

# Protozoan from Fresh Water Fishes from North West of Iran

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**Abstract:** During a parasitological investigation on the fresh water fishes of North West of Iran (West Azerbaijan Province), 266 specimens of 11 fishes were examined. Fishes were collected from seven stations from Aras, Zangbar and Sarysou Rivers between summer 2001 to summer 2002. Nine protozoan species were detected; eight Cilliophora and one Rhizopoda. Cilliophora are: *Chilodonella sp.*, *Apiosoma sp.*, *Vorticella sp.*, *Ichthyophthirius multifiliis*, *Trichodina perphorata*, *Amphileptus branchiarum*, *Tetrahymena pyriformis*, *Stylonchia pustulata*, and the Rhizopoda species is *Arcella vulgaris*. Results show that five of those species are for the first time being reported from Iranian fresh water fishes.

**Keywords:** Protozoan, Cilliophora, Rhizopoda, West Azerbaijan Province, Iran

## Introduction

For many years former Soviet Union researchers worked on different fishes and recorded lots of protozoans from northern part of the Caspian Sea (Bykhovskaya & Bykhovsky, 1940 ; Dogiel, 1948 ; Dogiel & Bogolepova, 1957; Dogiel *et al.*, 1964;

Bykhovskaya- Pavloskaya *et al.*, 1964; Shulman, 1984, 1900 and Bauer *et al.*, 2002).

Studies on southern part of the Caspian Sea, however goes back to the work of Niak *et al.*, (1971); on *Trichodina* sp. from Acipenseridae fishes, and Mokhayer (1974, 1975). Check list of Acipenseridae parasites from Iranian waters, and ecological accepts of Acipenserids parasites; he also reported *Trypanasoma percae* from *Perca fluviatilis* in the southern part of the Caspian Sea (Mokhayer, 1974, 1975).

The first intensive study on parasites of Iranian fresh water fishes from the same area was carried out by Mokhayer (1981), who recorded 30 different parasite species, three of them protozoans among those *Myxobolus lobatus* from *Barbus brachicephalus*.

Masoumain & Pazooki (1999) found different Myxosporean species from different fishes of the Caspian Sea. Pazooki & Masoumian (2004) also reported *Cryptobia acipenseris* and *Haemogregarina acipenseris* from Acipenserids fishes. Masoumian *et al* (2003), furthermore made a survey on Coccidian and Myxozoan parasites of fishes of Aras and Mahabad Dams in the north of West Azerbaijan Province.

The present study was planned to complete in our understanding of protozoan parasites of freshwater fishes of north of West Azarbaijan Province.

## **Material and Methods**

During the present study 266 fish specimens from 11 species of fishes were examined. (Table 1). Fishes were collected from seven stations of Aras, Zangbar and Sarysou Rivers of West Azerbaijan Province, Iran. The stations were as follows:

- 1- Aras River: Cheshmeh Soraya, Bohlokkandy and Aras Dam.
- 2- Zangbar River: Ghalae jough, Ghezal dagh and Baroun Dam.

## 3- Sarysou River

The sampling was carried done seasonality between summer 2001 and summer 2002. Fishes were transferred to the laboratory of Fisheries Department of Research Center of Natural Resources & Animal Sciences, Uremia, alive. In the laboratory, each fish was weighted and measured, before killing by cutting the spinal cords (Tables 1 & 2). Finally, they were examined for different protozoa under light and stereo microscope. The protozoans were fixed and classified according to the Shulman, 1990; Lom & Dycova, 1992 and Kotpal, 2000.

**Table 1:** Fish species examined during the study

No	Fish species	Number	weigh (gr)	length (cm)
1	<i>Capoeta capoeta</i>	166	8.5-60	9-18.5
2	<i>Alburnoides bipunctatu</i>	15	2.4-7	6-8
3	<i>Carassius carassi</i>	12	92-21	16-22
4	<i>Barbus capito</i>	2	37-56	15-19
5	<i>Rutilus rutilus caspius</i>	18	22.213	2.6-2
6	<i>Abramis brama</i>	23	44-260	16-29
7	<i>Sander leucioerca</i>	9	162-400	28-49
8	<i>Cyprinus carpio</i>	7	78-306	17.5-31
9	<i>Aspius aspius taeniatus</i>	11	17-196	12-30
10	<i>Leuciscus cephalus</i>	1	13	11.7
11	<i>Silurus glanis</i>	2	3500-5000	31-47
		<b>266</b>	<b>Total</b>	

**Table 2:** Characteristics of sampling stations in different seasons

Station	No. of fish	Ave. air T°	Ave. water T°	Salinity	pH
Ghalae jough	41-15-50-20	33-18.2-1.2-17.1	21-12.9-5.5-13.6	0-0.1-0-0	7.5-8.2-8.6
Ghezel dagh	2-5-*4	37.3-20.6-8-20.5	28-13-1.5-14.2	0.1-0.3-0.3-0	7.4-8.5-8.7-8.9
Baroun Da	4-*5-0	*-7-0	*-1.5-0	0.4-*5-*	*-8-*
Cheshme Soraya	8-5-*0	33-20.5-*0	19.3-16-*0	0.2-0.3-*	6.8-7.6-*
Bohlokkandy	4-5-*5	32-16-*16.5	24.2-16-*15.5	0.3-0.4-*0	8.1-8-*7.7
Aras Dam	5-24-47-4	35.4-20-5-22.3	31.9-18-6-15	0.4-0.5-6-15	8.2-8.3-8.3-8.8
Sarysou	5-*5	22.2-*15-22.5	21.7-*0.5-14.6	0.5-*0.2-*	8.7-*8.7-8.7
<b>S-A-W-Sr</b>	<b>S-A-W-Sr</b>	<b>S-A-W-Sr</b>	<b>S-A-W-Sr</b>	<b>S-A-W-Sr</b>	

**S:** summer, **A:** autumn, **W:** winter, **Sr:** spring

\*: no data

## Results

During this study nine species of protozoans were detected; they belonged to eight species of Cilliophora and one species of Rhizopoda, seven of those species were characteristic fish parasites and two species were free-living are the protozoans of fresh waters fauna. Table 3 summarizes a list of parasites and their hosts. *Capoeta capoeta* with 65.6% was the fish hosting most of parasites fauna in the study. Prevalence of infections of different parasites was not only different in different fish species but also in different stations as well.

Prevalence of infections fluctuates seasonally (Table 4) most of infections were recorded in spring 2002 and the lowest infections on autumn 2001. Seasonality infections show that spring time is the most infected season; the prevalence is 76.9%. The prevalence of infections in other seasons is 55%, 47% and 19.6% for summer, winter and autumn respectively.

### *Ichthyophthirius multifiliis* Fouquet 1876

This parasite was collected from the skin of five fish species. This parasite was collected from *Alburnoides bipunctatus*, *Capoeta capoeta*, *Carassius carassius*, *Abramis brama* and *Barbus capito*. (Table 3). The highest prevalence of infection (65%) observed in *Capoeta capoeta*. This parasite was seen in fish species in all stations, the most infections was in Ghalae jough and the less was in Cheshmeh Souraya.

### *Trichodina perforata* Golemansky & Grupcheva 1976

*Trichodina perforata* was recorded from fins and skin of seven fish species In the case of collected protozoa; AD is 28-36µm and ND is 23-26. (Table 3, Fig. 1).

Table 3: Different parasites found in examined fishes

Host	Station	Protozoa	Nr. Inf.(%)	
<i>Capoeta capoeta</i>	Ghalae jough, Ghezel dagh, Sarysou	<i>Ich. multifiliis</i>	109	65%
		<i>Trichodina perforata</i>		
		<i>Chilodonella sp.</i>		
		<i>Amph. branchiarum</i>		
		<i>Tetra. Pyriformis</i>		
		<i>Apiosoma sp.</i>		
		<i>Vorticella sp.</i>		
<i>Alburnoides bipunctatus</i>	Bohլoulkandy Cheshmeh Souraya	<i>Ich. multifiliis</i>	5	33.3%
		<i>Trichodina perforata</i>		
		<i>Chilodonella sp.</i>		

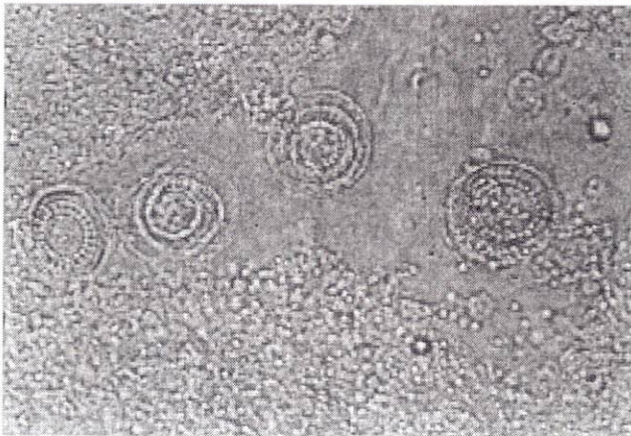


Table 3 Continue:

Host	Station	Protozoa	Nr. Inf.(%)	
<i>Carassius carassius</i>	Aras Dam	<i>Ich. multifiliis</i>	1	8.3
<i>Abramis brama</i>	"	<i>Trichodina perforate</i>	7	1.4
	"	<i>Ich. multifiliis</i>		
<i>Aspius aspius taeniatus</i>	"	<i>Chilodonella sp.</i>	2	18
<i>Barbus capito</i>	Bohloulkandy,	<i>Ich. Multifiliis</i>	2	100
	Sarysou	<i>Trichodina perforata</i>		
<i>Silurus glanis</i>	Aras Dam	<i>Trichodina perforata</i>	1	50
<i>Sander leuciperca</i>	"	<i>Trichodina perforata</i>	4	44.4

Table 4: Prevalence of infections during different seasons

Season	examined fish	infected fish	prevalence %
Summer 2001	69	38	55
Autumn 2001	56	11	19.6
Winter 2001	102	48	47
Spring 2002	40	30	76.9

Figure 1: *Trichodina perforata* from the skin of *Capoeta capoeta*, mag. X112

***Chilodonella* sp.**

This parasite was collected from fins and skin of one *Alburnoides bipunctatus*, two *Aspius aspius taeniatus* and two *Capoeta capoeta*.

***Amphileptus branchiarum* Weinrich 1924**

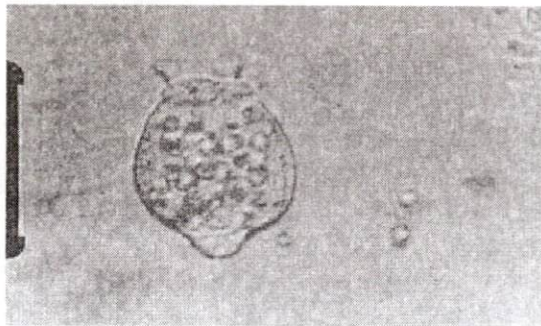
*Amphileptus branchiarum* was collected from skin and fins of three *Capoeta capoeta*. The intensity of infection was very high. The flat body is lance late in out line, about 65-120x35-70  $\mu\text{m}$  in size (Fig. 2).



**Figure 2:** *Amphileptus branchiarum* from the skin and fins of *Capoeta capoeta*, mag. x560

***Apiosoma* sp.**

This parasite was collected from one *Capoeta capoeta* in Ghalae jough station. The size of body was 20-110  $\mu\text{m}$  (Fig.3).



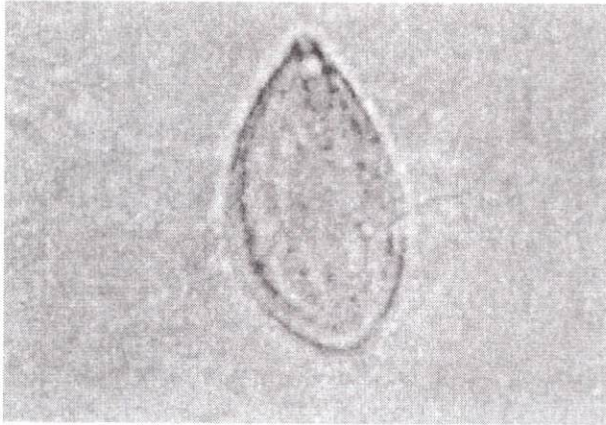
**Figure 3:** *Apiosoma* sp. from the skin of *Capoeta capoeta*, mag. x224

***Vorticella* sp.**

This protozoa was collected from two *Capoeta capoeta* in Ghalae jough station. The size of body was 20-150 $\mu$ m.

***Tetrahymena pyriformis* Timofeev 1962**

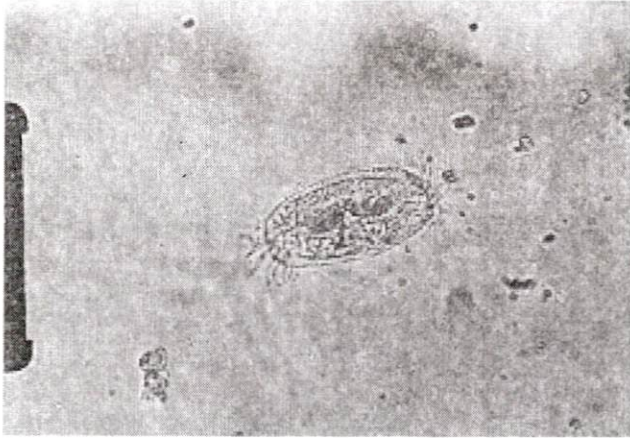
*Tetrahymena pyriformis* was collected from skin of one *Capoeta capoeta* in Ghalae jough station. The shape of the parasite was pyriform without caudal cilium. The size of body was 54-19x 32-16 $\mu$ m (Fig.4).



**Figure 4:** *Tetrahymena pyriformis* from the skin of *Capoeta capoeta*, mag. x560

***Stylonchia pustulata***

*Stylonchia pustulata* is a free living species, belongs to the freshwaters fauna. It was collected from one *Capoeta capoeta* in Ghalae jough station. It is one of the most prevalent and typical hypotrichids found in infusions and freshwater environment. The elongated oval body is rigid and depressed with an arched dorsal surface and flat ventral surface (Fig. 5).

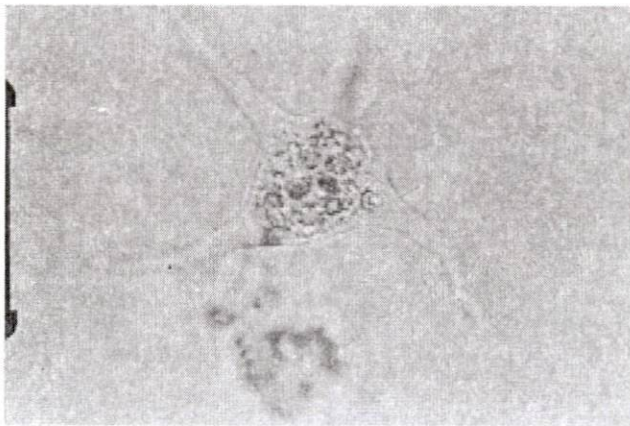


**Figure 5:** *Stylonchia pustulata* collected from Ghalae Jough station on the skin of a *Capoeta capoeta*, mag. x560.

### ***Arcella vulgaris* Ehrenberg 1830**

*Arcella vulgaris* belongs to the freshwater fauna, and collected from one *Capoeta capoeta* in Ghalae Jough station.

*Arcella vulgaris* commonly occurs in stagnant freshwater containing much vegetation and also in moist forest soil. It secretes a yellow to brown, thick, hard transparent and hemispherical or disk-shaped shell. The shell is 100 to 150 $\mu$ m (Fig. 6).



**Figure 6:** *Arcella vulgaris* collected from the water of Ghalae Jough station on the skin of a *Capoeta capoeta*, mag. x560.



## Discussion

According to the results of this study, five protozoans are for the first time recorded from fresh water fishes of Iran; *Tetrahymena pyriformis* and *Amphileptus branchiarum* from *Capoeta capoeta*, *Trichodina perforata* from *Abramis brama*, *Capoeta capoeta*, *Silurus glanis* and *Alburnoides bipunctatus*.

*Ichthyophthirius multifiliis* is the most important parasite recorded in this study. It is commonly considered as a dangerous ectoparasite of freshwater fishes, the agent of ichthyophthiriasis or "white spot disease" (Kabata, 1985). This parasite was seen in all stations, the most was in Ghalae jough and the less was in Cheshmeh Souraya. *Ichthyophthirius multifiliis* had already reported from North West of Iran; West Azarbaijan Province (Mahmoudi Hesar 2002). This parasite has been also reported from other parts of the country (Mokhayer, 1981, Moghainemi & Abbasi, 1996, Sayed Mortezaei, 2002).

The next important parasite is *Trichodina perforata*. Most of *Trichodina* species are considered as agent of trichodinosis, and are potentially pathogenic to their fish host. *Trichodina perforata* caused higher (up to 50%) mortalities when occurred together with the monogenean *Gyrodactylus unicoputa* (Woo 1995). This parasite was collected from the skin and fins of five fishes.

The genus *Trichodina* was not recorded from the West Azerbaijan Province but it was reported from other parts of Iran (Mokhayer, 1981; Molnar & Baska, 1993; Moghainemi & Abbasi, 1996). Consequently *Trichodina perforata* is hereby, reported for the first time from fresh water fishes of Iran; it was collected from fins and skin of seven fishes.

*Chilodonella* sp. was recorded from *Alburnoides bipunctatus* and *Apiosoma* sp. from *Capoeta capoeta*. These parasites had already reported from other part of the country; (Mokhayer, 1981; Moghainemi & Abbasi, 1996 and Jalali, 1999).

*Amphileptus branchiatum* was collected from skin and fins of three *Capoeta capoeta*, for the first time from Iran. It may invade the fry of various fish hosts especially through the injured integument. It may destroy not only the surface tissues but also internal organs (Roberts 2001).

*Stylonchia pustolata* and *Arcella vulgaris* are also recorded for the first time from Iran, they belong to Ciliophora and Rhizopoda respectively. These protozoans commonly are in commensally relationships with fishes but they may cause some difficulties in the intensive culture (Kotpal, 2000).

*Capoeta capoeta* being infected with seven different parasite species is the most susceptible infected fish, *Alburnoides bipunctatus* with three and *Barbus capito* and *Abramis brama* with two parasites species were the next, other fish species infected only by one parasite species. *Barbus capito* and *Abramis brama* which are very important are infected by two dangerous parasites; *Trichodina perforata* and *Ichthyophthirius multifiliis*. These two fish were part of restocking program to the rivers and other inland water reservoir. The sanitary instructions for these fish species must be kept in mind.

Prevalence of infection of different fishes are not similar, the most infected ones was *C. capoeta* (65.6%), *Lucioperca lucioperca* (44.4%) and *Albornoides bipunctatus* (33.3%). The prevalence of infection for *Barbus capito* was 100%, but there were only two fishes examined.

The rivers being sampled from during the present study are important water reservoir in the area and many hatcheries and farms are established around these rivers and used these waters. Although many of protozoans found in this study are free living or commensal, but they can injure the cultured fishes under certain condition (Bush *et al.*, 2001).

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## References

- Bauer, O.N.; Pugachev, O.N. and Voronin, V. , 2002. Study of parasites and diseases of sturgeon in Russia: a review. *J. Appl. Ichthyol.* **XI**:420-429.

- Bush, A.O.; Fernandez, J.C.; Esch, G.W. and Seed, J.R. , 2001. Parasitism: the diversity and ecology of animal parasites. Cambridge University Press. 566P.
- Bykhovskaya, I.E. and Bykhovsky, B.E. , 1940. Parasitic fauna of fishes of Akhtarinsk bays (Azov Sea, River Kuban delta). *Parazitologicheskij Sbornik* (Leningrad). **8**:131- 161 (in Russian).
- Bykhovskaya-Pavlovskaya, I.E.; Gussev, A.V.; Dubinina, M. N.; Izyumova, N.A. ; Smirnova, T.S.; Sokolvskaya, I.L.; Shtein, G.A.; Shulman, S.S. and Spshtein, V.M. , 1964. Key to Parasites of freshwater fish of U.S.S.R. Israel program for scientific translations. Jerusalem. 622P.
- Dogiel, V.A. , 1948. Parasitic protozoa of the fish in the Peter The Great Bay. *Izvestiya Vsesoyuznogo Nauchno-Issledovatel'skogo Instituta Ozerogo khozyaistva*. **27**:17-66 (in Russian).
- Dogiel, V.A. and Bogolepova, I. I. , 1957. Parasitic fauna of Lake Baikal fishes. *Trudy Baikalskoi Limnologicheskoi Stancii Akademii Nauk SSR Vostochno-Sibirskii Filial*. (in Russian).
- Dogiel, V.A.; Petrushevski, G.K. and Polanski, Y. , 1964. Parasitology of fishes. Oliver and Boyd press, London. England. 383P.
- Jalali B. , 1999. Parasites and parasitic diseases of fresh water fishes of Iran. Iranian Fisheries Co. Publication. 564P. (in Persian).
- Kabata, Z. , 1985. Parasites and diseases of culture in the tropics. Taylor and Francis, Ltd. Publications, U.S.A.
- Kotpal R. I. (2000) Protozoa, A text – Book of Protozoa. Rakesh Kumar Rastogi Publisher. Delhi, India.
- Lom, J. and Dykova, I. , 1992. Protozoan Parasites of fishes. Elsevier. Amsterdam, London, New York, Tokyo. 315P.
- Mahmoudi Hesar, .2002. Survey on prevalence of *Ichthyophthirius multifiliis* in the coldwater fish's ponds of West Azerbaijan Province. D.V.M. Theses Azad University of Urmia, Veterinary Medicine Faculty. No. 36, Vol. 4. (in Persian).
- Masoumian, M.; Pazooki J. , 1999. Myxosporean parasites from Mesopotamian part of Iran. *Iranian J. of Fisheries Sci.* **1**:(1)35-46.

- Masoumian, M.; Mehdizadeh A. and Yahyazadeh, M. , 2003. Coccidian and Myxozoan infections in some fishes of Aras and Mahabad Dams. *Iranian J. of Fisheries Sc.* **11:(2)**79-90 (in Persian).
- Moghainemi, R. and Abbasi, S. , 1996. Survey on parasitic infections on endemic fishes of Hoor-El-Azim Marsh. Iranian Fisheries Res. Org. Publ. 107P. (in Persian).
- Mokhayer, B. , 1974. A check list of Acipenseridae fishes parasites. J. of Vet. Med. Faculty of Tehran Univ. **29:(1)**1-12. (in Persian).
- Mokhayer, B. , 1975. Ecological survey on parasites of Acipenseridae fishes, J. of Vet. Med. Faculty of Tehran Univ. **30:(1)**38-48. (in Persian).
- Mokhayer, B. , 1981. Survey on the parasites of Sefid-Roud River. J. of Vet. Med. Faculty of Tehran Univ. **38:**61-75. (in Persian).
- Molnar, K. and Baska, F. , 1993. Scientific report on intensive training course on parasites and parasitic diseases of freshwater fishes of Iran. 15-26 November 1993. Fisheries Company of Iran. 153P.
- Niak, A.; Kohneshahri, M. and Azari, Gh. , 1971. Infection to the Trichodina in the Acipenseridae fishes of The Caspian Sea. J. of Vet. Med. Faculty of Tehran Univ. **26:40** (in Persian).
- Pazooki J., Masoumian M. (2004): *Cryptobia acipenseris* and *Haemogregarina acipenseris* infections in *Acipenser guldenstadti* and *A. persicus* in the Southern part of the Caspian Sea. J. Agric. Technol. Vol. 6, pp.86-92.
- Roberts, R.J. , 2001. Fish pathology. Bailliere Tindall. London. England. 472P.
- Shulman, S.S. , 1984. Parasitic Protozoa. In: Key to parasites of fresh water fishes of the U.S.S.R (Ed. O.N. Bauer). Nauka, Leningrad. **Vol:1** (in Russian).
- Shulman, S.S. , 1990. Myxosporidia of the U.S.S.R. Translation Sires 75.A.A. Balkema/Rotterdam. 631P.
- Syed Mortezaei, S. , 2002. Protozoan infections of fresh water fishes in Khuzestan Province. *Pajouhesh and Sazandegi.* **51:**86-89 (in Persian).
- Woo, P.T.K. , 1995. Fish diseases and disorders, Volume 1, Protozoan and metazoan infections. CAB International. Wallingford, Oxon OX 10, 8 DE, UK. 874P.