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PARASITES AND PARASITE COMMUNITIES OF *Squalius orpheus* Kottelat & Economidis, 2006 FROM THE LUDA YANA RIVER

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Abstract

The present study presents new data on the helminths and helminth communities of fish from the freshwater ecosystem of the Luda Yana River as part of the Maritsa River Basin in Bulgaria, Eastern Aegean Water Basin. In connection with this, 32 specimens of Orpheus dace (Squalius orpheus Kottelat & Economidis, 2006) were collected and examined. The specimens were collected in the autumn of 2022 in the vicinity of the Popintsi village, located in the middle section of the Luda Yana River. The helminthological examination was carried out according to standard methods. Invasion with 3 species of helminths was found - one cestode species (Caryophyllaeides fennica (Schneider, 1902) Nybelin, 1922); one acanthocephalan species (Acanthocephalus lucii (Müller, 1776) Lühe, 1911) and one nematode species (Rhabdochona denudata (Dujardin, 1845) Railliet, 1916). Ac. lucii is reported for the first time from Sq. orpheus in Bulgaria.

Key words*: Aegean Water Basin, Bulgaria, helminths, helminth communities, Orpheus dace.*

INTRODUCTION

The East Aegean region covers the catchment basins of four large rivers in Southern Bulgaria - the Maritsa River, the Arda River, the Tundzha River, and the Byala Reka River (Ministry of environment and waters. East Aegean River Basin Directorate, Plovdiv). The Maritsa River ranks fourth in length in Bulgaria (with 321.6 km on Bulgarian territory) (Chunchukova et al., 2019a; 2019b). The catchment basin of the river in Bulgaria is 21,084 km^2, including over 100 tributaries (Ministry of environment and waters. East Aegean River Basin Directorate, Plovdiv). The Luda Yana River, a left tributary of the Maritsa River, is 74 km long. The river begins from the Sredna Gora Mountains, flows through the Upper Thracian Plain, and flows into the Maritsa River in the area of the village of Sinitovo (Kolev, 2013; 2020). Along its entire course, the Luda Yana River is exposed to anthropogenic pollution (ore mining, industrial waste water, sewerage, irrigation, and others) (Kirin et al., 2019a). Different authors study the anthropogenic impact on the water quality and biodiversity of the river (Rabadjieva et al., 2009; Georgieva et al., 2014; Nam & Tamburadzhiev, 2019; Gartsiyanova et al., 2020; Gartsiyanova et al., 2021; Radeva & Seymenov, 2021; Gartsiyanova et al., 2022). There are a number of studies on the anthropogenic pressure (pollution with heavy metals) on a number of water bodies being part of the Aegean Water Basin - the Sazliyka River (Mn contamination; Atanasov et al., 2013; Cd contamination, Valkova et al., 2015; Pb contamination, Valkova et al., 2016); the Zhrebchevo Dam (Mn contamination, Atanasov et al., 2013; Fe, Ni, Pb, Mn, Cu, Cr, Cd, Zn contamination, Zhelyazkov et al., 2014; Cd contamination, Valkova et al., 2015; Pb contamination, Valkova et al., 2016; Cd, Ni, Pb, Zn contamination, Zhelyazkov et al., 2018); the Tundzha River (Mn contamination, Atanasov et al., 2013; Cd contamination, Valkova et al., 2015; Pb contamination, Valkova et al., 2016); the Bedechka River (Mn contamination, Atanasov et al., 2013; Cd contamination, Valkova et al., 2015; Pb contamination, Valkova et al., 2016); the Zagorka Lake (Fe, Mn, Cu, Cr, Ni, Zn, Pb, Cd contamination, Atanasov et al., 2012); the Ovcharitsa Dam (Fe, Mn, Cu, Cr, Ni, Zn, Pb, Cd contamination, Atanasov et al., 2012; Fe, Mn contamination, Valkova et al., 2020; Cu, Cd contamination, Valkova et al., 2021); the Chepelarska River (Pb, Cd contamination,

Dospatliev et al., 2015); others. Kolev (2013) studied the ichthyofauna of rivers entering the Maritsa River and reported the following species for the Luda Yana River: *Gobio bulgaricus* Drensky, 1926; *Pseudorasbora parva* Temminck & Schlegel, 1846; *Barbus cyclolepis* Heckel, 1837; *Carassius gibelio* Bloch, 1782; *Alburnus alburnus* Linnaeus, 1758; *Rutilus rutilus* Linaeus, 1758; *Squalius orpheus* Kottelat & Economidis, 2006; *Cobitis strumicae* Karaman, 1955; *Salmo* sp.; *Lepomis gibbosus* Linnaeus, 1758; *Perca fluviatilis* Linnaeus, 1758. Fish are directly affected by the pollutants in the aquatic environment and indicate the condition of the environment. They are an important part of the monitoring systems of aquatic ecosystems (Authman et al., 2015). Parasites can also reflect changes in the environment because their life cycles involve a number of intermediate and definitive hosts (Kirin, 2013). Studies on parasites and parasite communities of fish from the Luda Yana River were carried out by Kirin (2002b); Kirin et al. (2019a).

The purpose of this study is to provide new data on the species composition of helminths and the structure of the helminth communities of Orpheus dace from the ecosystem of the Luda Yana River, part of the Maritsa River Basin in Bulgaria.

MATERIALS AND METHODS

In the autumn of 2022, 32 specimens of Orpheus dace (*Squalius orpheus* Kottelat & Economidis, 2006) from the Luda Yana River were examined. The fish were collected from the river in the vicinity of the village of Popintsi (denoted as a biotope), Pazardzhik Province (Figure 1).

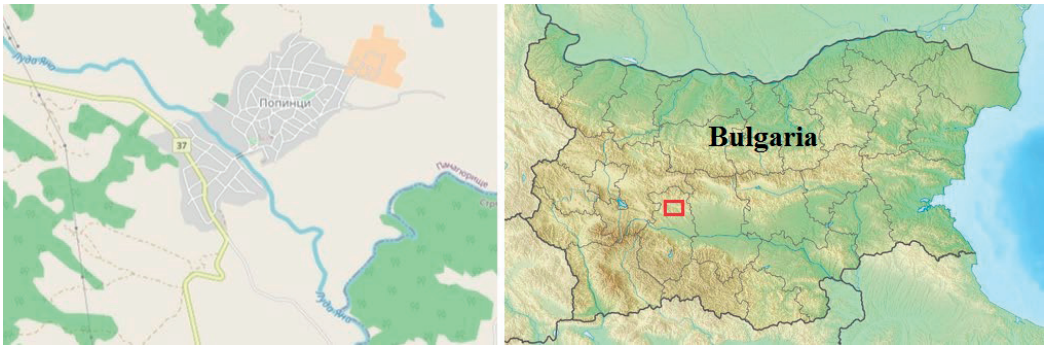

Figure 1. Location of the studied biotope from the Luda Yana River (Caynax Sports Tracker GPS; https://bg.wikipedia.org/wiki/Попинци with changes)

The scientific name of the species is given by Fröse & Pauly (2022). The body surface as well as the organs of the fish were examined for parasites immediately after capture. The ecologoparasitological study was completed in a laboratory at the Agricultural University - Plovdiv (Department of Agroecology and Environmental Protection) according to standard methods (Zashev & Margaritov, 1966; Moravec, 2013; and others). Permanent microscopic preparations (for the representatives of class Cestoda; Scholz & Hanzelová, 1998) and temporary microscopic preparations (for the representatives of classes Acanthocephala and Nematoda; Moravec, 2013) were prepared. Species belonging to the helminths ware determined according to Petrochenko (1956); Kakacheva-Avramova (1983); Moravec (2013), and others. Helminth communities are examined at the level of component communities and the level of infracommunities. Concerning the prevalence (Kennedy, 1993), species are divided into accidental (P% < 10), component (10 < P% < 20), and core (P% > 20). Basic ecological indices (mean intensity (MI), mean abundance (MA) and prevalence (P%), as well as Brillouin's diversity index (HB), Pielou's evenness index (E), Simpson's dominance index (C) were calculated (Margolis et al., 1982; Magurran, 1988; Kennedy, 1993).

RESULTS AND DISCUSSIONS

Model fish species

Sq. orpheus was selected as a model fish species (reported as *Squalius cephalus* (Linnaeus, 1758); *Leuciscus cephalus* (Linnaeus, 1758) in the Aegean Water Basin until 2006); genus *Squalius* Bonaparte 1837; family Cyprinidae. Orpheus dace is a freshwater, pelagic, omnivorous fish. The species is distributed in the rivers part of the Aegean Water Basin on the territory of Bulgaria, Greece, and Turkey. It is found in streams and rivers where the current is moderate or the water is standing (Fröse & Pauly, 2022).

Structure of the helminth communities

During the study of the 32 specimens Orpheus dace from Popintsi biotope, three taxa of helminths were found - *Caryophyllaeides fennica* (Schneider, 1902) Nybelin, 1922 (class Cestoda); *Acanthocephalus lucii* (Müller, 1776) Lühe, 1911 (class Acanthocephala) and *Rhabdochona denudata* (Dujardin, 1845) Railliet, 1916 (class Nematoda).

Component community

In the component community of Orpheus dace, the representatives of class Acanthocephala (1 species with 15 specimens) had the largest number of specimens, and the representatives of class Cestoda (1 species with 1 specimen) had the smallest number. In the helminth community of *Sq. orpheus*, one component helminth species (*Ac. lucii*) was found, with a prevalence P% = 15.63. While *C. fennica* and *Rh. denudata* were accidental helminth species, with prevalence P% = 3.13 and P% = 6.25, respectively. *Ac. lucii* also had the highest values for MI and MA (Table 1).

Table 1. Species diversity and ecological indices in the helminth community of *Squalius orpheus* from the Luda Yana River (N - number of investigated fish; n - number of infected fish; p - number of fish parasites; MI - mean intensity; MA - mean abundance; P% - prevalence; R - range)

***Squalius orpheus* (N = 32 / Popintsi biotope)** **Parasite species**	**n**	**p**	**MI**	**MA**	**P%**	**R**
Caryophyllaeides fennica (Schneider, 1902) Nybelin, 1922	1	1	1.00	0.03	3.13	1
Acanthocephalus lucii (Müller, 1776) Lühe, 1911	5	15	3.00	0.09	15.63	1-5
Rhabdochona denudata (Dujardin, 1845) Railliet, 1916	2	3	1.50	0.05	6.25	1-2

Infracommunity

In the present study of 32 *Sq. orpheus* specimens, parasites were found in eight of them (25%). All specimens Orpheus dace were infected with only one helminth species. In one specimen of *Sq. orpheus*, one specimen of *C. fennica* was found. In 1, 3, and 1 *Sq. orpheus* specimens, 1, 3, and 5 specimens of *Ac. lucii* were found, respectively. Two Orpheus dace specimens were infected with 1 and 2 specimens of *Rh. denudata*, respectively. The helminthological examination showed infection with 3 species and a total of 19 helminth specimens. The number of the found helminth specimens in one Orpheus dace specimen varied from 1 to 5. The index of diversity and evenness are close (HB = 0.51 and E = 0.57, respectively). The dominance index, C = 0.65 is highly associated with the dominance of *Ac. lucii* (Table 2).

Table 2. Infracommunity of *Squalius orpheus* from the Luda Yana River

	Number of parasite species	
	0	**1**
Number of specimens *Sq. orpheus*	24	8
Total number of species (Mean number of species ± SD)	3 (0.25±0.44)	
Total number of specimens (Mean number of specimens ± SD)	19 (0.59±1.32)	
Range	1-5	
Brillouin's diversity index (HB)	0.51	
Pielou's evenness index (E)	0.57	
Simpson's dominance index (C)	0.65	

For the last 22 years, a number of studies on the species composition and ecological indices of parasites of *Sq. orpheus* from the Aegean Water Basin in Bulgaria have been conducted. Studies on Orpheus dace parasites from Luda Yana River have not been conducted (Table 3).

Table 3. Species composition of *Squalius orpheus* parasites from the Aegean Water Basin in Bulgaria

Authors	Localities	Species composition of *Squalius orpheus* parasites
Kakacheva-Avramova, 1965	reservoirs of Thrace	*Rh. Denudate*
Margaritov, 1964	Maritsa, Vacha, Chepinska rivers	*Rh. denudata*
Kirin, 2000	Maritsa River – Plovdiv	*Allocreadium isoporum* (Looss, 1894) Looss, 1902 (syn. *Allocreadium isoporum macrorchis* Koval & Kulakowskaya in Koval, 1957); *Clinostomum complanatum* (Rudolphi, 1814) Braun, 1899 (metacercaria); *Caryophyllaeus brachycollis* (Janiszewska, 1951); *Bathybothrium rectangulum* (Bloch, 1782) Lühe, 1902; *Acanthocephalus tenuirostris* (Achmerov & Dombrovskaja-Achmerova, 1941) Yamaguti, 1963; *Acanthocephalus anguillae* (Müller, 1780) Lühe, 1911; *Pomphorhynchus laevis* (Zoega in Müller, 1776) Porta, 1908; *Philometra ovata* (Zeder, 1803) Skrjabin, 1923 (syn. *Philometra abdominalis* Nybelin, 1928)
Kirin, 2001a	Kardzhali Rezervoir	*All. isoporum*; *Cl. complanatum* (metacercaria); *Ichthyocotylurus pileatus* (Rudolphi, 1802) Odening, 1969 (metacercaria); *C. brachycollis*; *B. rectangulum*; *Rh. denudata*
Kirin, 2001b	Maritsa River – Pazardzhik	*All. isoporum*; *Cl. complanatum* (metacercaria); *C. brachycollis*; *B. rectangulum*; *Ac. anguillae*; *P. laevis*
Kirin, 2001c	Mesta River	*Cl. complanatum* (metacercaria); *Ichth. pileatus* (metacercaria); *C. brachycollis*; *Caryophyllaeides fennica* (Schneider, 1902) Nybelin, 1922; *Ac. tenuirostris*; *Ac. anguillae*; *Rh. Denudate*
Kirin, 2002a	Chepelarska River – between Asenovgrad and Bachkovo	*B. rectangulum*; *Ac. anguillae*; *Ac. tenuirostris*; *Contracaecum microcephalum* (Rudolphi, 1809) Baylis, 1920 (syn. *Contracaecum squalii* Linstow, 1907 Skrjabin, 1917 (larvae)); *Rh. Denudate*
Kirin, 2002c	Arda River – cascade Gorna Arda	*All. isoporum*; *Cl. complanatum* (metacercaria); *Ichth. pileatus* (metacercaria); *C. fennica*; *C. brachycollis*; *B. rectangulum*; *Ac. anguillae*; *Ac. tenuirostris*; *Rh. denudata*
Kirin et al., 2002; Kuzmanov et al., 2002	Arda River – Rabovo	*C. fennica*; *Rh. Denudate*
	Arda River – Madzharovo	*Ichth. pileatus* (metacercaria); *C. fennica*; *C. brachycollis*
Kirin et al., 2003; Kuzmanov et al., 2003	Arda River – Huhla	*Ichth. pileatus* (metacercaria); *Cl. complanatum* (metacercaria); *C. fennica*; *C. brachycollis*; *Schyzocotyle acheilognathi* (Yamaguti, 1934) Brabec, Waeschenbach, Scholz, Littlewood & Kuchta, 2015 (syn. *Bothriocephalus acheilognathi* Yamaguti, 1934); *Ligula intestinalis* (Linnaeus, 1758) Gmelin, 1790 (plerocercoid); *Ac. anguillae*; *Rh. Denudate*
Kirin et al., 2005	Stryama River – from 9 biotopes	*All. isoporum*; *C. fennica*; *C. brachycollis*; *B. rectangulum*; *P. laevis*; *Ac. anguillae*; *Ac. tenuirostris*; *Rh. denudata*
Kirin, 2006	Arda River – Rabovo	*C. fennica*; *Rh. Denudate*
	Arda River – Madzharovo	*Ichth. pileatus* (metacercaria); *C. fennica*; *C. brachycollis*
	Arda River – Huhla	*Ichth. pileatus* (metacercaria); *Cl. complanatum* (metacercaria); *C. fennica*; *C. brachycollis*; *Sch. acheilognathi*; *L. intestinalis* (plerocercoid); *Ac. anguillae*; *Rh. Denudate*
	Arda River – Slaveevo	*Ichth. pileatus* (metacercaria); *Posthodiplostomum cuticola* (von Nordmann, 1832) Dubois, 1936 (metacerc); *C. fennica*; *C. brachycollis*; *Sch. acheilognathi*; *L. intestinalis* (plerocercoid); *Paradilepis scolecina* (Rudolphi, 1819) (cysticerc); *Ac. anguillae*; *Rh. denudata*; *Raphidascaris acus* (Bloch, 1779) Railliet & Henry, 1915 (larvae)
Kirin & Shukerova, 2006	Arda River – Slaveevo	*Ichth. pileatus* (metacercaria); *P. cuticola* (metacerc); *C. fennica*; *C. brachycollis*; *Sch. acheilognathi*; *L. intestinalis* (plerocercoid); *P. scolecina* (cysticerc); *Ac. anguillae*; *Rh. denudata*; *R. acus* (larvae)
Kirin & Shukerova, 2007	Arda River	*Ichth. pileatus* (metacercaria); *Cl. complanatum* (metacercaria); *C. fennica*; *C. brachycollis*; *Sch. acheilognathi*; *L. intestinalis* (plerocercoid); *P. scolecina* (cysticerc); *Ac. anguillae*; *Rh. denudata*; *R. acus* (larvae)
Kirin et al., 2012, 2013a	Tundzha River	*Ichth. pileatus* (metacercaria); *Cl. complanatum* (metacercaria); *C. fennica*; *C. brachycollis*; *Sch. acheilognathi*; *L. intestinalis* (plerocercoid); *Ac. anguillae*; *Rh. Denudate*
Kirin et al., 2013b	Arda River	free of parasites
Kirin et al., 2019b	Stryama River	*All. isoporum*; *C. brachycollis*; *P. laevis*; *Rh. denudata*
Chunchukova et al., 2020a	Topolnitsa River	*P. laevis*

The found three helminth species of Orpheus dace, from the present study, have been reported for a large number of fish host species from different water bodies on the territory of Bulgaria (Table 4).

Table 4. Fish hosts of *Caryophyllaeides fennica*, *Acanthocephalus lucii*, and *Rhabdochona denudata* in Bulgaria

Authors	Localities	Host
studies on *CARYOPHYLLAEIDES FENNICA*		
Margaritov, 1959	Iskar River – Vrazhdebna; Tundzha River – Vetren, Kazanlak Municipality; Iskar River – Vrazhdebna, Kalkovo, Samokov Municipality; Palakaria River, Shiroki dol, Samokov Municipality Iskar River – Vrazhdebna	*Barbus barbus* (Linnaeus, 1758) *Barbus petenyi* Heckel, 1852 *Squalius cephalus* (Linnaeus, 1758) (syn. *Leuciscus cephalus*)
Margaritov, 1964	Batak Reservoir	*Sq. cephalus*
Margaritov, 1965	Maritsa River	*B. cyclolepis*; *Sq. cephalus*; *V. melanops*
Kakacheva-Avramova, 1965	Asenitsa, Harmanliyska, Topolnitsa, Syutliyka, Bedechka rivers	*B. cyclolepis*; *Sq. cephalus*; *V. melanops*
Margaritov, 1966	Danube River – from the sections Svishtov – Ruse and the mouth of the Timok River – Novo Selo	*Barbus barbus* (Linnaeus, 1758)
	Danube River, between the mouth of the Timok River and Novo Selo	*Sander lucioperca* (Linnaeus, 1758) (syn. *Lucioperca lucioperca*)
Kakacheva-Avramova, 1969	Nishava, Ogosta, Vodomerka, Buchinska, Vrabnishka, Burzia, Chuprenska, Iskretska, Botunya, Bebresh rivers Bogovina River Bogovina, Nishava, Ogosta, Vodomerka, Burzia, Botunya, Bebresh rivers Botunya, Bebresh rivers Ogosta River Leva River	*B. petenyi* *B. barbus* *Sq. cephalus* *Gobio gobio* (Linnaeus, 1758); *Chondrostoma nasus* (Linnaeus, 1758) *Alb. alburnus*
Margaritov, 1977	Shiposhnitsa River, Iskar Reservoir	*Sq. cephalus*, *R. rutilus*
Kakacheva-Avramova et al., 1978	Danube River – Vidin, Lom, Svishtov, Silistra	*Abramis brama* (Linnaeus, 1758); *Alb. alburnus*; *Ballerus sapa* (Pallas, 1814) (syn. *Abramis sapa*); *Ballerus ballerus* (Linnaeus, 1758) (syn *Abramis ballerus*); *B. barbus*; *Blicca bjoerkna* (Linnaeus, 1758); *Pelecus cultratus* (Linnaeus, 1758); *S. lucioperca* (syn. *Stizostedion lucioperca*); *Scardinius erythrophthalmus* (Linnaeus, 1758); *Vimba vimba* (Linnaeus, 1758) (syn. *Vimba vimba carinata*)
Kakacheva-Avramova, 1973	Vit, Cherni Vit rivers	*Sq. cephalus*
Margaritov, 1977	Shiposhnitsa River, Iskar Reservoir	*Sq. cephalus*
Kakacheva-Avramova, & Menkova, 1978	Palakaria River	*Sq. cephalus*
Kakacheva-Avramova, & Nedeva-Menkova, 1981	Struma, Zheleznitsa rivers	*B. barbus*
Kirin, 2001c	Mesta River	*Sq. orpheus*; *Barbus meridionalis petenyi* Heckel, 1847
Kirin, 2002c	Arda River – from the confluence of the Cherna, Rodozemska and Madanska rivers to the Kardzhali Rezervoir / cascade Gorna Arda	*Sq. orpheus*
Kirin et al., 2002; Kuzmanov et al., 2002	Arda River – Rabovo, Madzharovo	*Sq. orpheus*
	Arda River – Rabovo	*Alb. alburnus*
Kirin, 2003	Arda River – from the confluence of the Cherna, Rodozemska and Madanska rivers to the Kardzhali Rezervoir	*B. cyclolepis*; *Alb. alburnus*
Kirin et al., 2003; Kuzmanov et al., 2003	Arda River – Huhla	*Sq. orpheus*
Kirin et al., 2005	Stryama River	*Sq. orpheus*
Kirin, 2006	Arda River – Rabovo, Madzharovo, Huhla, Slaveevo	*Sq. orpheus*
Kirin & Shukerova, 2006; 2007	Arda River – Slaveevo	*Sq. orpheus*
Atanasov, 2012	Danube river – from the region of Dobri dol	*B. barbus*
Kirin et al., 2012; 2013a	Tundzha River	*Sq. orpheus*
Shukerova, 2010	Srebarna Lake	*P. fluviatilis*
Kirin et al., 2019a	Luda Yana River – Popintsi	*R. rutilus*

Authors	Localities	Host
studies on *CARYOPHYLLAEIDES FENNICA*		
Kirin et al., 2020	Tamrashka River – between Hrabrino and Parvenets	*B. cyclolepis*
studies on *ACANTHOCEPHALUS LUCII*		
Margaritov, 1959	Danube River – Svishtov	*Sillurus glanis* Linnaeus, 1758
	Iskar River – Vrazhdebna, Kalkovo	*Sq. cephalus*
Margaritov, 1966	Danube River – between Svishtov and Ruse and between the Timok River and Novo Selo	*P. fluviatilis*
Kakacheva-Avramova et al., 1978	Danube River – Svishtov, Silistra and in the region of Vidin	*B. sapa*; *Sq. cephalus*; *R. rutilus*; *S. glanis*; *P. fluviatilis*; *Lota lota* (Linnaeus, 1758); *Gymnocephalus schraetser* (Linnaeus, 1758) (syn. *Acerina schraetser*); *Benthophilus stellatus* (Sauvage, 1874); *Proterorhinus marmoratus* (Pallas, 1814)
Atanasov, 2012	Danube River – Archar and Kozloduy	*L. lota*; *Zingel zingel* (Linnaeus, 1766)
Chunchukova, 2017; Chunchukova et al., 2016; Chunchukova et al., 2017; Chunchukova et al., 2020b	Danube River – Vetren	*Abr. brama*
Chunchukova, 2017; Chunchukova et al., 2018	Danube River – Vetren	*Alb. alburnus*
Shukerova, 2010; Shukerova et al., 2010	Srebarna Lake	*P. fluviatilis*
Chunchukova et al., 2020c	Ogosta River	*Sq. cephalus*
Kirin et al., 2019a	Luda Yana River – Popintsi	*R. rutilus*
Kirin & Chunchukova, 2021	Tundzha River	*S. glanis*
studies on *RHABDOCHONA DENUDATA*		
Margaritov, 1959	Iskar River – Vrazhdebna	*B. barbus*; *Sq. cephalus*
Kakacheva-Avramova, 1962	Strumeshnitsa River	*Scardinius erythrophthalmus* (Linnaeus, 1758)
Margaritov, 1964	Maritsa, Vacha, Chepinska rivers Maritsa River Maritsa, Chepinska rivers Maritsa, Vacha, Chepinska, Topolnitsa rivers	*Sq. orpheus* *V. melanops* *Alb. alburnus* *B. cyclolepis*
Kakacheva-Avramova, 1965	reservoirs of Thrace	*Sq. orpheus*; *Alb. alburnus*; *L. aspius*; *B. cyclolepis*
Kakacheva-Avramova, 1969	Ogosta, Vrabnishka, Burzia, Nishava, Botunya, Leva, Archar, Berkovska, Vrabnishka, Chuprenska rivers Chuprenska, Burzia, Leva rivers Leva River Burzia River Ogosta, Lom, Leva rivers	*Sq. cephalus* *B. petenyi* *B. barbus* *G. gobio* *Alb. alburnus*
Margaritov, 1977	Shiposhnitsa River, Iskar Reservoir	*Sq. cephalus*
Kakacheva-Avramova & Menkova, 1978	Palakaria River	*Sq. cephalus*
Kakacheva-Avramova et al., 1978	Danube River – Vidin	*Z. zingel* (syn. *Aspro zingel*); *Zingel streber* (Siebold, 1863) (syn. *Aspro streber*); *Alb. alburnus*
Kakacheva-Avramova & Nedeva-Menkova, 1981	State Fisheries Blagoevgrad Zheleznitsa,Blagoevgradska Bistritsa, Gradevska, Struma rivers	*Cobitis taenia* Linnaeus, 1758 *Sq. cephalus*
Kirin, 2001a	Kardzhali Rezervoir	*Sq. orpheus*
Kirin, 2001c	Mesta River	*Sq. orpheus*
Kirin, 2001d	Mesta River	*Cyprinus carpio* Linnaeus, 1758
Kirin, 2001e	Veleka, Rezovska rivers	*Alb. alburnus*
Kirin, 2002a	Chepelarska River – between Asenovgrad and Bachkovo	*Sq. orpheus*
Kirin, 2002c	Arda River – from the confluence of the Cherna, Rodozemska and Madanska rivers to the Kardzhali Rezervoir / cascade Gorna Arda	*Sq. orpheus*
Kirin, 2003	Arda River – from the confluence of the Cherna, Rodozemska and Madanska rivers to the Kardzhali Rezervoir	*Alb. alburnus*
Kirin et al., 2002; Kuzmanov et al., 2002	Arda River – Rabovo, Madzharovo	*Alb. alburnus*

Authors	Localities	Host
studies on *RHABDOCHONA DENUDATA*		
Kirin et al., 2002; Kuzmanov et al., 2002	Arda River – Rabovo, Madzharovo	*Alb. alburnus*
Kirin et al., 2002; Kuzmanov et al., 2002; Kirin, 2006	Arda River – Rabovo	*Sq. orpheus*
Kirin et al., 2003; Kuzmanov et al., 2003; Kirin, 2006	Arda River – Huhla	*Sq. orpheus*
Kirin et al., 2005	Stryama River	*Sq. orpheus*
Kirin, 2006; Kirin & Shukerova, 2006	Arda River, Slaveevo	*Sq. orpheus*
Kirin & Shukerova, 2007	Arda River	*Sq. orpheus*
Shukerova & Kirin, 2008	Srebarna Lake	*Sc. erythrophthalmus*
Shukerova, 2010	Srebarna Lake	*L. aspius*; *Sc. erythrophthalmus*
Atanasov, 2012	Danube River – Archar	*B. barbus*; *Sc. erythrophthalmus*; *Sq. cephalus*
Kirin et al., 2012, 2013a	Tundzha River	*Sq. orpheus*
Chunchukova et al., 2019a	Maritsa River	*Alb. alburnus*
Chunchukova et al., 2019b	Maritsa River	*Sc. erythrophthalmus*
Kirin et al., 2019a	Luda Yana River – Popintsi	*R. rutilus*
Kirin et al., 2019b	Stryama River	*Sq. orpheus*
Kuzmanova et al., 2019	Osym River – Lovech	*Sq. cephalus*
Chunchukova & Kirin, 2020a	Danube River – Silistra	*Abr. brama*
Chunchukova & Kirin, 2020b	Tundzha River – Yambol	*L. aspius*
Chunchukova et al., 2020c	Ogosta River	*Sq. cephalus*

CONCLUSIONS

In the autumn of 2022, 32 specimens of *Sq. orpheus* from the Luda Yana River (Popintsi biotope) were examined for parasites. Infection was found in 25% of the examined specimens. Three helminth species were found (*Caryophyllaeides fennica* (Schneider, 1902) Nybelin, 1922; *Acanthocephalus lucii* (Müller, 1776) Lühe, 1911; *Rhabdochona denudata* (Dujardin, 1845) Railliet, 1916). In the component community of Orpheus dace, *Ac. lucii* (MI = 3.00; MA = 0.09; P% = 15.63) had the highest ecological indices. *C. fennica*, *Ac. lucii* and *Rh. denudata* were reported of *R. rutilus* from the Luda Yana River (Popintsi biotope), but were not reported of *Sq. orpheus* from the Luda Yana River. *Sq. orpheus* is a new host for *Ac. lucii* in Bulgaria. The parasite species found in the present study are not dangerous for humans and fish. Studies on parasites are important for conservation of the fish resources.

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