariae parasitize in the lenses of the eyes of fish of various families; first intermediate hosts are freshwater mollusks of the genus *Limnaea*, definitive hosts are fish-eating birds of the gull family (Niewiadomska, Laskowski, 2002).

*D. spathaceum* (Rudolphi, 1819)

Hosts: asp (7,7%), Kura gudgeon (10,0%), Aras khramulya (16,7%), chanari barbel (30,0%), common carp (18,2%), catfish (10,0%); infection intensity: 3–46 specimens.

Localization: lens of the eye.

Metacercariae parasitize in the lenses of the eyes of fish of various families; first intermediate hosts are freshwater mollusks of the genus *Limnaea*, definitive hosts are fish-eating birds of the gull family (Karvonen, 2012).

*Tylodelphys clavata* (Nordmann, 1832)

Hosts: roach (13,3%), asp (15,4%), South Caucasian bleak (30,0%), Kura bleak (13,3%), bream (13,3%), golden carp (20,0%), common carp (36,4%), South Caucasian spined loach (8,3%), zander (10,0%), bighead goby (18,2%); infection intensity: 2–18 specimens.

Localization: vitreous body of the eye.

Metacercariae parasitize in the vitreous body of the eyes of fish of the cyprinid family, sometimes they are found in predatory fish of other families, the definitive hosts are the birds of the order Ciconiiformes (Shendrik et al., 2015; Yakovleva et al., 2015).

*Posthodiplostomum cuticola* (Nordmann, 1832)

Hosts: asp (15,4%), bream (6,7%), golden carp (10,0%), common carp (27,3%), South Caucasian spined loach (33,3%), zander (20,0%), bighead goby (18,2%); infection intensity: 2–23 specimens.

Localization: skin and muscles.

Metacercariae parasitize in the vitreous body of the eyes of various fish living in fresh waters, the definitive hosts are the birds of the order Podicipediformes (Yakovleva et al., 2015).

Family STRIGEIDAE Railliet, 1919

*Ichthyocotylurus pileatus* (Rudolphi, 1802)

Host: spirilin (11.8%); infection intensity: 1–2 specimens.

Localization: swim bladder walls.

Metacercariae parasitize in the walls of the swim bladder of various freshwater fish, the first intermediate hosts are gastropods, the definitive hosts are various fish-eating birds (Bykhovskaya-Pavlovskaya, 1962).

Family CLINOSTOMATIDAE Lühe, 1901

*Clinostomum complanatum* (Rudolphi, 1819)

Hosts: Kura bleak (20.0%), bream (13.3%), golden carp (10.0%), common carp (18.2%), zander (10.0%); infection intensity: 1–12 specimens.

Localization: muscles, under the skin and in the body cavity.

Metacercariae parasitize in the muscles, under the skin and in the body cavity of various freshwater fish, the first intermediate hosts are the mollusks *Limnaea stagnalis* and *Radix ovate*, the definitive hosts are herons, pelicans and cormorants (Lo et al., 1981).

Nine species of the trematodes listed above use fish only as definitive hosts, while 11 species use them only as intermediate hosts. Seven species were localized in the fish intestines, and seven species in the lenses of eyes. Other organs (blood, ureters and urinary bladder, vitreous body of the eye, walls of the swim bladder, skin and muscles, under the skin and in the body cavity) hosted one trematode species each.

One trematode species is a specific catfish parasite, one species is a parasite of various predatory fish, seven species are cyprinids parasites, and 11 species are parasites of fish of various families. *Diplostomum chromatophorum* was found in 12 fish species, *Tylodelphys clavata* in 10 species, *Diplostomum paracaudum* in eight species, *Posthodiplostomum cuticola* in seven species, *Sphaerostomum bramae* in six species, *Allocreadium markewitschi*, *A. transversale*, *Diplostomum spathaceum*, and *Clinostomum complanatum* in five species, *Diplostomum mergi* in four species, *Diplostomum helveticum* in three species, *Phyllodistomum elongatum*, *Allocreadium isoporum*, *Acanthocreadium araxicum*, *Diplostomum commutatum*, *D. nordmanni*, and *Tylodelphys podicipina* in two species, while *Sanguinicola inermis*, *Bunodera luciopercae*, *Pseudosphaerostomum caudotestis*, and *Ichthyocotylurus pileatus* in one species only.

The trematode fauna of golden and common carps was the richest: eight species. Zander hosted seven trematode species, Kura bleak and bream six species. Asp, Aras khramulya, Kura barbel, and South Caucasian spiny loach were invaded by five trematode species, roach, gudgeon, South Caucasian bleak, South Caspian spirilin, and bighead goby by four species, chanari barbel and catfish by three species, mosquito fish and round goby by two species, and Angora loach by one species.

Comparison of the trematode faunas of the three collecting localities in the reservoir showed that the richest was the fauna of the middle area (17 species) (Table 2). This can be explained by the absence of current and the rich vegetation that create favorable conditions for many mollusks – the intermediate hosts of trematodes, which, in turn, attracts piscivorous birds, the definitive hosts of some fish trematodes. For example, *Diplostomum mergi* was registered only in this area, since the ducks, its definitive hosts, inhabit only the middle part of the reservoir. The relatively fast current and less developed vegetation of the reservoir's upper part resulted in a lower abundance of mollusks and the lowest trematode species diversity (11). Nevertheless, this area has a specialist trematode species – *Acanthocreadium araxicum*, a specific parasite of barbel, which is a rheophilic fish. The lower area hosted 14 trematode species. A rare species of the reservoir, *Ichthyocotylurus pileatus*, was recorded from this locality only.

Among the trematodes found, *Diplostomum chromatophorum*, *D. commutatum*, *D. helveticum*, *D. mergi*, *D. nordmanni*, *D. paracaudum*, *D. spathaceum*, *Tylodelphys clavata*, and *Posthodiplostomum cuticola* are agents of fish diseases (Golovina et al., 2003), *Clinostomum complanatum* is pathogenic for humans if released into the digestive tract (Yamashita, 1938; Ibrahimov et al., 2010).

**Table 2: Distribution of fish trematodes in different parts of the Aras Dam Reservoir**

Trematode species	Reservoir areas		
	Upper	Middle	Lower
<i>Sanguinicola inermis</i>		+	+
<i>Bunodera luciopercae</i>		+	+
<i>Phyllodistomum elongatum</i>	+		+
<i>Orientocreadium siluri</i>	+	+	+
<i>Allocreadium isoporum</i>	+	+	
<i>A. markewitschi</i>		+	+
<i>A. transversale</i>		+	+
<i>Acanthocreadium araxicum</i>	+		
<i>Sphaerostomum bramae</i>	+	+	+
<i>Diplostomum chromatophorum</i>	+	+	+
<i>D. commutatum</i>	+	+	
<i>D. helveticum</i>	+	+	
<i>D. mergi</i>		+	
<i>D. nordmanni</i>		+	+
<i>D. paracaudum</i>		+	+
<i>D. spathaceum</i>	+	+	+
<i>Tylodelphys clavata</i>	+	+	
<i>Posthodiplostomum cuticola</i>	+	+	+
<i>Ichthyocotylurus pileatus</i>			+
<i>Clinostomum complanatum</i>		+	+
Number of species	11	17	14

### Conclusion

A helminthological study of 233 fishes of 19 species in the Aras Dam Reservoir revealed 20 trematode species of 12 genera, nine families, and two orders. Of these, nine species use fish only as a definitive host, while 11 species use it only as an intermediate host. Seven trematode species were found in the fish intestine, seven species in the lenses of the eyes. Other organs have one parasitic trematode species each. One trematode species is a specific catfish parasite; one species is a parasite of various predatory fish; seven species are cyprinids parasites, and 11 species are parasites of fish of several families. In the three collecting localities of the reservoir, 11 species were found in the upper area, 17

species in the middle area, and 14 species in the lower area. Among the trematodes found, nine species are agents of fish diseases, and one species can be pathogenic for humans if released into the digestive tract.

### References

- Agayeva N.B. (1982). *Parasites of fishes of the main rivers and reservoirs of the Aras River Basin (Nakhichevan ASSR): Author's abstract. diss. ...* Cand. biol. sciences. Baku, 25 p. (in Russian)
- Barskaya Y.Y., Yeshko Y.P., Lebedeva D.I. (2008). *Parasites of salmon fish of Fennoscandia. Tutorial.* Petrozavodsk: Karelian Scientific Centre of the Russian Academy of Sciences, 168 p. (in Russian)
- Bykhovskaya-Pavlovskaya I.E. (1962). *Trematodes of birds of the fauna of the USSR (ecological-geographical survey).* M.-L.: Publishing house of the Academy of Sciences of the USSR, 407 p. (in Russian)
- Bykhovskaya-Pavlovskaya I.E. (1985). *Parasites of fish. Study guide.* L.: Nauka, 122 p.
- Faltýnková A., Sures B., Kostadinova A. (2016). Biodiversity of trematodes in their intermediate mollusk and fish hosts in the freshwater ecosystems of Europe. *Systematic Parasitology*, 93(3), 283–293. <https://doi.org/10.1007/s11230-016-9627-y>
- Golovina N.A., Strelkov Yu.A., Voronin V.N. (2003). *Ichthyopathology.* M.: Mir, 448 p.
- Haarder S., Jorgensen K., Kania P. W. et al. (2013). Occurrence of *Diplostomum pseudospathaceum* Niewiadomska, 1984 and *D. mergi* Dubois, 1932 (Digenea: Diplostomidae) in Danish freshwater snails: ecological and molecular data. *Folia Parasitologica*, 60(2), 177–180. <https://doi.org/10.14411/fp.2013.020>
- Ibrahimov Sh.R., Najafov J.A., Shekaraliyeva Y.V. (2010). *Medical zoology.* Baku: Muallim, 124 p.
- Karvonen A. (2012). *Diplostomum spathaceum* and Related Species. In: Fish Parasites: Pathobiology and Protection (Eds. P.T.K. Woo, K. Buchmann). P. 260-269.
- Kirk R.S., Lewis J.W. (1993). The life-cycle and morphology of *Sanguinicola inermis* Plehn, 1905 (Digenea: Sanguinicolidae). *Systematic Parasitology*, 25, 125–133. <https://doi.org/10.1007/BF00009982>
- Koval V.P. (1966). Family Allocreadiidae Stossich, 1903. Trematodes of animals and human, 22, 185–310. (in Russian)
- Koval V.P., Kashkovsky V.V. (1970). On the study of trematodes of the species *Sphaerostomum bramae* (Müller, 1776). *Vesnyk zoologii*, 6, 70–71. (in Russian)
- Kuliev Z.M., Mamedov T.M. (2010). Ichthyofauna of the Aras reservoir. *Voprosy ichthyologii*, 50(6), 848–851. (in Russian)
- Lebedeva D.I. (2008). Trematodes of the genus *Diplostomum* Nordmann, 1832 fish of Lake Ladoga. *Parazitologiya*, 42(4), 292–299. (in Russian)
- Lo C.F., Huber F., Kou G.H., Lo C.J. (1981). Studies on *Clinostomum complanatum* (Rud., 1819). *Fish Pathology*, 15(3–4), 219–227. <https://doi.org/10.3147/jspf.15.219>
- Mamedov T.M. (2010). *Commercial fish of the Aras reservoir and ways of their rational use: Author's abstract. diss. ...* Ph.D on biol. Baku, 22 p. (in Azeri)
- Manfredi M.T., Di Cerbo A.R., Arlati G. (2003). Helminths in *Leuciscus cephalus* from the river Adda, Lombardy, Northern Italy. *Parassitologia*, 45, 73-78.
- Mikhailov T.K. (1975). *Parasites of fish of water bodies of Azerbaijan (systematics, dynamics and origin).* Baku: Elm. 299 p. (in Russian)
- Mikhailov T.K., Ibragimov SH.R. (1980). *Ecology and zoogeography of parasites of fish of water bodies of the Lenkoran natural area.* Baku: Elm, 115 p. (in Russian)
- Mitenev V.K., Shulman B.S. (2010). Ecological and faunal review of fish parasites in Umbozero (Kola Peninsula). *Parazitologiya*, 44(5), 406–418. (in Russian)
- Moravec F. (1992). Observations on the bionomy of *Allocreadium isoporum* (Looss, 1894) (Trematoda: Allocreadiidae). *Folia parasitol (Praha)*, 39(2), 133–144.
- National Atlas of the Republic of Azerbaijan. (2014). The State Committee for Land and Cartography. Baku Cartography Factory, Baku, 444 p.
- Niewiadomska K., Laskowski Z. (2002). Systematic relationships among six species of *Diplostomum* Nordmann, 1832 (Digenea) based on morphological and molecular data. *Acta Parasitologica*, 47(1), 20–28.
- Pronina S.V., Pronin N.M. (2007). *Methodological manual on hydroparasitology (Part 1. Technique of parasitological research and parasitic protozoa).* Ulan-Ude. 52 p. (in Russian)
- Shendrik T.V., Bychkova E.I., Yakovich M.M., Degtyarik S.M. (2015). Parasite fauna of fish in the “Braslav Lakes” National Park. *Vest. Polesky State University*, 1, 44–48. (in Russian)

- Shigin A.A. (1986). *Trematodes of the fauna of the USSR. Genus Diplostomum. Metacercariae*. M.: Nauka, 253 p. (in Russian)
- Sokolov S.G., Protasova Y.N., Reshetnikov A.N., Voropaeva Y.L. (2011). Interaction of the introduced sleeper *Perccottus glenii* Dybowski, 1877 (Osteichthyes, Odontobutidae) with local fish species: a parasitological aspect of the problem. *Povolzhskiy Journal of Ecology*, 2, 203–211. (in Russian)
- Sudarikov V.E., Shigin A.A., Kurochkin Yu.A. et al. (2002). *Metacercariae of trematode parasites of freshwater hydrobionts in Central Russia*. M.: Nauka. 298 p. (in Russian) Судариков В.Е., Шигин А.А., Курочкин Ю.В. и др. Метациркаррии трематод – паразиты пресноводных гидробионтов Центральной России. – М.: Наука, 2002. – 298 с.
- Tyutin A.V. (2001). Study of fertility of marita *Bunodera luciopercae* (Trematoda: Bunoderidae). *Parazitologiya*, 35(5), 436–442. (in Russian)
- Yakovleva G.A., Lebedeva D.I., Ieshko Y.P. (2015). Trematodes of waterbirds of Karelia. *Trudy Karel. scientific. Center of the Russian Academy of Sciences (Ecological Series)*, 2, 95–110.
- Yamashita J. (1938). *Clinostomum complanatum*, a trematode parasite new to man. *Annot. Zool. Japan*, 17(3–4), 563–566.
- Zhokhov A.E. (1987). On the developmental cycle and biology of the trematodes *Phyllodistomum elongatum* (Fasciolata, Gorgoderidae). *Parazitologiya*, 21(2), 134–139. (in Russian)

## Трематоди риб транскордонного Арацького водосховища Е.В. Шакаралієва

У 2015–2018 рр. у трьох точках Арацького водосховища, що відображають основні екологічні умови цієї водойми, методом повного гельмінтологічного розтину досліджено 233 особини риб, які належать до 19 видів: каспійська плотва – *Rutilus caspicus*, каспійський жерех – *Leuciscus aspius*, куринський піскар – *Romanogobio persus*, арацька храмуля – *Carpoeta sevangi*, вусач-чанар – *Luciobarbus capito*, куринський вусач – *Barbus laserta*, закавказька уклейка – *Alburnus hohenackeri*, куринська уклейка – *A. filippi*, східна бистрянка – *Alburnoides eichwaldi*, лящ – *Abramis brama*, срібний карась – *Carassius gibelio*, сазан – *Cyprinus carpio*, ангорський голец – *Oxyuroemacheilus angorae*, закавказька щиповка – *Cobitis satunini*, сом – *Silurus glanis*, гамбузія звичайна – *Gambusia affinis*, судак – *Sander lucioperca*, бичок кругляк – *Neogobius melanstomus*, головатий бичок – *Ponticola gorlap*. У результаті досліджень виявлено 20 видів трематод, що належать до двох рядів, восьми родин та 12 родів: *Sanguinicola inermis*, *Bunodera luciopercae*, *Phyllodistomum elongatum*, *Orientocreadium siluri*, *Allocreadium isoporum*, *A. markewitschi*, *A. transversale*, *Acanthocreadium araxicum*, *Sphaerostomum bramae*, *Diplostomum chromatophorum*, *D. commutatum*, *D. helveticum*, *D. mergi*, *D. nordmanni*, *D. paracaudum*, *D. spathaceum*, *Tylodelphys clavata*, *Posthodiplostomum cuticola*, *Ichthyocotylurus pileatus*, *Clinostomum complanatum*. З них один вид є специфічним паразитом сомів, один – паразитом різних хижих риб, сім видів – паразитами корошових риб, а 11 видів – паразитами риб, що належать до різних родин. За швидкістю течії та розвитком водної рослинності Арацьке водосховище можна розділити на три частини. У верхній частині виявлено 11 видів трематод, у середній – 17 видів, а в нижній – 14 видів. Багатству трематодофауни сприяє уповільнення течії та розвиток водної рослинності, що приваблює проміжних та остаточних хазяїв – молюсків, ракоподібних, риб, птахів. Серед виявлених трематод дев'ять видів є збудниками хвороб риб, а один вид при попаданні в травний тракт може становити небезпеку здоров'ю людини.

Ключові слова: Арацьке водосховище, риби, паразити, гельмінти, трематоди.

**Цитування:** Шакаралієва Е.В. Трематоди риб транскордонного Арацького водосховища. Вісник Харківського національного університету імені В.Н. Каразіна. Серія «Біологія», 2021, 37, 79–86. <https://doi.org/10.26565/2075-5457-2021-37-7>

### Про автора:

Е.В. Шакаралієва – Азербайджанський медичний університет, вул. Рашида Бейбутова, 134, Баку, Азербайджан, AZ1014, [bioloq@yahoo.com](mailto:bioloq@yahoo.com), <https://orcid.org/0000-0002-0653-7605>

Подано до редакції: 22.06.21 / Прорецензовано: 29.08.2022 / Прийнято до друку: 29.10.2021