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PARASITE COMMUNITIES OF FISH FROM THE MECHKA RIVER, MARITSA RIVER BASIN

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Abstract

This study aims to examine the component and infracommunity of the bleak, Alburnus alburnus (Linnaeus, 1758), from the freshwater ecosystem of the Mechka River, part of the Maritsa River basin, East Aegean region. For the study, 54 specimens of bleak were caught from the Mechka River - Parvomay biotope (Debar) in the autumn of 2024. The fish were examined for the presence of parasites using standard methods. Species from Trematoda, Acanthocephala, and Nematoda were identified. Representatives of Acanthocephala dominate. The following indices were examined: Brillouin's diversity index (HB), Pielou's evenness index (E), and Simpson's dominance index (C). The studied biotope is a new habitat for the identified bleak parasites.

Key words*: bleak, Bulgaria, East Aegean region, ecological indices, parasites.*

INTRODUCTION

The Mechka River falls into the Maritsa River basin, East Aegean region. The river rises from the foot of Samantepe Peak in the Western Rhodopes at 954 m above sea level, flows for 43 km and flows into the Upper Thracian Lowland on the right side of the Maritsa River in the area of the town of Parvomay at 117 m above sea level.
The Mechka River passes through the territory of two municipalities (Assenovgrad and Parvomay) and two settlements - the town of Parvomay and the village of Poroyna (Integrated Development Plan of Municipality of Parvomay, 2021-2027).
Fish and their parasites are a significant element of biodiversity in freshwater ecosystems (Kirin et al., 2020).
They are among the most used bioindicators for assessing the state of waters (Kuzmanova et al., 2023). Many anthropogenic activities lead to a deterioration in the quality of aquatic ecosystems (Biswal & Chatterjee, 2020; Gartsiyanova et al., 2022; Gartsiyanova et al., 2024). The species diversity of parasites decreases due to pollution and stress (Biswal & Chatterjee, 2020). The ecological indices of parasites are related to the conditions of the aquatic environment and reflect the presence of pollutants (Palm, 2011). There is usually an equilibrium in the parasite-host relationship. A large number of parasites infect fish and can lead to their death, but not all fish parasites are dangerous to human health. It is necessary to increase people's awareness of diseases caused by parasites (Tessema, 2020). Knowing about the parasite fauna of fish is important for protecting fish populations and human health. Currently, the parasite fauna of fish from the freshwater ecosystem of the river Mechka has not been studied.
This study aims to examine the component community and infracommunity of the bleak, *Alburnus alburnus* (Linnaeus, 1758), from the Mechka River, part of the Maritsa River basin, East Aegean region.

MATERIALS AND METHODS

In the autumn of 2024, 54 specimens of the bleak, *Alburnus alburnus* (Linnaeus, 1758), were caught from the Mechka River near Parvomay. The habitat is in the Debar district (42°04'27.2"N 25°11'48.4"E). It is located next to the bridge on the main road connecting the villages of Popovitsa and Byala Reka (Figure 1).

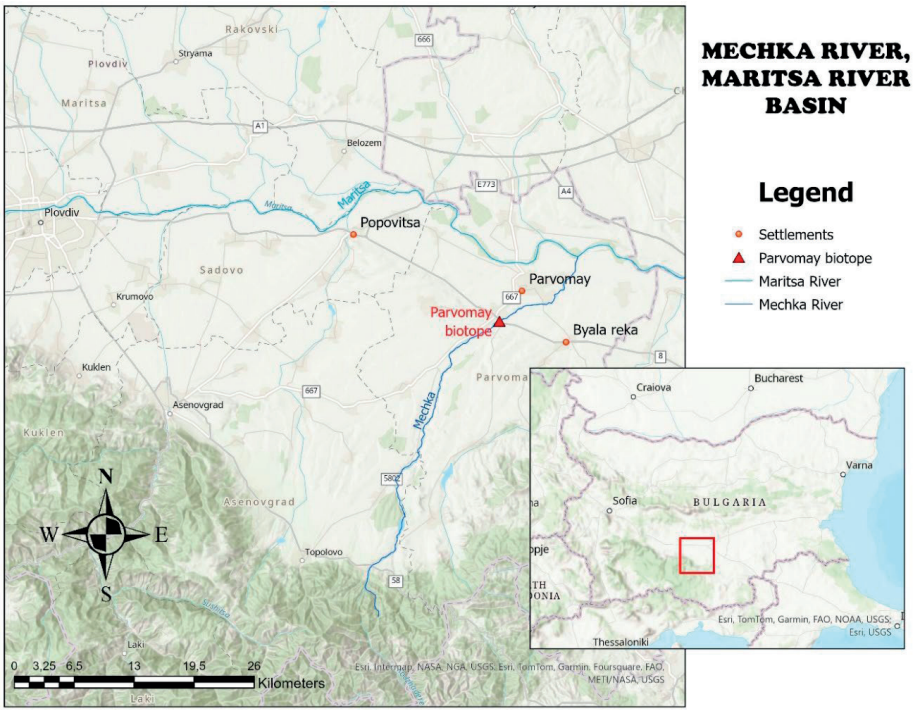

Figure 1. Map of the studied biotope of the Mechka River (original)

After issuing a ticket for amateur fishing, the fish were caught with a fishing rod. The caught fish species were determined using a handbook (Karapetkova & Zhivkov, 2006). After the fish were caught, a visual inspection of the body surface and abdominal cavity was performed, followed by a dissection of the organs. The parasitological examination of the fish was conducted in a laboratory at the Department of Chemistry, Phytopharmacy and Ecology, and Environmental Protection of the Agricultural University-Plovdiv. A Micros Austria MZ 1240 stereomicroscope and an XS-213 China microscope were used. Permanent microscopic preparations were prepared from the isolated trematodes using staining with carmine and passing through an ascending alcohol series according to Dubinina (Zaharieva, 2022). Temporary microscopic slides were prepared from the isolated acanthocephalans and nematodes using the glycerine-alcohol brightening method according to Zashev & Margaritov (Zaharieva, 2022); Moravec (2013). The parasite species were determined according to Bauer (Zaharieva, 2022) and Moravec (2013). The structure of the parasite communities was examined at two levels – component community, characterized by the ecological indices mean intensity (MI), mean abundance (MA) and prevalence (P%) according to Bush et al. (Zaharieva et al., 2025); and infracommunity represented by the indicators total number of species, mean number of species, total number of specimens, mean number of specimens, Brillouin's diversity index (HB), Pielou's evenness index (E) and Simpson's dominance index (C) according to Magurran (Zaharieva, 2022). According to the prevalence, parasite species are divided into core (P % > 20), component (10 < P % < 20) and accidental (P % < 10) by Kennedy (Zaharieva, 2022).

RESULTS AND DISCUSSIONS

Alburnus alburnus is a freshwater, brackish, benthopelagic fish. The species is native to almost Europe and Asia and was introduced to Cyprus, Italy, Portugal, Spain and Algeria. The bleak is a gregarious fish. It feeds on insects, invertebrates that have fallen to the water surface, and plankton (Froese & Pauly, 2025).

In the autumn of 2024, 54 specimens of bleak from the Mechka River, Parvomay biotope (Debar), were collected and subjected to parasitological examination. Infection with six parasite species was detected: two species of trematodes (*Posthodiplostomum cuticola* (von Nordmann, 1832) Dubois, 1936, localized in the skin, fins, gills; *Ichthyocotylurus pileatus* (Rudolphi, 1802) Odening, 1969, metacercariae, localized in the body cavity under the serous membrane of the intestine and the swim bladder); two species of acanthocephalans (*Acanthocephala anguillae* (Müller, 1780), with intestinal localization; *Pomphorhynchus laevis* (Zoega in Müller, 1776) Porta, 1908, with intestinal localization) and two species of nematodes (*Pseudocapillaria tomentosa* (Dujardin, 1843) Lomakin & Trofimenko, 1982, with intestinal localization, mainly in the distal part); *Schulmanela petruschewskii* (Schulman, 1948) Ivashkin, 1964, with liver parenchyma localization).

In the component community of the bleak with the largest number of specimens, trematodes are represented (with > 803 specimens), followed by acanthocephalans (with 157 specimens) and nematodes (with seven specimens). Two core parasite species have been identified - *Ac. anguillae* (P % = 57.41) and *P. laevis* (P % = 46.30); one component and three accidental species. The highest values for MI and MA were found in the trematode *P. cuticola*, and the lowest in the nematode *Sch. petruschewskii* (Table 1).

Table 1. Component community of *Alburnus alburnus* from the Mechka River, Parvomay biotope (Debar) (N - number of fish studied; n - number of infected fish; p - number of parasites; MI - mean intensity; MA - mean abundance; P % - prevalence; R - range)

N = 54	N	p	MI	MA	P%	R
Posthodiplostomum cuticola (von Nordmann, 1832) Dubois, 1936, metacercariae	8	> 800	100.00	14.81	14.81	> 100
Ichthyocotylurus pileatus (Rudolphi, 1802) Odening, 1969, metacercariae	1	3	3.00	0.06	1.85	3
Acanthocephalus anguillae (Müller, 1780)	31	98	3.16	1.81	57.41	1-15
Pomphorhynchus laevis (Zoega in Müller, 1776) Porta, 1908	25	59	2.36	1.09	46.30	1-11
Pseudocapillaria (Pseudocapillaria) tomentosa (Dujardin, 1843) Lomakin & Trofimenko, 1982	5	6	1.20	0.11	9.26	1-2
Schulmanela petruschewskii (Schulman, 1948) Ivashkin, 1964	1	1	1.00	0.02	1.85	1

In the present parasitological study of 54 specimens of bleak, infection was found in 46 specimens (85.19%). More than 967 parasite specimens were studied. Twenty-four specimens of bleak were infected with 1 parasite species; 19 specimens - with 2 parasite species and 3 specimens of bleak - with 3 parasite species. The number of parasite specimens in one specimen of *Alb. alburnus* varies from 1 to more than 109. Pielou's evenness index (E) is low, which indicates that the conditions are not optimal. Simpson's dominance index (C) is high, which is associated with the dominance of one species – the trematode *P. cuticola* (Table 2).

A number of authors have studied the parasite fauna of bleak from the East Aegean region, including the catchments of the Maritsa, Arda, Tundzha, and Byala Rivers. Three parasite species found in *Alb. alburnus* from the Mechka River, Parvomay biotope (Debar) -*P. cuticola, Ps. tomentosa*, and *Sch. petruschewskii*, have not been reported in bleak from the East Aegean region (Table 3).

Table 2. Infracommunity of *Alburnus alburnus* from the Mechka River, Parvomay biotope (Debar)

Number of specimens *Alburnus alburnus*	**Number of parasites**			
	0	**1**	**2**	**3**
	8	24	19	3
Total number of species (Mean numbet of species ± SD)	6 (1.33 ± 0.82)			
Total number of specimens (Mean number of specimens ± SD)	> 967 (17.91 ± 36.19)			
Range	1- > 109			
Brillouin's biodiversity index (HB)	0.403			
Pielou's evenness index (E)	0.256			
Simpson's dominance index (C)	0.788			

Table 3. Parasites of *Alburnus alburnus* reported from the East Aegean region

Author	**River**	**Parasite species**
According to Margaritov (by Chunchukova et al., 2019)	Maritsa River, Chepinska River	*Caryophyllaeus brachycollis* (Janiszewska, 1951)
Kakacheva-Avramova, 1965	Maritsa River	*Caryophyllaeidae* gen sp.; *Rhabdochona* sp. juv.
	Maritsa River (Pazardzik) and some canals; Topolnitsa River and canals; Chepinska River; Asenitsa River; Chetiridesette izvora (Asenovgrad Region); Sushitsa River and canals; Syutliyka River; Bedechka River; Harmanliyska River; fishponds; Azmaka Dam near the village of Ivanovo, Harmanliysko	*Rhabdochona denudata* (Dujardin, 1845) Railliet, 1916
Kakacheva-Avramova (cited by Chunchukova & Kirin, 2020)	Tundzha River	*Caryophyllaeides fennica* (Schneider, 1902) Nybelin, 1922; *P. laevis*; *Rh. denudata*
Kirin, 2001	Kardzhali Reservoir	*Ichth. pileatus*, metacercariae; *Neogryporhynchus cheilancristrotus* (Wedl, 1855) Wedl, 1855 (syn. *Gryporhynchus cheilancristrotus* (Wedl, 1855)); *Rh. denudata*
Kirin et al., 2002	Arda River, Rabovo	*C. fennica*; *Schyzocotyle acheilognathi* (Yamaguti, 1934) Brabec, Waeschenbach, Scholz, Littlewood & Kuchta, 2015 (syn. *Bothriocephalus acheilognathi* Yamaguti, 1934); *Ligula intestinalis* (Linnaeus, 1758) Gmelin, 1790, plerocercoid; *Paradilepis scolecina* (Rudolphi, 1819), cysticerc; *Rh. denudata*
	Arda River, Madzharovo	*C. brachycollis*; *Sch. acheilognathi*; *Rh. denudata*
Kirin, 2003	Arda River	*C. brachycollis*; *C. fennica*; *Bathybothrium rectangulum* (Bloch, 1782) Lühe, 1902; *Ac. anguillae*; *Rh. denudata*
Kirin et al., 2013	Arda River	free of parasites
Chunchukova et al., 2019	Maritsa River (Plovdiv)	*Allocreadium isoporum* (Looss, 1984); *C. brachycollis*; *L. intestinalis*; *P. laevis*; *Rh. denudata*
Chunchukova & Kirin, 2020	Tundzha River	*Ac. anguillae*
Zaharieva et al., 2024	Luda Yana River (Svoboda)	*Raphidascaris acus* (Boch, 1779)
	Chepelarska River (Katunitsa)	free of parasites

Of the parasite species discovered in this study, the acanthocephalan *P. laevis* is pathogenic for fish and causes the disease pomphorhynchosis associated with intestinal damage in infected fish (Novakov et al., 2015). The metacercariae of the trematode *P. cuticola* cause the disease postodiplostomosis, which can lead to refusal to feed, rapid weight loss and death of fish (Rusev & Stratev, 2021).

CONCLUSIONS

The present study provides the first data on the component and infracommunity of the bleak from the Mechka River. Infection with six parasite species was detected - *P. cuticola*, Metacercariae; *Ichth. pileatus*, Metacercariae; *Ac. anguillae*; *P. laevis*; *Ps. tomentosa*; *Sch. petruschewskii*. The Parvomay (Debar) biotope is a new habitat for the six identified species of bleak parasites. *P. cuticola*, *Ps. tomentosa* and *Sch. petruschewskii* are reported for the first time from *Alb. alburnus* from the East Aegean region in Bulgaria. No parasite species pathogenic to humans were detected. Two of the identified parasite species - *P. laevis* and *P. cuticola*, cause diseases in fish that can affect fish populations. *P. laevis* has a high prevalence (P % = 46.30) in bleak from the Parvomay biotope (Debar). To protect fish resources, it is recommended that parasitological research in the freshwater ecosystem of the Mechka River be continued.

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