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THE OCCURRENCE OF HELMINTH PARASITES IN BARBEL *(BARBUS PLEBEJUS ESCHERICHI*, STEINDACHNER, 1897) OF THE DOGANCI (BURSA) DAM LAKE, TURKEY

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The occurrence of helminth parasites of barbel in the Doganci Dam Lake was investigated monthly from December 1998 to November 1999. During this study, a total of 47 barbell were caught and examined for helminth parasites. A total of 5 species of helminth parasites was found as follows. Dactylogyrus carpathicus (Monogenea) was observed on gills of the fish and Bothriocephalus acheilognathi, Caryophyllaeus laticeps (Cestoda), Allocreadium isoporum (Digenea) and Contracaecum sp (Nematoda) were present in the intestines and the abdominal cavity of fishes. D. carpathicus was the dominant parasite species found in barbel. A total of 117 parasites were recorded on 27 of the 47 fish examined. The overall prevalence of D. carpathicus was 57%. A. isoporum was the second most dominant parasite in this study. A total of 35 parasites were found in 9 of 47 fish examined and the total prevalence of A. isoporum was 19.1%. However B. acheliognathi were present only in very small numbers. Only seven B. acheliognathi were found in 4 of the 47 fish examined. Four fish were infected by C. laticeps and a total of 13 parasites was found. A single species of Nematoda, Contracaecum sp was observed in 5 of the 47 fish examined. A total of 25 parasites was recorded. The overall prevalence of Contracaecum sp was 27.2%. D. carpathicus and .A. isoporum were new records for the helminth fauna of Turkey.

Keywords: barbel, parasites, D. carpathicus, B. acheliognathi, C laticeps, A. isoporum Contracaecum sp

INTRODUCTION

B. plebejus escherichi is one of the rarest cyprinids in Turkey. The helminth fauna of barbel in Turkey was investigated by Soylu (1991) and Oge and Sarmehmetoglu, (1996). Among the parasites of barbels, one genus of Acanthocephala, *Pomporhynchus laevis* from Buyukcoz Lake (Sakarya) (Soylu, 1991) and one genus of Digenea, *Clinostomum complanatum* metecercarie from Kirmir Stream (Oge and Sarmehmetoglu, 1996) were observed in Turkey. In both studies the number of helminth parasites was rather small. Our present study aims

to increase our knowledge on the occurrence of parasites of *B. plebejus escherichi* in Turkey.

MATERIAL AND METHODS

The fish population was investigated from December 1998 to November 1999 in monthly samples. The barbel were caught using a net, hook or blow -net. The fish were always transported to the laboratory alive, in aerated cans or polyethylene bags inflated with oxygen. When the sampling was performed in summer, the water used for transporting the fish to the laboratory was cooled with ice. Fish were placed in flowthrough type concrete basins and the aquarium in the laboratory, and dissected as soon as possible, within a few days after sampling. During the dissection, all internal organs (liver, kidney, heart, intestine, swimbladder, gills), the eyes, the fins and the skin were examined for parasites. The parasitological findings were based upon the examination of small pieces taken from the individual organs. The organs were dissected under a stereomicroscope and light microscope equipped with phase contrast. The parasite specimens were fixed in formaldehyde or Bouin's fluid stained with Mayer's hematoxylin. Then, the specimens were kept in Canada balsam after passing through the ethanol series: 70 % ethanol for (15-20 minutes), 80 % ethanol (10 minutes), 90% ethanol (5 minutes), and 100 % ethanol (5 minutes) and finally 2 minutes in xylol. All the parasites found were counted and classified (Table 1). The taxonomical determination was done according to Bychovskaya - Pavkoskava (1962), Markevic (1951), Gussev (1985), Moravec (1994) and Yamaguti (1956, 1963).

RESULTS AND DISCUSSION

We examined 47 specimens of barbel from the Doganci Dam Lake. One species of ectoparasite was found on the gills *(Dactylogyrus carpathicus)* and four endoparasite species *(B. acheliognathi, C. laticeps, A. isoporum* and *Contracaecum* sp.) were recorded parasiting in the intestine and abdominal cavity of the barbel. The dominant parasite species was *D. Carpathicus,* being the most frequent and numerous species. The overall prevalence of *D. carpathicus* was 57.4%. *A. soporum* was the second most dominant parasite in this study with a total prevalence of 19.1%. Two different types of Cestoda were found in the present study and were identified as *B. acheliognathi and C. laticeps.* A total of 13 *C. laticeps* was found on 4 of the 47 fish examined, while only seven *B. acheliognathi* were found on 4 of the 47 fish examined. A single species of Nematoda, *Contracaecum* sp was found on 5 of the 47 fish examined. The overall prevalence of *Contracaecum* sp was 27,2%. *Bothriocephalus acheilognathi, Caryophyllaeus laticeps* and *Contracaecum* sp (Nematoda) have been reported earlier but the other two parasite species were detected in our study for the first time in the ichthyoparasitofauna of Turkey. The results of the study are summarized in Table 1.

Table 1. Survey of Barbus plebejus escherischi from Doganci Dam Lake and their infection with helminth parasites.

Months		Number of barbel examined	Parasite species	Number of barbel infected					Prevalence (%)					Numbers of parasites				
				Dactylogyrus carpathicus	*Allocreadium isoporum*	*Caryophyllaeus laticeps*	*Bothriocephalus acheilognath*	*Contracaecum* sp	*Dactylogyrus carpathicus*	*Allocreadium isoporum*	*Caryophyllaeus laticeps*	*Bothriocephalus acheilognath*	*Contracaecum* sp	*Dactylogyrus carpathicus*	*Allocreadium isoporum*	*Caryophyllaeus laticeps*	*Bothriocephalus acheilognath*	*Contracaecum* sp
December	98																	
January	99	3																
February	99	4				1					25					3		
March	99	4	2			3	1		50		75	25		5		10	1	
April	99	6	5						83,3					15				
May	99	8	8	6					100	75			27,2	30	25			2
June	99	9	6	3				1	66,6	33,3			11,1	23	10			1
July	99												90					
August	99																	
September	99	5	2						40	11,1				10				
October	99	5	3					2	60	20			40	25				4
November	99	3	1					4	3,3				20	7				24
Total		47	27	9	4	4	4	5	57,4	19,1	8,5	8,50	27,2	117	35	13	7	25

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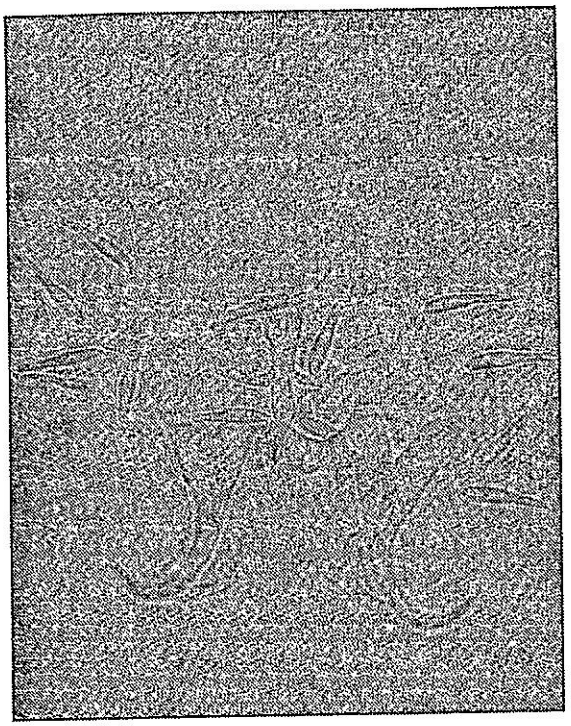

Figure 1. *Dactylogyrus* [illegible] ptor [illegible]

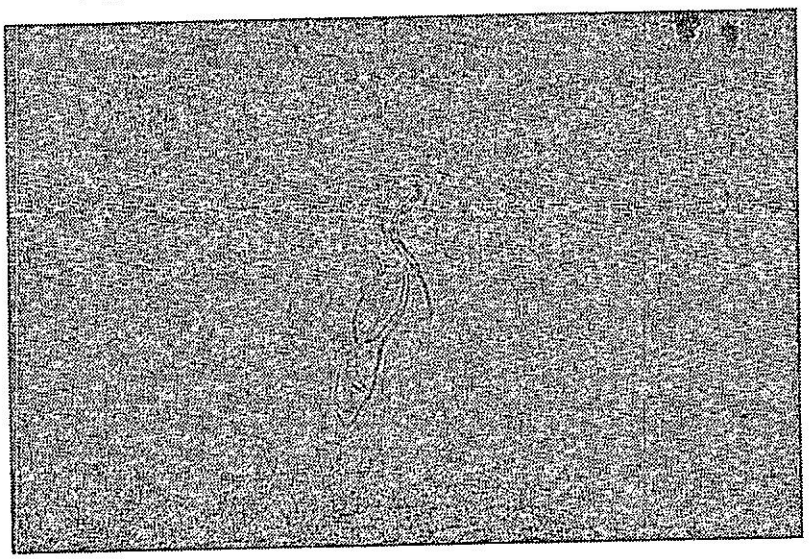

Figure 2. *Dactylogyrus carpathicus* copulatory organ - original x 575

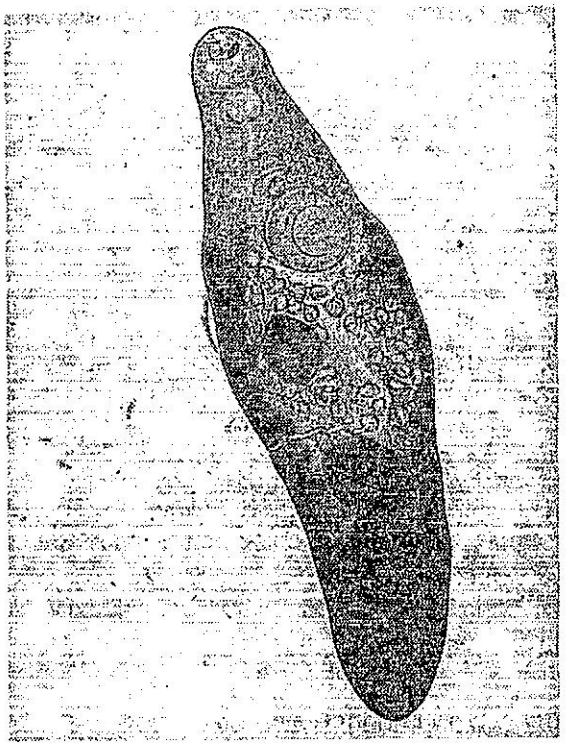

Figure 3. *Allocreadium isoporum* - original x 120

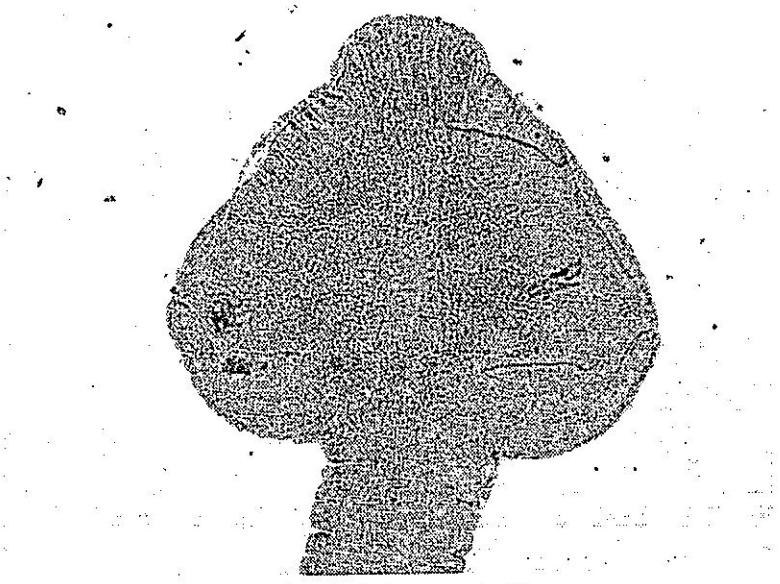

Figure 4. *Bothriocephalus acheilognathi* (Scolex) - original x 85

Figure 5. *Bothriocephalus acheilognathi* (gravid segments) - original x 83

Class: Monogenea (Beneden) Bychowsky, 1937
Species: *Dactylogyrus carpathicus,* Zakhvatkin, 1951(Fig.1- 2)
Location: Gills
Specimens studied : 20

On the gill filaments we found the monogenean *Dactylogyrus carpathicus*. This is the first record of this species in Turkey. This was the most common parasite in this locality. As can be seen in Table 1, in January and February the fish were free of this parasite. A total of 117 parasites were found in 27 of the 47 fish examined.The infection rate was the highest in May. No samples could be taken in December 98, or July and August 99 but a slight increase in numbers was observed in September, October and November (Table 1).

D. carpathicus is a common parasite of the barbel genus. The present record extends the geographical distribution to Turkey.

Class: *Trematoda* Rudolphi, 1808
Species: *Allocreadium isoporum* (Looss,1894) Looss, 1900 (Fig. 3)
Synonyms: *Distomum isoporum* Looss, 1894
Location: intestine
Specimens studied : 20

The second most dominant parasite, *Allocreadium isoporum* was found in the intestine. This trematode was found in May and June (Table 1). A total of 35 *Allocreadium isoporum* specimens was found on 9 of the 47 fish examined. The total prevalence of *Allocreadium isoporum* was 19% (Table 1). The infection rate was highest in May (Table 1). It seems that the choice and composition of the diet is

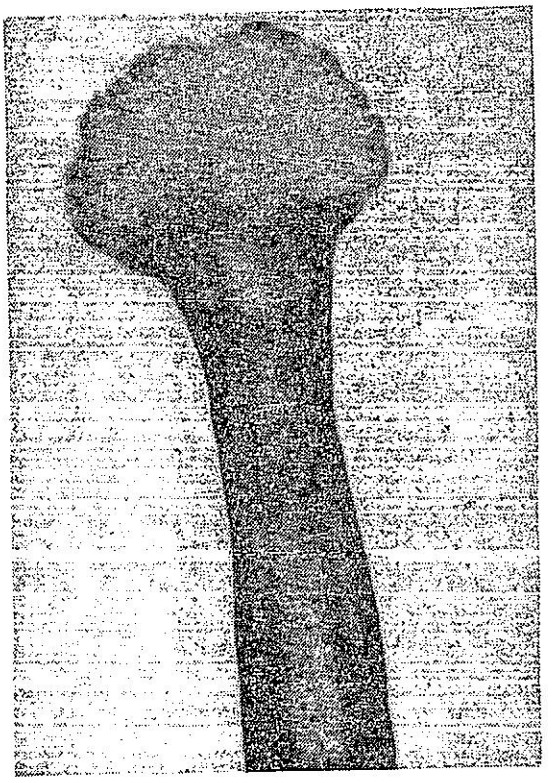

Figure 6. *Caryophyllaeus laticeps* (anterior part) - original x 26

very important for the formation of the helminth fauna in this species, which can be influenced by local ecological conditions. Barbel do not undergo seasonal fasts. The causes of prevalence or mean intensity in this species can be ascertained in further studies in Doganci Dam lake.

Class: Cestoda Rudolphi, 1808

Species: *Bothriocephalus acheilognathi* Yamaguti, 1934 (Figures 4 -5)

Synonyms: *B. opsariichthydis* Yamaguti, 1934

B. gowkongensis Yeh, 1955

B. phoxini Molnar, 1968

Location: intestine

Specimens studied : 7

This species was present only in a very small number (Table 1). Of the 47 *B. plebejus escherichi* examined 7 were(total prevalence 8.5 %) infected with *Botheriocephalus acheilognathi. B. acheilognathi,* commonly referred to as the Asian fish tapeworm, has spread from Asia throughout Europe and part of North America. This parasite is known to infect over 40 species of fish, mainly cyprinids (Rigg and Esch, 1987). This species was recorded in March, June and October. Seasonal changes in the abundance of fish parasites can be influenced by various

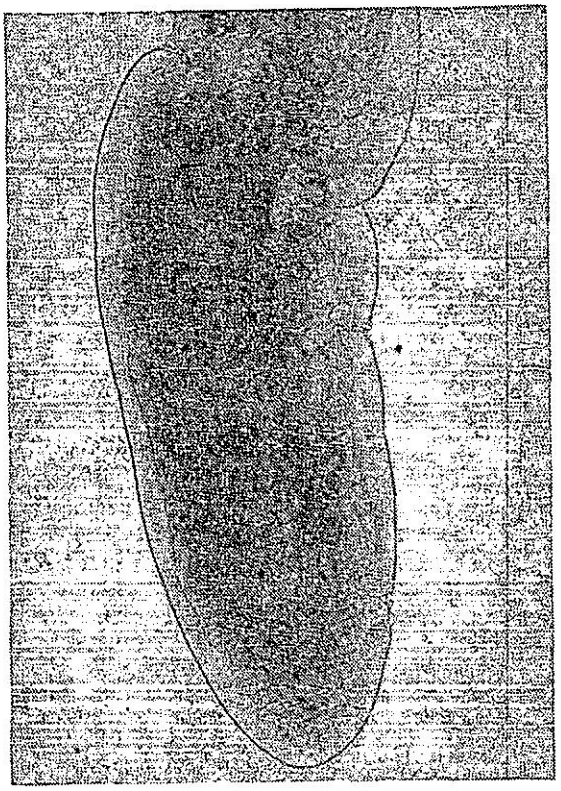

Figure 7. *Caryophyllaeus laticeps* (posterior part) - original x 33

factors, affecting both components of the host parasite system: by temperature regulating the maturation rate of the parasite (Granath and Esch, 1983), but also metabolism in and food consumption by the fish, availability of infective stages in the intermediate host (Klenov, 1972) and food preferences connected with the age of the fish (Judimenko, 1970; Riggs and Esch, 1987). *Bothriocephalus acheilognathi* is one of the most extensively studied parasites of fish in different regions. Quick development and maturation of this tapeworm in the definite host was noted by Klenov (1972), who found gravid tape worms in 25 day old fish. Granath and Esch (1983) found that the abundance of *Bothriocephalus acheilognathi* in *Gambusia* was negatively correlated with temperature and was the highest in autumn and winter. Klenov (1972) observed an increase in prevalence of this parasite in fry of grass carp in Russia between July and August, then a decrease in September - October. As a result of this, data about the seasonality of prevalence and mean intensity or abundance are more complete. The present material provides information resembling the data of Granath and Esch (1983). However, in the case of *Bothriocephalus acheilognathi* it can be concluded that the infections are influenced by temperature and seasonal changes in the abundance of copepods and seasonal changes in the diet of barbel in October, March and June.

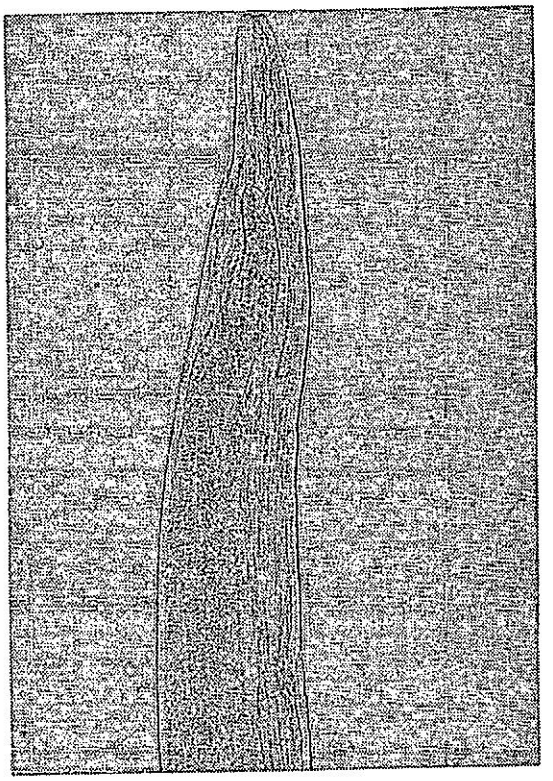

Figure 8. *Contracaecum* sp (anterior part) - original x 122

Class: Cestoda Rudolphi, 1808
Species: *Caryophyllaeus laticeps* (Pallas, 1784) (Fig.6 - 7)
Synonyms: *Taenia laticeps* (Pallas, 1784)
Location: intestine
Specimens studied : 13

C. laticeps was also found in the intestine of the host fish. Only 4 of the 47 fish were infected by *Caryophyllaeus laticeps.* A total of 13 parasites were found. This species was collected in February and March. The infection was the highest in March. *C. laticeps* is a characteristic and common parasite of cyprinid fishes in Europe. The experimental studies of Kulakowskaya (1962, 1964) showed that C. laticeps larvae preserve their intermediate host *Tubifex tubifex.* Such a long time of infectivity of procercoids results in infection of fishes all over the year. However, the cyclic character of the incidence and maturation of these tapeworms in fishes has been widely recorded. Three main factors were regarded as controlling these processes. Variations in the availability of infective larvae, variations in host feeding habits and changes in the physiological state of the host, including the hormone levels connected with spawning, and the resistance of the host to infection (Kennedy 1968). The data from the Doganci Dam lake seem to support the signifi-

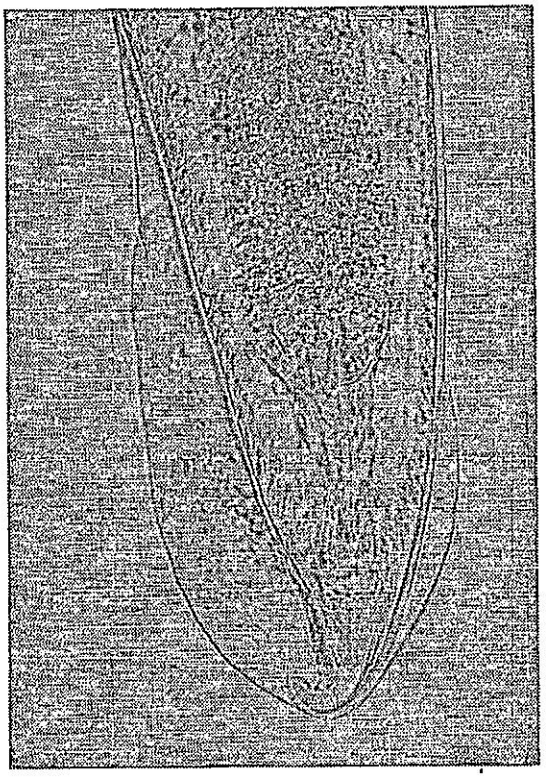

Figure 9. *Contracaecum* sp (posterior part) - original x 122

cance of these factors. Accordingly, the choice and composition of the diet is very important for the formation of helminth fauna in this fish, this being considerably influenced by local ecological conditions.

Class: *Nematoda* Rudophi, 1808

Species: *Contracaecum* sp (Fig. 8 - 9)

Location: Abdominal cavity

Specimens studied : 20

A single species of *Nematoda, Contracaecum* spp, was found. This species occurred in June and October but not in other months. The infection rate was highest in October (Table 1). Contracaecum sp have been found in larval stages, when the species could not be identified. Generally, adults and fourth stage larvae of nematodes of the genus *Contracaecum* are found in the digestive tract of seals, some dolphins and piscivorous birds, while third stage larvae are known to occur in fishes, usually encapsulated in the viscera. Although the life cycles of some avian species of *Contracaecum* are known, those invading mammalian species have not yet been elucidated experimentally. The larvae especially are transferred to fish hosts. They have not been determined for these species. Since specific identification is based on the morphology of adults, it is almost impossible to as-

sign these larvae with certainty to any species without carrying out feeding experiments. In Europe, ten *Contracaecum* species have been reported (Moravec, 1994). Due to insufficient knowledge of the morphology of *Contracaecum* larvae of individual species from fishes, it is not possible to identify the species reliably.

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ZASTUPLJENOST HELMINTSKIH PARAZITA KOD MRENE *(BARBUS PLEBEJUS ESCHERICHI* STEINDACHNER, 1897) U JEZERU DOGANCI U TURSKOJ

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SADRŽAJ

U ovom radu su prikazani rezultati ispitivanja zastupljenosti helmintskih parazita kod mrene iz jezera Doganci u Turskoj u periodu od decembra 1998 do novembra 1999. godine. U ovom periodu je izlovljeno 47 primeraka mrene i dokazano je prisustvo sledećih pet parazitskih vrsta: *Dactylogyrus carpathicus (Monogenea)* na škrgama i *Bothriocephalus acheilognathi, Caryophyllaeus laticeps (Cestoda), Allocreadium soporum (Digenea)* i *Contracaecum spp (Nematoda)* u crevima i abdominalnoj duplji. Dominantna parazitska vrsta je *D. carpathicus* i od 47 pregledanih riba on je dokazan na 27 primeraka (57 %) u ukupnom broju od 127 parazita. *A. soporum* je bio zastupljen sa 19.1 % a ukupno je pronađeno 35 primeraka. *B. acheliognathi* je dokazan kod samo 4 mrene i ukupno je otkriveno 7 parazita. Četiri mrene su bile infestirane sa *C. laticeps* i ukupno je otkriveno 13 primeraka parazita. Ukupno je registrovano 25 primeraka nematode *Contracaecum spp* kod pet riba. Dokaz prisustva *D. carpathicus* i *A. soporum* predstavlja nov nalaz u helmintološkoj fauni Turske.