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Protozoan and Myxozoan Infections in Some Fishes of Parishan Lake

[1]A.R. Golchin Manshadi, [2]M. Masoumian, [3]B. Jalali Jafari and [4]M. Barzegar Dowlatabadi

[1]Department of Aquatic Animal Health, Faculty of Veterinary Medicine, Kazerun Branch, Islamic Azad University, Kazerun, Iran
[2]Department of Aquatic Animal Health, Fisheries Research Institute of Iran, Tehran, Iran
[3]Department of Aquatic Animal Health, Faculty of Specialized Veterinary Medicine, Islamic Azad University, Science and Research Branch, Tehran, Iran
[4]MS in Fisheries Engineering, Tehran, Iran

Corresponding Author: A.R. Golchin Manshadi, Department of Aquatic Animal Health, Faculty of Veterinary Medicine, Kazerun Branch, Islamic Azad University, Kazerun, Iran Tel: 09122707806

ABSTRACT

In parasitological investigations on some fishes of Parishan Lake in 2008, totally 76 numbers of fish from 6 species were examined. They were as follows: *Cyprinus carpio*, *Barbus luteus*, *Barbus grypus*, *Carassius carassius*, *Liza abu* and *Mastacembelus mastacembelus*. The fishes were collected seasonally and were transported alive to the aquatic laboratory in Islamic Azad University of Kazerun. According to the results, there were eight different parasites collected; five species of Myxozoa including: *Myxobolus karuni*, *Myxobolus persicus*, *Myxobolus mulleri*, *Myxobolus bramae*, *Myxidium pfeiffer* and three species of protozoa including: *Ichthyophthirius multifiliis*, *Trichodina nigra*, *Trichodina puytoraci*. During this study, *Barbus grypus* is introduced as new host for *Myxobolus bramae* and also *Barbus luteus* for *Myxobolus mulleri*, *Myxidium pfeiffer* and *Trichodina nigra*; The Trichodinads were recorded for the first time from Iranian freshwater fishes. No parasites were seen from examined *Mastacembelus mastacembelus*.

Key words: Protozoa, Myxozoa, Parishan lake, Kazerun, Iran

INTRODUCTION

Parishan Lake lays at a distance of 12 km to the southeast of Kazeroon city, southern area of Famur's mountain, in Fars province, Iran. As water of the lake is supplied from around springs' comes, its area varies in different seasons according to the amount of rainfall. This lake's water is brackish and a small amount is used for agricultural uses. Native fishermen fish strongly and native residents feed from them with a passion, because of the good quality of the fish (Takamy *et al*., 1979). Other reports from the Fars province are related to studies on Kaftar's Lake (Barzegar and Alali, 2000). Mentioned studies show *Trichodina* sp. from skin and gills of fish silver carp, grass carp, common carp, *Capoeta aculeata* and *Ichthyophthirius multifiliis* from the gills of *Chondrostoma orientalis* and *Leuciscus persidis* and *Dermocystidium* sp. from the gills of common carp were isolated.

In the case of Myxozoa, comprehensive studies have been done in the species level of fishes: Masoumian *et al*. (1994, 1996a, b), Molnar *et al*. (1996), Masoumian *et al*. (2005), Pazooki *et al*. (2007) and Masoumian *et al*. (2004, 2003). In this studies about 50 species of Myxozoa from fish has been identified, classified and reported. About Trichodina parasite, in the

Table 1: Fish identification keys

No. of captured fish	Length (cm)	Weight (g)	Scientific name	Row
1	5/31	230	*Barbus grypus*	1
35	25-16	240-53	*Barbus luteus*	2
28	30-17	458-55	*Cyprinus carpio*	3
9	28-16	326-67	*Carassius carassius*	4
2	50-44	290-186	*Mastacembelus mastacembelus*	5
1	15	51	*Liza abu*	6
Total = 76				

genus level there are many reports of fish from several areas of Iran and in the species level, *T. domerguei* and *T. perforata* from sturgeon and carp fish and *T. polycolpus* from *Capoeta capoeta* have been reported by Mortezai and Abbasi (2001). The purpose of this study was identification and introduction of Myxozoa and Protozoa parasites of fish in Parishan Lake.

MATERIALS AND METHODS

During studies on fish's parasite of the Parishan Lake in 2007, total number of 76 fish were caught and studied. Sampling was done during the year. The fish were caught by fixed net in different areas, including areas of deep lakes, high vegetation areas or deep zone and immediately transferred alive by containers specialized for transporting fish contain the lake's water to the laboratory of parasitology in Azad University, where they were kept in the aquarium. Fish identification was performed by using keys of Berg (1965), Coad (1995), Abdoli (1999) and Vossoughi and Mostajir (2004) (Table 1). All internal and external organs of fish were put in Petri dishes and after adding normal saline were studied with stereo microscope and light microscope. Obtained protozoa and spores of myxozoa fixed in gelatin glycerin and were identified and categorized by keys of Shulman (1984, 1990) and Lom and Dykova (1992).

RESULTS

During this study, eight parasites were identified totally which is consist of: *Myxobolus karuni, Myxobolus persicus, Myxobolus mulleri, Myxobolus bramae, Myxidium pfeifferi, Ichthyophthirius multifiliis, Trichodina nigra* and *Trichodina puytoraci*. In freshwater eel no Protozoa and Myxozoa were observed. Parasites isolated from the studied fish, the hosts and the infected organs are shown in Table 2.

***Myxobolus karuni* (Masoumian *et al*., 1994):** This parasite were isolated and identified from primary gill filaments of *Barbus grypus* and *Barbus luteus*. Spores are relatively large and ovoid in frontal view, lemon shaped in side view, with distinct sutural line. The ends of the anterior part of polar capsules are separated from each other and there is a distinct intercapsular appendix. Spores valves are symmetrical and smooth, relatively thin surface and the end of the anterior part of them is flattened. Spores are 14.1 (13-14.9) μm long, 10.2 (9.7-10.4) μm wide and 7.2 (6.5-7.8) μm thick. Spores have two equal polar and elongated oval capsules, 6.2 (6.5-7.5) μm long and 3.4 (3.2-3.9) μm wide and are tapering at the discharging canals of the polar filament. The polar capsules are a bit longer than semilength of the spore. Polar filament has 11-10 turns. Spores have a large iodinophilous vacuole in the sporoplasm (Fig. 1).

Table 2: Protozoa and myxozoa isolated from fish of Parishan lake

Infected organ	Host	Parasites	Row
Skin and gills	*Cyprinus carpio, Barbus luteus, Carassius carassius*	*Ichthyophthirius multifiliis*	1
Skin and gills	*Liza abu*	*Trichodina puytoraci*	2
Skin and gills	*Cyprinus carpio, Barbus luteus*	*Trichodina nigra*	3
Gills	*Barbus grypus*	*Myxobolus persicus*	4
Gills	*Barbus grypus, Barbus luteus*	*Myxobolus karuni*	5
Gills	*Barbus grypus*	*Myxobolus bramae*	6
Bile fluid	*Barbus luteus*	*Myxobolus mulleri*	7
Bile fluid	*Barbus luteus*	*Myxidium pfeifferi*	8

Fig. 1: Extracted spores from cyst of *Myxobolus karuni* of *Barbus grypus*'s gill (X 1710)

***Myxobolus persicus* (Masoumian *et al*., 1994):** This parasite was isolated and identified from secondary filaments of *Barbus grypus*. Spores are ovoid in frontal view, lemon shaped in side view, with distinct sutural line. The ends of the anterior part of polar capsules are separated from each other and there is a distinct intercapsular appendix. Spores valves are symmetrical and smooth, relatively thin surface. Spores are 10(9.1-10.4) μm long, 7.3(6.5-7.8) μm wide and 6/3(5.2-6.5) μm thick. The two polar capsules are pear-shaped in form and unequal (occasionally equal)in size. The larger is 5.1(4.5-5.8) μm long and 2.7(2.6-3.2) μm wide. The smaller is 4.8(3-4.5) μm long. The larger polar capsule is longer than semi length of the spore with 6-7 turns in larger and 7-8 turns in the smaller one. Sporoplasm does not have iodinophilous vacuole (Fig. 2).

***Myxobolus bramae* (Reuss, 1906):** This parasite was isolated and identified from secondary filaments of *Barbus grypus*. The spores are ovoid, rarely narrow in the anterior part. Spore valves are seen distinctly in frontal view. The two polar capsules are pear-shaped and their lengths are half or occasionally more than half of the length of the spores which have largely occupied the anterior part of spore. The anterior ends of polar capsules are set apart to each other and intercapsular appendix is triangular shaped, large and visible. Spores are 9-15 μm long, 8-12 μm wide and 4.5-8 μm thick. Polar capsules are 4-7.2 long and 2.5-3 μm wide (Fig. 3). This parasite produces milky white and circular cysts in gills of infected fish.

***Myxobolus mulleri* (Butschli, 1882):** This parasite were isolated and identified from bile fluid of *Barbus luteus*. Spores are ovoid and seem to be enlarged at the anterior part. In some cases, are

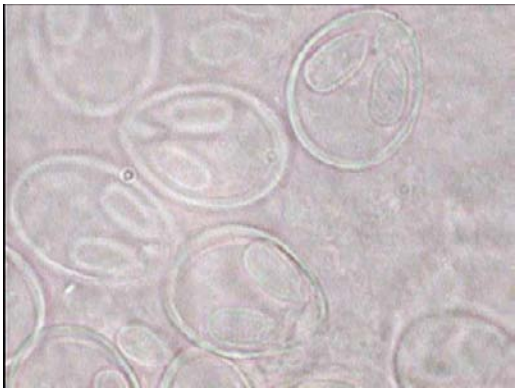

Fig. 2: Extracted spores from cyst of *Myxobolus persicus* of *Barbus grypus*'s gill (X 1960)

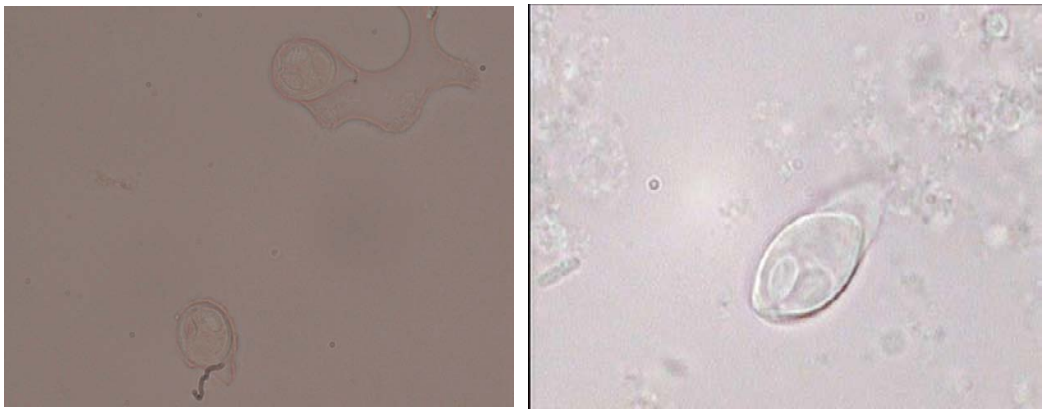

Fig. 3: Extracted spores from cyst of *Myxobolus bramae* of *Barbus grypus*'s gill (X 810)

seen ellipsoidal in shape. The pear-shaped polar capsules are longer than the half length of spore. The anterior ends of polar capsules are closed to each other and intercapsular appendix is triangular shaped, hardly visible. Spores are 8-13 μm long, 7-10 μm wide and 5.4-6 μm thick. The polar capsules are 3.6-5.5 long and 2.5-3 μm wide (Fig. 4).

***Myxidium pfeifferi* (Auerbach, 1908):** This parasite was observed as a Ceolozoit form and isolated from bile fluid of *Barbus luteus* (Fig. 5). Spores are spindle in shape and in some cases the wide of middle part are less than beginning and end of them. Spores are 12-18 μm long, 5-6 μm wide. Polar capsule is 5-6 μm long.

***Ichthyophthirius multifiliis* (Fouquet, 1876):** Parasite is around to ovoid in shape, 0.05 to 1 mm diameter and has a cytostome in the third of anterior part of body. The Parasite was isolated from gills and skin's moisture spread of *Carassius carassius*, *Barbus luteus* and *Cyprinus carpio* (mirror carp) (Fig. 6).

Genus *Trichodina* (Ehrenberg, 1838): The other external protozoan parasite is *Trichodina* sp. cause of Trichodiniasis. The genus characterized by teeth with central part of dense and

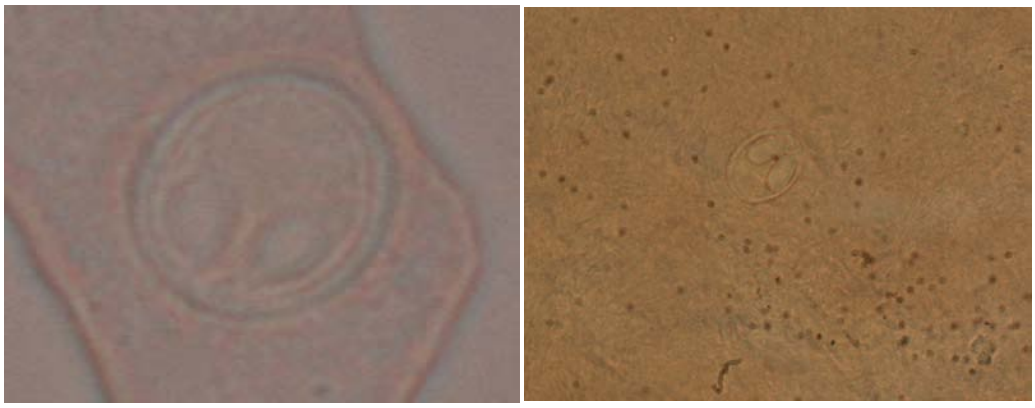

Fig. 4: Spores of *Myxobolus mulleri* isolated from bile fluid of *Barbus grypus* (left picture X1920 and right picture X 410)

Fig. 5: Spores of *Myxidium pfeifferi* isolated from bile fluid of *Barbus luteus*, Ceolozoit form, X 2200

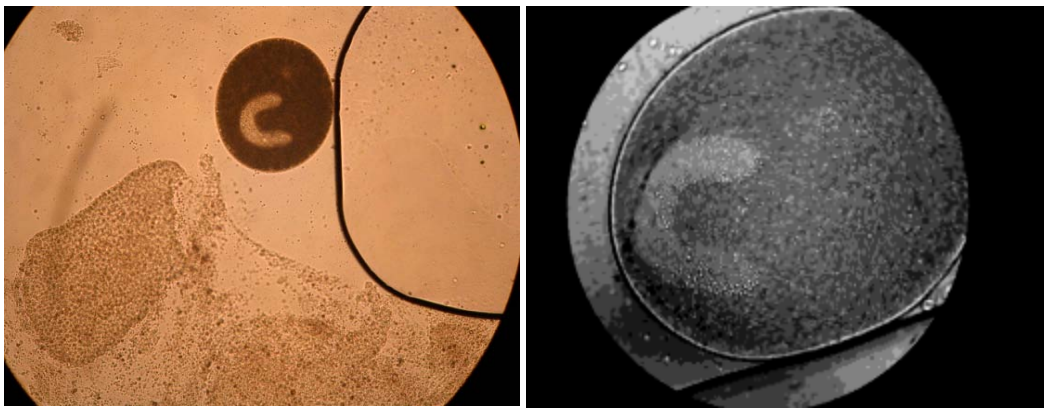

Fig. 6: *Ictyophthirius multifiliis* isolated from gills of *Barbus luteus*

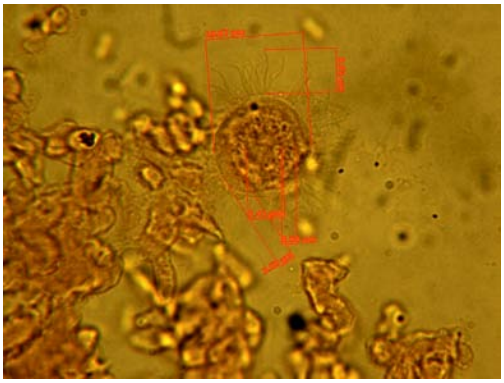

Fig. 7: View of *Trichodina nigra* isolated from skin of *Barbus luteus*

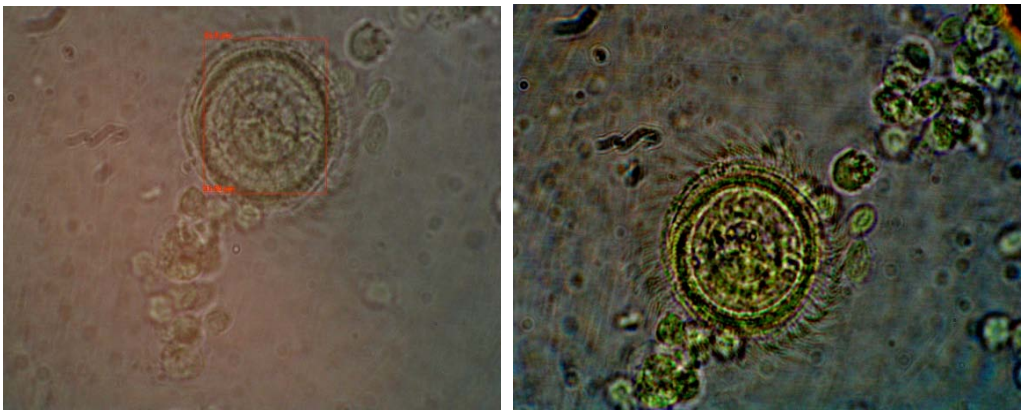

Fig. 8: View of *Trichodina puytoraci* isolated from skin of *Liza abu*

cone-shaped and by outside semicircle blades and inside straight thorn. Diameter of adhesive disk and dental ring, size and number of teeth and diameter of the macro and micronucleus and their ratio together are considered criteria for differentiation of species of this genus.

***Trichodina nigra* (Lom, 1960):** This protozoa was isolated from the skin and gills of common carp and *Barbus luteus*. Adhesive disk diameter (da) is 19.87 μm and of tooth ring's diameter (dd) is 31.9 μm (Fig. 7).

***Trichodina puytoraci* (Lom, 1962):** *Trichodina puytoraci* was isolated from the skin and gills of *Liza abu*. Adhesive disk diameter (da) is 31.36 μm and of tooth ring's diameter (dd) is 14.56 μm (Fig. 8).

DISCUSSION

Among the protozoan parasites obtained in this study *Ichthyophthirius multifiliis* is considered as one of the important pathogenic ciliated protozoan of freshwater's fish. This parasite is a factor of white spot disease and lead to severe losses and can reduce fish growth. The parasites have been

reported by Moghinemyi *et al.* (1992) and Molnar and Baska (1993) from large numbers of wild fish and rearing farm of Iran. In this study *Ichthyophthirius multifiliis* was isolated from gills and skin of *Carassius carassius*, *Barbus luteus* and *Cyprinus carpio* (mirror carp) of water basin's Parishan for the first time.

Genus *Trichodina* is another important protozoa. Moghinemyi *et al.* (1992) reported as the parasites of *Barbus sharpeyi, Aspius vorax and Barbus grypus* and *Liza abu* of Hoor-Elazim and Mortezai and Abbasi (1997) reported from *Barbus sharpeyi* of Shadgan Marsh. As other reports, it could be pointed to Mortezai *et al.* (2009) in study on Barboid fish of Khuzestan province that it was reported from *Barbus sharpeyi*, *B. barbulus* and *B. grypus* and also *Trichodina perforata* was reported from *C. capoeta* by Masoumian *et al.* (2005). In this study *Trichodina nigra* from skin and gills of common carp and also *B. luteus* and *Trichodina puytoraci* from skin of *Liza abu* were isolated for the first time in Iran.

Phylum of Myxozoa is a controversial group of parasites that are known in the fish. New theory about the life cycle of these parasites have been confirmed with new experiments: (El-Mansy *et al.*, 1998; Szekely *et al.*, 1998; El-Mansy and Molnar, 1997) and finally with the molecular experiments as well as position classification phylum of Myxozoa between metazoan parasites were proposed to belong to *Cnidaria*, however, parasites belonging to this phylum are most important parasites in fish (Smother *et al.*, 1994; Bush *et al.*, 2001; Kent *et al.*, 2001).

In this study, four species of Myxobolus were reported including *Myxobolus karuni* and *Myxobolus bramae from* gills of *B. grypus*, *Myxobolus mulleri* from bile of *B. luteus* and *Myxobolus persicus* from gills of *B. grypus* and *B. luteus*. Also *Myxidium pfeifferi* were isolated from bile of *B. luteus*. This is the first time that five species of myxozoa are reported, among the reports has been done in other water basins of Iran.

M. karuni from gills of *B. luteus* and *B. sharpeyi* and *M. persicus* from gills of *B. grypus* by and *M. persicus* from gills of *B. luteus* and *B. sharpeyi* and *M. karuni* from gills of *B. grypus* by Masoumian *et al.* (1994) were reported. Also Masoumian *et al.* (1994) in a study on some of the fish in the provinces of Gilan and Mazandaran, isolated *M. bramae* from gills of *Rutilus frisii* Kutum and *M. mulleri* from muscle of *Leuciscus cephalus* and *Myxidium pfeifferi* from the gallbladder of *Scardinius erythrophthalmus*.

Estimating the pathogenicity and economic importance of the parasites is very difficult and the exact amount of loss and mortality in fish, due to our lack of information is not available. In addition, in the aquaculture system comparing data of different incidence of parasite and infection rate of Myxosporea is very difficult because the data varies, comparing the type and extent of rearing system, fish species and ultimately climate. All of the parasites has been studied had no sign of the disease.

Parishan Lake is one of the important water basin of Fars province and supplies fish protein source, especially for people in the region and the fish economically can also be selected for fish farms.

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