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Metazoan Parasites from Freshwater Fishes of Northwest Iran

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ABSTRACT

A systematic parasitological examination was carried out on 266 freshwater fish specimens, belonging to 11 species, from Northwest of Iran during the period from Summer 2001 to Summer 2002. Twelve parasite species including *Diplostomum spathaceum, Allocreadium isoporum, Ligula intestinalis, Digrama sp., Caryophylleus laticeps, Rhabdocona hellichi, Eustrongylides excisus, Argulus foliaceus, Lamprolegna compacta, Myxobolus musayevi, M. cristatus,* and *Neoechinorhynchus rutili* were isolated and identified. It was concluded that *Sander lucioperca, Albornoides bipunctatus, Capoeta capoeta, Carassius carassius and Barbus capito* were five new hosts for those parasites in Iranian freshwater fishes. Furthermore, *Myxobolus cristatus* is recorded for the first time among Iranian freshwater fishes. All the parasites were collected from natural waters, but these rivers form a very important water reservoir in this area and these parasites can injure cultured fishes under certain conditions.

Keywords: Freshwater fishes, Iran, Metazoan, Parasites.

INTRODUCTION

The presence of many fish hatcheries and fish farms along the freshwaters resources of the northern part of Iran has made carrying out parasitological studies on the Caspian Sea Fauna Region a very important task.

In the former Soviet Union, Bykhovskaya and Bykhovsky (1940), Dogiel and Bogolepova (1957), Bykhovskaya-Pavlovskaya *et al*. (1964), Shulman (1990) and Bauer *et al*. (2002), worked on different fish species along the northern part of the Caspian Sea and identified many species of fish parasites.

The study of freshwater fish parasites in the southern part of the Caspian Sea, however, has been continuing over the past 40 years: Eslami *et al.* (1972), Golovin and Mokhayer (1973), Mokhayer (1974, 1975, 1976, 1981), Williams *et al*. (1980), Eslami and Mokhayer (1977), Eslami and Kohneshahri (1978) and Jalali 1998.

After the 1990s, several intensive studies were done at species level: Malek (1993), Satari and Faramarzi (1997), Pazooki and Masoumian (1999, 2004); Mirhashemi and Pazooki (2003), Pazooki and Aghlmandi (2002), Pazooki *et al*. (2004), Masoumian and Pazooki (1999) and Masoumian *et al*. (2002, 2004, 2005). During these studies more than 30 species were recorded.

The aim of this study is to summarize and review previous information on and surveys of metazoan parasites on freshwater fishes of West Azerbaijan Province, Iran.

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MATERIALS AND METHODS

During the present study, 266 fish specimens from 11 different species were examined (Table 1). The fishes were collected from seven stations on the Aras, Zangbar and Sarysou Rivers. The stations are as follows:

1) Aras River: Cheshmeh Soraya, Bohlolkandy and Aras Dam.
2) Zangbar River: Ghalae Jough, Ghezel Dagh and Baroun Dam.
3) Sarysou River.

Fish samplings were carried out seasonally, from Summer 2001 to Summer 2002. Fishes were transferred alive to the laboratory of Fisheries Department of the Research Center of Natural Resources and Animal Sciences, Urumia. In the laboratory, the fishes were weighed, measured and the spinal cords cut. Finally, they were examined for different parasites under light and stereo microscope. The collected parasites were fixed and classified according to Bykhovskaya-Pavlovskaya *et al*. (1964) and Moravec (1994).

RESULTS

Altogether, 12 different metazoan parasites were detected. Prevalence was different depending on seasons and stations (Tables 2 and 3). The highest and the lowest infection rates were in Winter 2002 and Spring 2001, respectively. The parasites found are as follows:

1) Metacercaria of *Diplostomum spathaceum* Rudolphi, (1819).

Hosts (prevalence of infection %): *Capoeta capoeta* (84%), *Cyprinus carpio* (72%), *Lucioperca lucioperca* (67%), *Albornoides bipunctatus* (73%) (Figure 1a and Table 3).

Infected organs: lens of eyes.

Place of collection (prevalence of infection %): Baroun Dam (79%), Sarysou River (81%), Aras Dam (69%).

Table 1. Fish examined during the study.

No	Fish species	Number examined	Weight (g)	Length (cm)	Prevalence of Infection
1	*Capoeta capoeta*	166	8.5-60	9-18.5	65.6%
2	*Alburnoides bipunctatus*	15	2.4-7	6-8	33.3%
3	*Carassius carassius*	12	92-216	16-22	8.3%
4	*Barbus capito*	2	37-56	15-19	100%
5	*Rutilus rutilus caspicus*	18	22.213	12.6-2	11.1%
6	*Abramis brama*	23	44-260	16-29	1.4%
7	*Sander lucioperca*	9	162-400	28-49	44.4%
8	*Cyprinus carpio*	7	78-306	17.5-31	0
9	*Aspius aspius taeniatus*	11	17-196	12-30	18%
10	*Leuciscus cephalus*	1	13	11.7	0
11	*Silurus glanis*	2	3500-5000	31-47	50%

Table 2. Prevalence of infections in different seasons.

Season	Examined fish	Infected fish Ecto-parasites	Infected fish Endo-parasites
Summer 2001	69	42(60.8%)	27(31.9%)
Autumn 2001	56	50(79.9%)	6(10.7%)
Winter 2001	102	58(56.2%)	44(75%)
Spring 2002	39	35(89.7%)	18(46.1%)

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Table 3. Prevalence of infections in different fishes and seasons.

Parasites Fishes	Stations	Seasons	No. exam. Fish	No. exam. Fish	(%)
1): *Diplostomum spathaceum*					
Capoeta capoeta	Baroun Dam	S	92	73	79.3%
″	Sarysou River	"	43	38	88.4%
Cyprinus carpio	Aras Dam	A	7	5	71.5%
Lucioperca lucioperca	Aras Dam	"	15	11	73.3%
2): *Ligula intestinalis*					
Capoeta capoeta	Ghalae Jough	S	67	20	29.8%
″	Cheshme Souraya	"	3	2	66.6%
″	Ghalae Jough	A	7	2	28.57%
Cyprinus carpio	Aras Dam	"	6	2	33.3%
Abramis brama	"	"	1	1	100%
Capoeta capoeta	Ghalae Jough	W	34	3	8.23%
"	Ghezel Dagh	"	1	1	100%
Abramis brama	Aras Dam	"	21	7	33.3%
Capoeta capoeta	Ghalae Jough	Sp	21	1	0.07%
Abramis brama	Aras Dam	"	4	2	50%
3): *Digrama sp.*					
Capoeta capoeta	Ghalae Jough	S	67	5	7.6%
Cyprinus carpio	Ghezel Dagh	A	3	1	33.3%
Abramis brama	Aras Dam	W	21	10	9.25%
"	"	Sp	4	1	25%
4): *Rhabdochona hellichi*					
Capoeta capoeta	Ghalae Jough	S	67	14	20%
"	Ghezel Dagh	A	13	4	66.6%
"	Ghalae Jough	W	34	24	70%
"	"	Sp	21	14	66.6%
5): *Argulus fuliaceus*					
Capoeta capoeta	Baroun Dam	S	92	11	11.1%
Cyprinus carpio	Aras Dam	"	7	6	85.7%
Abramis brama	"	A	34	28	82.3%
Aspius aspius	"	W	11	7	63.6%
Lucioperca lucioperca	"	Sp	9	6	66.7%s
6): *Allocreadium isoporum*					
Capoeta capoeta	Ghalae Jough	S	1	1	--
7): *Neoechinorhynchus rutilli*					
Barbus capito		Sp	1	1	--
8): *Caryophylleus laticeps*					
Abramis brama	Ghalae Jough	S	67	7	10%
9): *Lamprolegna compacta*					
Capoeta capoeta	Baroun Dam	Sp	3	3	--
10): *Myxobolus cristatus*					
Capoeta capoeta	Ghalae Jough	Sp	68	14	20.5%
11): *Myxobolus musayevi*					
Capoeta capoeta	Ghalae Jough	Sp	68	10	14.7%
12): *Estrongylides excisus*					
Carassius carassius	Aras Dam	W	1	1	--

S: summer, A: autumn, W: winter, Sp: spring.

2) *Allocreadium isoporum* Loos, (1894).
Host: *Capoeta capoeta* (Figure 1b).
Infected organ: intestine.
Place of collection: Ghalae Jough.

3) *Ligula intestinalis* Lineaus (1758).
Hosts (prevalence of infection %): *Capoeta capoeta* (34%), *Cyprinus carpio* (33%), and only one *Abramis brama* (Figure1c1, c2;

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Table 3).

Infected organ: abdominal cavity.

Place of collection (prevalence of infection %): Baroun Dam (79%), Sarysou River (81%), Aras Dam (69%).

4) *Digrama* sp.

Hosts (prevalence of infection %): *Capoeta capoeta* (8%), *Cyprinus carpio* (33%), *Abramis brama*(17%), (Figure1d and Table3).

Infected organs: abdominal cavity.

Place of collection (prevalence of infection %): Ghalae Jough (8%), Ghezel Dagh (34%), Aras Dam (17%).

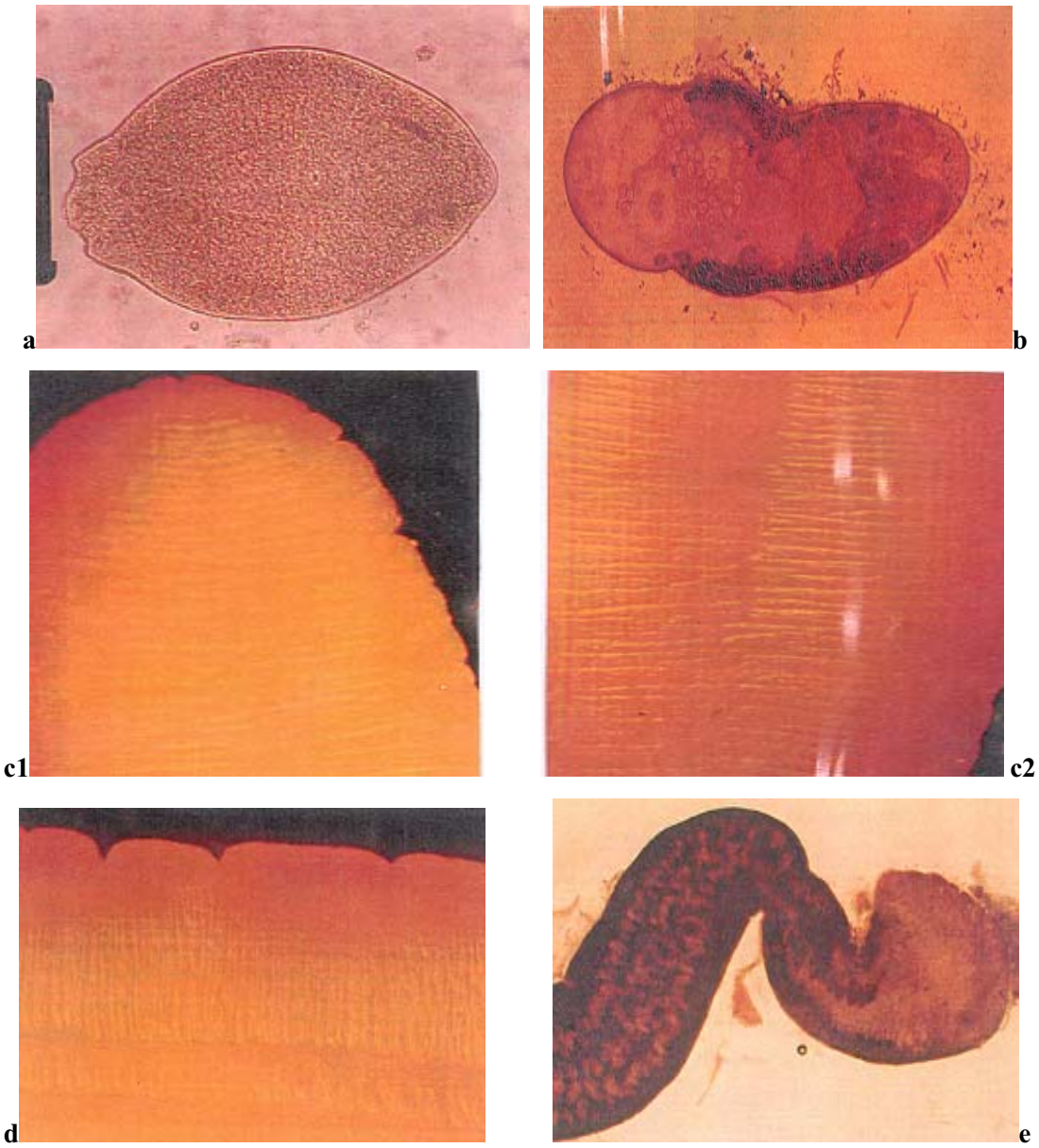

Figure 1: a) Metacercaria of *Diplostomum spataceum* from the lens of eyes in *Capoeta capoeta,* mag. X224. **b**) *Allocreadium isoporum* from the intestine *Capoeta capoeta,* mag. X140. **c1**) Anterior part, **c2**) Abdominal line of *Ligula intestinalis* from the abdominal cavity of *Abramis brama,* mag. x28. **d**) *Digrama sp.* from the abdominal cavity of *Abramis brama,* mag. x28. **e**) *Caryophylleus laticeps* collected from intestine of *Abramis brama,* mag. X112.

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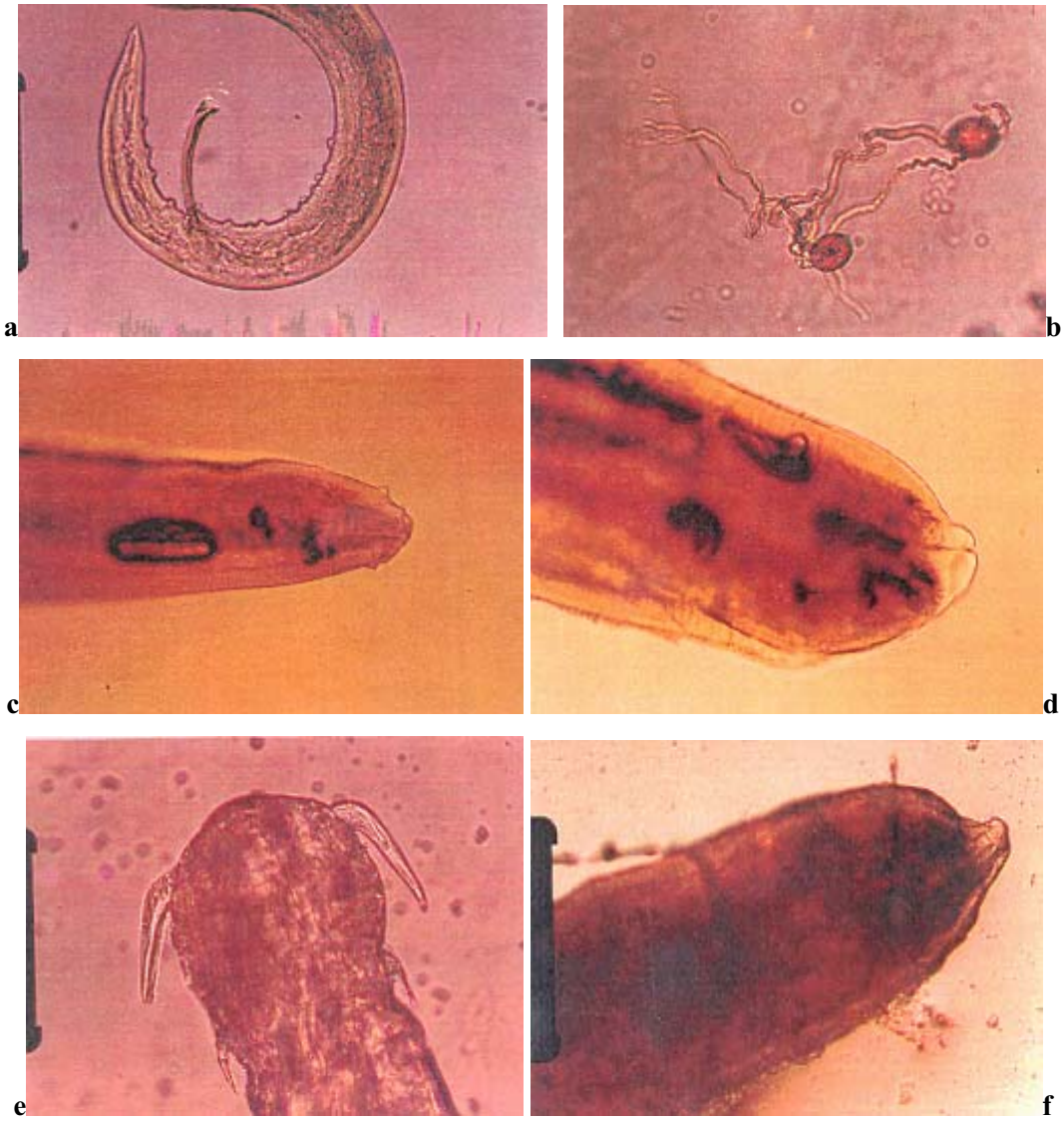

Figure 2: a) Spicule of *Rhabdocona hellichi* from *Capoeta capoeta* intestine, mag. x560. **b**) The eggs of *Rhabdochona hellichi,* mag. X224. **c and d**) Anterior part and posterior part of *Eustrongylides excisus* from *Capoeta capoeta,* mag. X560. **e and f**) Anterior part and posterior part of *Neoechinorhynchus rutili* from *Barbus capito,* mag. X560.

5) *Caryophyllaeus laticeps* Pallas, (1781).

Hosts (prevalence of infection %): *Abramis brama* (10%), (Figure 1e).

Infected organs: intestine.

Place of collection (prevalence of infection %): Ghalae Jough (10%),

6) *Rhabdochona hellichi* Sramet, (1959).

Hosts (prevalence of infection %): *Capoeta capoeta*(56%), (Figure 2a, b and Table3).

Infected organs: intestine.

Place of collection (prevalence of infection %): Ghalae Jough (52%), Ghezel Dagh (66%).

7) *Eustrongylides excisus* Jagerskiold, (1909).

Hosts: *Carassius carassius,* (Figure 2c, d).

Infected organs: intestine.

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Place of collection: Aras Dam.

8) *Neoechinorhynchus rutilli* Muller, (1780).
Hosts: *Barbus capito,* (Figure 2e, f).
Infected organs: intestine.
Place of collection: Sary Sou Dam.

9) *Argulus foliaceus* Muller, (1785).
Hosts (prevalence of infection %): *Capoeta capoeta* (11%)*, Cyprinus carpio* (86%)*, Sander lucioperca* (67%), *Abramis brama* (82%) and *Aspius aspius* (64%) (Table 5).
Infected organs: skin.
Place of collection (prevalence of infection %): Baroun Dam (11%), Aras Dam (59%).

10) *Lamprolegna compacta* Nordmann, (1832).
Hosts: *Capoeta capoeta*.
Infected organs: gills.
Place of collection: Baroun Dam.

11): *Myxobolus cristatus* Shulman, (1962).
Hosts: Capoeta capoeta.
Infected organs: gills.
Place of collection: Ghalae Jough.

12) *Myxobolus musayevi* Kadilov, (1963).
Hosts: *Capoeta capoeta*.
Infected organs: gills.
Place of collection: Ghalae Jough

DISCUSSION

During this study two Digenea, three Cestod, two Nematod, two Myxozoan, two Crustacean and only one Acathocephalus were identified.

According to the results, five new hosts are recorded for the first time from Iranian freshwater fishes. They are as follows:

Sander lucioperca and *Albornoides bipunctatus* for *Diplostomum spathaceum*; *Capoeta capoeta* for *Allocreadium isoporum* and *Digrama* sp.; *Carassius carassius* for *Eustrongylides excius*; and *Barbus capito* for *Neoechinorhychus rutilli*. Furthermore, *Myxobolus cristatus* is reported here for the first time from Iranian freshwater fishes, namely from *Capoeta capoeta*.

Diplostomiasis is very common in the freshwater fishes of Iran (Jalali, 1998). The results of the present study and that of Jalali (1998) show that incidence of *Diplostomum spathaceum* in the study area, especially among Cyprinid fishes, is very high.

Allocreadium isoporum has already been reported from the intestine of *Alburnoides bipunctatus* from the Gorgan Roud River (Jalali, 1998), and *Leuciscus cephalus* from the Zayandeh Roud River (Williams *et al*., 1980). This parasite may be pathogenic in cultured fishes (Woo, 1995), and is reported here also from the intestine of *Capoeta capoeta.*

Ligula intestinalis and *Digrama sp.* are widely distributed parasites (Jalali, 1998). Family Ligulidae are dangerous parasites for fish culture. *Ligula sp.* has been studied in Iran (Jalali, 1998), but there less data is available for *Digrama sp.*

Caryophyllaeus laticeps was collected from *Abramis brama* at Aras Dam. Satari and Faramarzi (1997) studied the life cycle of this parasite and indicated that if the number of parasites in the intestine was more than 300, the mortality of Cyprinids might be as high as 70%. *Caryophyllaeus laticeps* has previously been reported from the northern part of the Caspian Sea, (Evlanov and Kolokol, 1992), and is reported here from the southern part of the Caspian Sea.

The nematodes found in this study were *Rhabdochona hellichi* and *Eustrongylides excisus*, of which the former had already been reported from *pike* and *Barbus spp*. (Eslami *et al*., 1972), and *Chalcalburnus chalcoides* (Pazooki and Masoumain, 1999), in Europe from *Barbus spp*. (Moravec, 1994), and later from *Silurus glanis* (in Jalali, 1998). In this study, *Eustrongylides excius* is reported for the first time from *Carassius carassius*.

Research on acanthocephalans in Iran is scarce. The genus *Neoechinorhynchus* has been reported by Mokhayer (1974) and *Neoechinorhynchus rutili* by Jalali (1998). In the present study this worm is reported from a new host, *Barbus capito*.

Crustaceans are even less well studied in Iran, with Mokhayer (1981) and Jalali (1998) having studied different crustaceans down to genus level. Abdi (1997) and Mirhashemi and Pazooki (2003) identified five

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Crustacean species. In this study two crustacean, *Argulus foliaceus* and *Lamproglena compacta* are reported with high prevalence from some economically important fishes from the Aras Dam.

Among others, two species of Myxozoan parasites which have been shown to belong to the Metazoans (Smother *et al*., 1994; Kent *et al*., 2001; Bush *et al*., 2001) were detected. One of them, *Myxobolus musayevi,* has already been reported in *Capoeta capoeta* from the Tajan River (Masoumian and Pazooki 1999), but the other one, *M. cristatus*, is reported for the first time from Iran. This parasite has already been reported from the northern part of the Caspian Sea (Shulman, 1990).

All the parasites were collected from natural waters, but these rivers form a very important water reservoir in this area; there are a lot of hatcheries and farms in the Northwest of Azarbaijan Province and, they used these waters. These parasites can injure the cultured fishes under certain conditions (Woo, 1995). The present study revealed some new host and locality records that are important from both the commercial and zoological points of view.

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ج. پازوکی، م. معصومیان، م. یحیی‌زاده و ج. عباسی

چکیده

در طی بررسیهای انگل شناسی روی ماهیان آبهای شمال غربی ایران در طی سالهای ۱۳۸۰ تا ۱۳۸۱ مجموعا" ۲۶۶ عدد ماهی معاینه گردیدند. ماهیان از هفت ایستگاه در سه رودخانهٔ شمال غربی استان آذربایجان غربی صید گردیدند و بطور زنده به آزمایشگاه شیلات مرکز تحقیقات منابع طبیعی استان منتقل شدند. در آزمایشگاه پس از بیومتری ماهیان قطع نخائی شده و سپس کلیه اندامهای ماهی از نقطه نظر آلودگی به انگلهای پریاخته معاینه شدند. مجموعا" در این مطالعات دوازده انگل زیر از ماهیان جداسازی و شناسائی شدند: دیپلوستوموم اسپاتاسه اوم، آلوکریدیوم ایزوپوروم، لیگولا اینتستینالیس، کاریوفیله اوس لاتی سپس، رابدوکونا هلیچی، اوسترونژیلیدس اکسیسوس، لامپرولگنا کمپاکتا، آرگولوس فولیاسه اوس، میکسوبولوس موسایوی، میکسوبولوس کریستاتوس، نئواکینورینکوس روتیلی و یک گونه از جنس دیگراما. براساس نتایج این مطالعات میکسوبولوس کریستاتوس و نیز پنج میزبان جدید برای اولین بار از ماهیان آب شیرین ایران معرفی شده است. کلیه انگلها از ماهیان محیطهای طبیعی جداشده‌اند که چنانچه به طریقی به محیطهای مصنوعی راه یابند برخی از آنها میتوانند بسیار خطرناک و بیماریزا باشند.

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