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The occurrence of epizoic ciliates (Protozoa: Ciliophora) of the juvenile flounder, *Platichthys flesus* L., 1758, from Sarıkum Lagoon Lake (Sinop, Turkey)

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Abstract: The occurrence of epizoic ciliates on the juvenile flounder, *Platichthys flesus* L., 1758, collected monthly by fishing net in Sinop's Sarıkum Lagoon Lake during the period from May 2003 to April 2004, was investigated. Five epizoic ciliate species, *Trichodina jadranica* (Raabe, 1958) Haider, 1964; *Trichodina domerguei* Wallengren, 1897; *Riboscyphidia* sp.; *Ambiphrya* sp.; and *Vorticella* sp., were found after examination of 296 juvenile flounder. Among these, *T. jadranica* was the dominant species. The prevalence and mean intensity values of the 5 epizoic ciliates were given as pooled data for 2 groups, namely mobiline ciliates and sessiline ciliates. Mobiline ciliates were commonly found on the gills of juvenile flounders, whereas sessiline ciliates were found only on fins. The highest prevalence and mean intensity levels of mobiline ciliates were recorded in the winter and spring seasons. Sessiline ciliates were absent in winter. The largest-sized juvenile flounder among the established 6 length classes had a higher intensity of mobiline ciliates. This study is the first on the epizoic ciliate fauna present on the juvenile flounder in Turkey. While *T. jadranica* is a new parasite record, the juvenile flounder is a new host record for *T. domerguei* in Turkey.

Key words: Flounder, *Platichthys flesus*, epizoic, trichodinids, sessiline ciliates

Sarıkum Lagün Gölü'ndeki (Sinop, Türkiye) yavru dere pisisi *Platichthys flesus* L., 1758 balığında görülen ektoparazitik siliatlar (Protozoa: Ciliophora)

Özet: Sinop Sarıkum Lagün'ünden Mayıs 2003 – Nisan 2004 tarihleri arasında her ay ığrıp çekilerek yakalanan yavru dere pisisi balığının, *Platichthyes flesus* L., 1758, epizoik siliatları belirlendi. *Trichodina jadranica* (Raabe, 1958) Haider, 1964; *Trichodina domerguei* Wallengren, 1897; *Riboscyphidia* sp.; *Ambiphrya* sp.; ve *Vorticella* sp. olmak üzere 5 epizoik siliat türü 296 adet yavru dere pisisi balığında tanımlandı. Bu türler arasında *Trichodina jadranica* dominat türdü. Beş epizoik siliatın enfeste balık başına ortalama yoğunluğu ve enfestasyon oranı mobil ve sesil siliatlar olmak üzere iki grup adı altında toplu olarak verildi. Mobil siliatlar yavru pisi balıkların solungaçlarında yaygın olarak bulunurken, sesil siliatlar yüzgeçlerinde bulundu. Mobil siliatlara ait en yüksek enfestasyon oranı ve yoğunluğu kış ve baharda kaydedildi. Diğer taraftan sesil siliatlar kışın gözlenmedi. Oluşturulan altı boy sınıf içinden en büyük boy sınıfında mobil siliatların yoğunluğu daha yüksek oranda bulundu. Bu çalışma Türkiye'deki yavru pisi balıklarının ektoparazitik siliatları üzerine ilktir. *T. jadranica*, Türkiye parazit faunası için yeni parazit kaydı iken, *T. domerguei* için yavru pisi balıkları yeni bir konak kaydıdır.

Anahtar sözcükler: Pisi balığı, *Platichthys flesus*, epizoik, trichodinidler, sesil siliatlar

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Introduction

Among epizoic protozoa, there are important pathogens of wild and hatchery-reared fish. The most frequently observed ectoparasitic protozoans are motile (mobiline) and nonmotile (sessiline) ciliates affecting the gills and skin of aquatic animals. One of the largest and most widely distributed mobiline ciliate genera is *Trichodina* Ehrenberg, 1838, present on aquatic invertebrate and vertebrate hosts (Van As and Basson, 1989). Sessiline ciliates live as symbionts, commensals, and parasites on various hosts, such as mollusks (Botes et al., 2001), copepods, mysids (Jayasree et al., 2001; Fernandez-Leborans, 2004), and fish (Kuperman et al., 2001). At high densities, these ciliates (mobiline and sessiline) have been reported as causing mortality in juvenile and adult cultured fish populations, leading to severe economic losses in various parts of the world (Van As and Basson, 1987).

There are many studies surveying epizoic ciliates of various aquatic species (Xu et al., 1999; Green and Shiel, 2000; Madsen et al., 2000; Basson and Van As, 2002; Dove and O'Donoghue, 2005). In the studies surveying the epizoic ciliates of flounder, *P. flesus*, more mobiline ciliates than sessiline ciliates were reported to be present. So far, *Trichodina borealis*, *T. claviformis*, *T. raabei*, *T. jadranica*, and *T. domerguei* have been described by various authors as the epizootic ciliates of flounder (Calenius, 1980; Lüthen, 1989; Palm and Dobberstein, 1999; Dobberstein and Palm, 2000; Chibani et al., 2005). There are few quantitative parasitological studies on flounder in Turkey (Oğuz, 1991; Aydoğdu and Öztürk, 2003; Oğuz and Öktener, 2007); these have covered larger, commercially caught fish and have mainly described the metazoan parasites. Despite several studies on ectoparasitic fauna of some juvenile fish species (Tokşen, 2004; Ogut and Akyol, 2007), no study on juvenile flounder has been done in Turkey.

The aim of the present study was to investigate and describe epizoic ciliates found on juvenile specimens of flounder and obtain more information on epizoic parasites depending on host characteristics and environmental factors.

Materials and methods

Specimens of juvenile flounder (*P. flesus*) were collected by fishing net in the estuary of Sarıkum Lagoon Lake (42°00´N; 34°54´E), connected to the Black Sea (Figure 1). It is typically a lagoon, a eutrophic lake with a brackish characteristic and salinity ranging from 1‰ to 5‰.

Sampling was carried out monthly from May 2003 to April 2004. For parasitological examination, fish were transported alive in local water to the Sinop Fisheries Faculty Laboratory and examined in the same water; the following day, they were collected. A total of 296 fish specimens were observed. The total length was measured postmortem. Skin, fins, and gills were examined under a light microscope and scrapings of whole mucus from these parts of the fish were taken on several slides. The total number of epizoic ciliates was determined by screening and

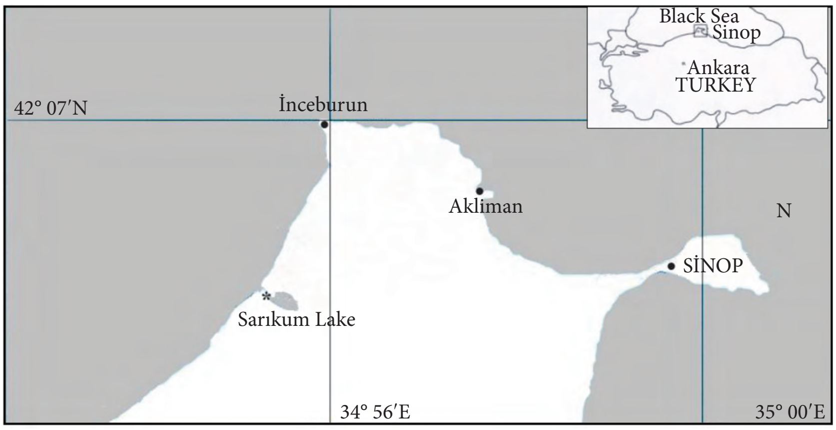

Figure 1. Map of Sarıkum Lake showing the sampling area (*).

counting of the entire mucus material of each slide. For trichodinids, air-dried smears were stained according to Klein's silver nitrate ($AgNO_3$) method (Lom and Dykova, 1992) in order to study details of the adhesive disk. All morphological measurements were carried out by an oil-immersion light microscope (Nikon SE), using 20 parasite specimens for each species. All measurements followed the uniform specific characteristics proposed by Lom (1958) and Arthur and Lom (1984). In the case of denticles and radial pins, the mode is given instead of the arithmetic mean. The span of the denticle was measured from the tip of the blade to the tip of the ray. In the description of denticle elements, the format recommended by Van As and Basson (1989) was followed.

Specifically, several references were used in the description of mobilines *T. jadranica* and *T. domerguei* (Lom and Stein, 1966; Lom, 1970; Arthur and Lom, 1984; Lom and Dykova, 1992) and sessilines *Riboscyphidia* sp., *Ambiphrya* sp., and *Vorticella* sp. (Viljoen and Van As, 1983; Lom and Dykova, 1992; Jayasree et al., 2001; Fernandez-Leborans, 2004).

Infestation prevalence (%) and mean intensity levels of the ciliates were determined according to the methods of Bush et al. (1997). The prevalence and mean intensity values of the 5 epizoic ciliates were given as pooled data for 2 groups, namely mobiline ciliates and sessiline ciliates, rather than by individual species.

Water temperature (°C), salinity (‰), and pH levels were recorded using a U-10 Horiba digital water analyzer at the sampling sites.

Normality of the data was checked using the Kolmogorov-Smirnov test. The Kruskal-Wallis test (nonparametric ANOVA) was performed to compare the mean intensity values of mobiline and sessiline ciliates for infestation sites, length classes of fish, and the months in which the study was conducted. The analyses were carried out using the computer programs GraphPad Instat 3.0 and SPSS 9.0 (Software Inc., USA).

Results

Epizoic protozoan ciliates belonging to 2 groups, 2 mobiline and 3 sessiline species, were found on juvenile flounder.

Mobiline ciliates

Two species of trichodinids, *T. jadranica* and *T. domerguei*, the former being the more common, were identified (Figures 2 and 3). The preferred infestation sites of these 2 trichodinid species on the juvenile flounder were different. *T. jadranica* was commonly found on the gills, whereas *T. domerguei* was commonly present on the skin and fins of the juvenile flounder. In addition, *T. jadranica* and *T. domerguei* were observed on stained slides in a ratio of 100:7, respectively.

T. jadranica (Figures 2A and 3A, Table 1) is a small-sized trichodinid with a disk-shaped body. The center of the adhesive disk of the specimens impregnated with silver nitrate appeared as a clear space. The blade of the denticle was sickle-shaped. The distal margin of the blade was rounded and away from the border membrane. The tangent point was

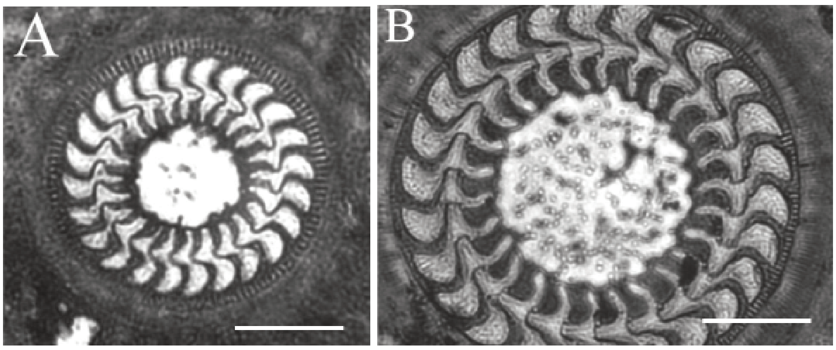

Figure 2. Parasitic mobiline ciliates of the juvenile flounder, *Platichthys flesus*: A, *Trichodina jadranica* (Raabe, 1958) Haider, 1964; B, *Trichodina domerguei* Wallengren, 1897. Specimens stained with silver-nitrate. Scale bar: 10 mm.

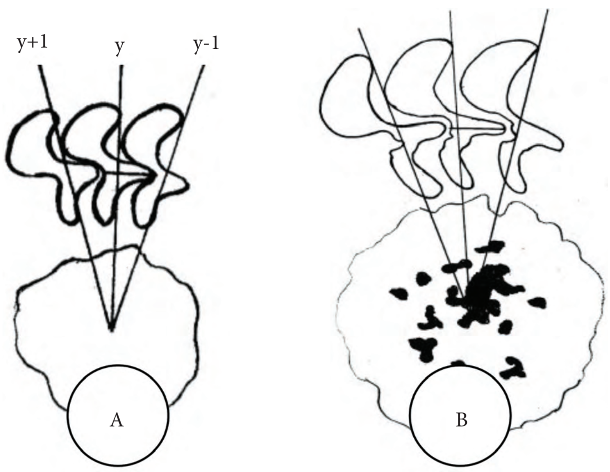

Figure 3. Diagrammatic drawings of the denticles of trichodinids: A, *Trichodina jadranica* (Raabe, 1958) Haider, 1964; B, *Trichodina domerguei* Wallengren, 1897.

rounded. The anterior margin of the blade sharply curved down. The apex of the blade was round. Anterior apophysis and posterior projection were not present. The central part of the denticle was roundly pointed and extended slightly more than halfway toward the y-1 axis. Rays were slightly curved in a posterior direction with tips extending beyond the y axes, and the point of the ray was rounded. The morphometrical data of the parasites' body parts are given in Table 1.

T. domerguei (Figures 2B and 3B, Table 1) is a large trichodinid with a disk-shaped body. The center of the adhesive disk of the specimens impregnated with silver nitrate was clear with numerous dark granules. The blade of the denticle was broad and sickle-shaped, filling a large area between the y axes. The distal margin of the blade was close to the border membrane. The apex of the blade was round. The tangent point was rounded. The posterior margin

Table 1. Morphometrical data and infestation sites of *Trichodina jadranica* and *T. domerguei* in the juvenile flounder, *Platichthys flesus* (n: number of measured specimens) (range with arithmetic mean and standard error in parentheses) (all measurements in mm).

Species	*Trichodina jadranica* (n = 20)	*Trichodina domerguei* (n = 20)
Site	gills, rarely skin and fins	skin and fins, rarely gills
Diameter of		
body	27-33 (31.0 ± 0.32)	52-73 (62.18 ± 1.54)
adhesive disk	22.5-29 (26.51 ± 0.38)	37.5-65 (50.46 ± 1.52)
denticulate ring	13.5-18 (16.14 ± 0.25)	27.5-45 (34.18 ± 1.07)
Number of		
denticles	21-25	21-29
radial pins per denticle	5-6	8-11
Length of		
blade	2.5-3.5 (3.03 ± 0.05)	5.5-7.5 (6.28 ± 0.20)
ray	1.5-2.5 (2.04 ± 0.06)	3.25-5.75 (4.22 ± 0.16)
denticle	3-4.7 (4.05 ± 0.08)	7.5-10 (8.84 ± 0.19)
Span of denticle	6-7.2 (6.47 ± 0.10)	12-15.5 (13.53 ± 0.27)
Width of		
central part	1-1.8 (1.42 ± 0.06)	2.1-3.75 (2.66 ± 0.09)
border membrane	1.5-2.8 (2.1 ± 0.08)	3.5-5 (4.48 ± 0.12)

fairly curved down. Blade apophysis was present, but not clearly visible. The blade connection was thin. The central part was well developed, but thin and long, tapering to a rounded point and fitting tightly into the preceding denticle. The ray connection was short and thin. The base of the ray was thin, with the ray being bulbous toward broad, with a rounded point. Rays were short and curved in the posterior direction with tips extending beyond the y axes. The section of the denticle above the x axis was similar to the portion below, with a ratio of one. The morphometrical data are presented in Table 1.

The monthly seasonal prevalence and mean intensities of mobiline ciliates infesting the juvenile flounder are reported in Table 2 and Figure 4. A statistically significant difference among the seasonal mean intensities was detected (P = 0.0074, Table 2). Mean intensities were higher in the spring and winter than in autumn. The overall infestation prevalence (%) and mean intensity levels estimated from a total of 296 fish specimens were 97.97% and 1584.37 ± 242.91 trichodinids/infested fish, respectively (Table 2). Statistically significant differences in the mean intensity values were found in relation to the length classes, months, seasons, and infestation sites (Table 2, Figure 5). However, it must be noted that there were no statistically significant differences among the mean intensities of each of the 6 length classes of fish in any month (P > 0.05). Thus, the data were grouped and analyzed for the 6 length classes with no respect to sampling months. Larger fish had higher intensities than smaller fish (Table 2).

Sessiline ciliates

A total of 3 sessiline ciliate species, *Riboscyphidia* sp., *Ambiphrya* sp., and *Vorticella* sp., the first one being the most common, were identified. The sites of infestation of these sessiline ciliates on the juvenile flounder were different. *Riboscyphidia* sp. was commonly found on skin and fins, rarely on gills; for *Ambiphrya* sp. and *Vorticella* sp., it was the reverse. In addition, *Riboscyphidia* sp., *Ambiphrya* sp., and *Vorticella* sp. were observed in a respective ratio of 80:15:5.

Riboscyphidia sp. (Figure 6A) has a cylindrical or conical body, with a length of 60-64 mm (55.50 ± 0.80). The body was divided into nearly equal distinct regions by a circular groove, 30-43 mm in diameter (37.16 ± 0.79). The scopula was extremely large with a thin flat border, 30-43 mm in diameter (37.16 ± 0.79). The peristomial lip opened wider than the body, 35-42 mm in diameter (38.48 ± 0.34), and the infundibulum extended from the ciliary zone to the circular groove.

Ambiphrya sp. (Figure 6B) was similar to *Riboscyphidia* sp. and its body is also cylindrical. The macronucleus was ribbon-like. The diameter of the

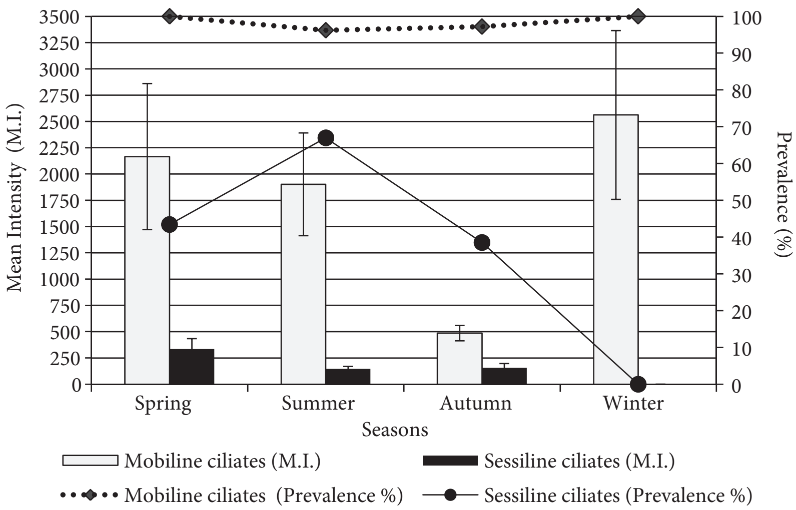

Figure 4. Values of prevalence and mean intensity of epizoic ciliates on juvenile flounder according to seasons.

Table 2. Combined infestation prevalence (%) and mean intensity levels of parasitic mobiline ciliates (*T. jadranica* and *T. domerguei*) on the juvenile flounder, *Platichthys flesus*.

	n	Infestation prevalence (%)	Mean intensity ± S.E.	Statistical test used
Months				Kruskal-Wallis P < 0.05
May 2003	32	100	302.28[a] ± 111.66	
June 2003	31	100	1248.42[ab] ± 500.11	
July 2003	42	100	1823.29[bd] ± 392.77	
August 2003	33	87.88	2714.21[ab] ± 1488.37	
September 2003	32	93.75	387.13[ab] ± 73.61	
October 2003	34	100	622.47[bc] ± 145.29	
November 2003	30	100	429.50[ac] ± 139.78	Dunn's
December 2003	32	100	2049.81[bc] ± 636.14	
January 2004	2	100	5017.00[abd] ± 4467.00	
February 2004	7	100	4200.71[abd] ± 3702	
March 2004	10	100	1162.80[abd] ± 564.97	
April 2004	11	100	8498.09[d] ± 2571.00	
Overall	296	97.97	1584.37 ± 242.91	
Seasons				Kruskal-Wallis P < 0.05
Spring	53	100	2165.66[ab] ± 694.85	
Summer	106	96.23	1901.87[a] ± 488.84	Dunn's
Autumn	96	97.22	485.78[b] ± 72.87	
Winter	41	100	2561.78[a] ± 803.07	
Infestation site				Kruskal-Wallis P < 0.05
Gills	296	97.63	1480.87[a] ± 196.10	
Skin	296	87.5	51.92[b] ± 13.06	Dunn's
Fins	296	83.78	73.37[b] ± 13.94	
Length classes of fish (mm)				Kruskal-Wallis P < 0.05
<40	6	100	288.00[ab] ± 263.47	
40-60	100	98	436.93[ad] ± 75.99	
61-81	111	96.4	1586.40[bc] ± 282.33	Dunn's
82-102	51	100	2353.88[bc] ± 895.87	
103-123	21	100	3700.29[cd] ± 1530.11	
>123	7	100	6774.43[c] ± 3458.07	

Means followed by the same superscript letter are not significantly different.

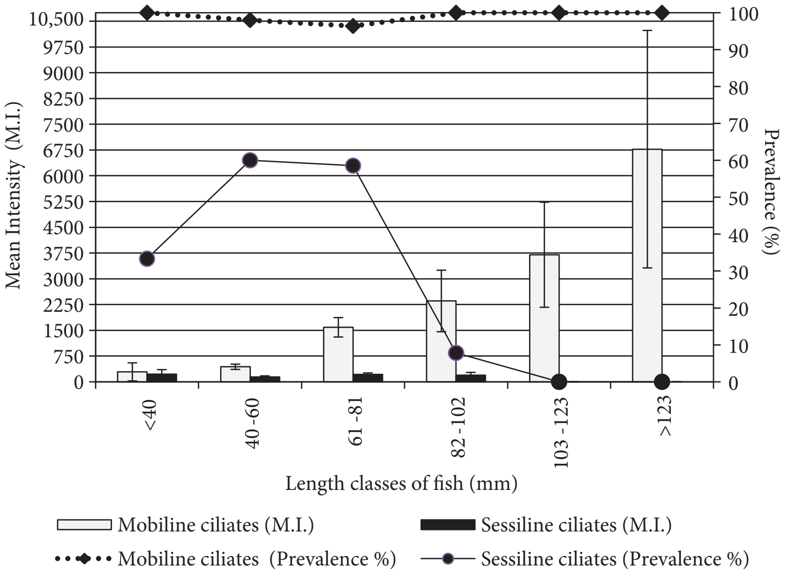

Figure 5. Values of prevalence and mean intensity of epizoic ciliates on juvenile flounder according to fish length classes.

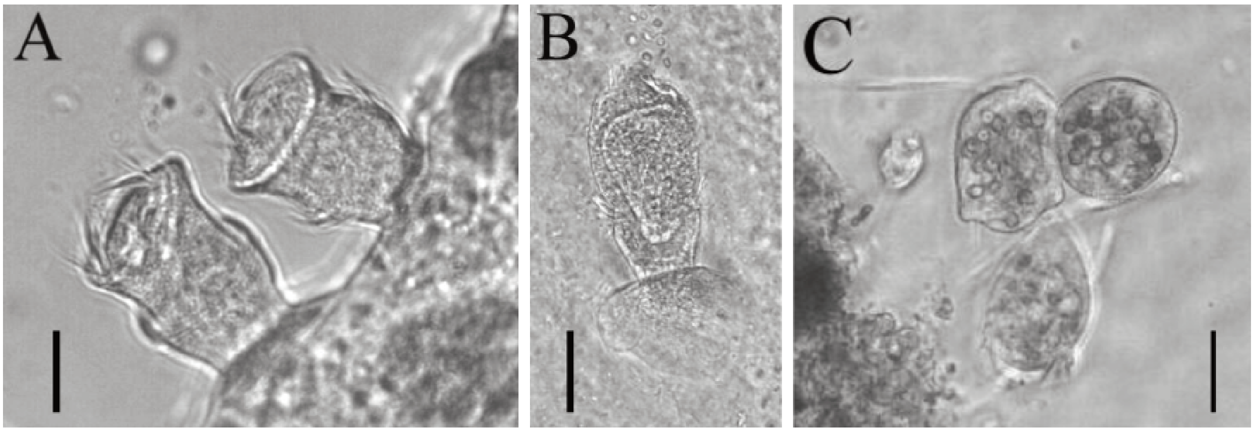

Figure 6. Parasitic sessiline ciliates of the juvenile flounder, *Platichthys flesus*: A, *Riboscyphidia* sp.; B, *Ambiphrya* sp.; C, *Vorticella* sp. Photomicrographs from fresh material. Scale bar: 10 mm.

scopula was wider than the diameter of the circular groove near the scopula.

Vorticella sp. (Figure 6C) has a conical and an inverted bell-shaped body. The stalk was contractile and longer when compared with the size of the body. The macronucleus was J-shaped. A spherical micronucleus was located close to the macronucleus.

Monthly and seasonal prevalence and mean intensity levels of sessiline ciliates infesting the juvenile flounder are presented in Table 3 and Figure 4. No sessiline ciliates were observed in November or December 2003, or January, February, March, or April 2004. The mean intensity of sessiline ciliates was slightly greater in the spring than in summer or autumn, although the difference among the seasons was statistically insignificant ($P > 0.05$, Table 3). The overall infestation prevalence (%) and mean intensity levels were 44.26% and 181.80 ± 24.92 sessiline ciliates/infested fish, respectively (Table 3). Both levels

Table 3. Combined infestation prevalence (%) and mean intensity levels of parasitic sessiline ciliates (*Riboscyphidia* sp., *Ambiphrya* sp., and *Vorticella* sp.) on the juvenile flounder, *Platichthys flesus*.

	n	Infestation prevalence (%)	Mean intensity ± S.E.	Statistical test used
Months				Kruskal-Wallis P < 0.05
May 2003	32	71.88	333.57^{ab} ± 100.1	
June 2003	31	25.81	6.86^{c} ± 3.60	
July 2003	42	95.24	196.20^{b} ± 35.72	Dunn's
August 2003	33	72.73	102.25^{a} ± 29.03	
September 2003	32	50	195.94^{ac} ± 82.40	
October 2003	34	61.77	126.76^{a} ± 32.82	
November 2003	30	0	0	
December 2003	32	0	0	
January 2004	2	0	0	
February 2004	7	0	0	
March 2004	10	0	0	
April 2004	11	0	0	
Overall	296	44.26	181.80 ± 24.92	
Seasons				Kruskal-Wallis P > 0.05
Spring	53	43.40	333.57 ± 100.04	
Summer	106	66.98	145.78 ± 23.48	
Autumn	96	38.54	156.68 ± 39.94	
Winter	41	0	0	
Infestation site				Kruskal-Wallis P < 0.05
Gills	296	23.65	42.61^{a} ± 7.80	
Skin	296	31.42	44.18^{a} ± 8.31	Dunn's
Fins	296	39.19	144.20^{b} ± 23.66	
Length classes of fish (mm)				Kruskal-Wallis P > 0.05
<40	6	33.33	223.50 ± 130.5	
40-60	100	60	140.95 ± 31.08	
61-81	111	58.56	217.83 ± 40.57	
82-102	51	7.84	189.00 ± 84.27	
103-123	21	0	0	
>123	7	0	0	

Means followed by the same superscript letter are not significantly different.

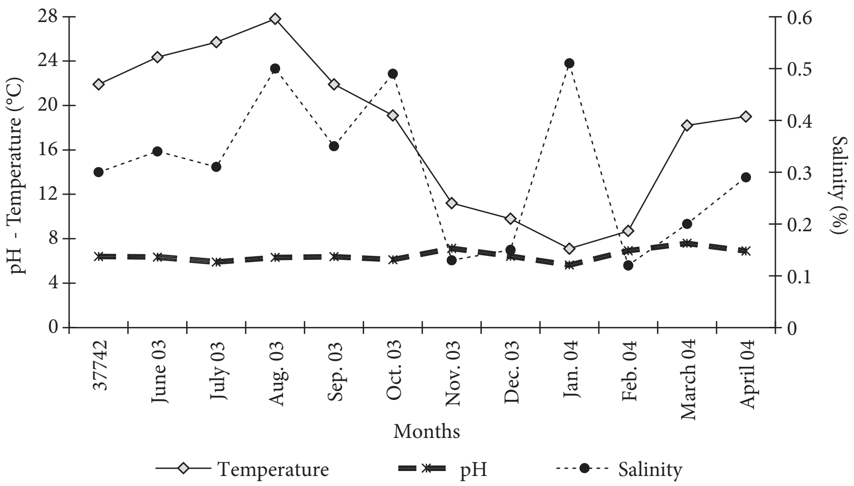

Figure 7. Selected water parameters for Sarıkum Lagoon Lake from May 2003 through April 2004.

were also recorded for all body parts and the length classes of the juvenile flounder (Table 3). The highest prevalence of sessiline ciliates was observed on the fins (39%), while the skin and gills were found to be less infested (31.42% and 23.65%, respectively). No difference in mean intensities among the various length classes was detected (Table 3).

Water parameters

Monthly water temperature (°C), salinity (‰), and pH values recorded throughout the sampling period are presented in Figure 7. While the highest temperature value was recorded in August (27.8 °C), the lowest temperature was recorded in January (7.1 °C). During the study period, salinity varied from 1.2‰ to 5.1‰ and pH from 5.63 to 7.59. The salinity was at its minimum in February (1.2‰). High salinities were recorded in January (5.1‰) and August (5.0‰)

Discussion

T. jadranica, having a wide geographical distribution and host range, occurs on the gills and skin of marine and brackish fish in the Adriatic, Baltic, Black, Azov, Yellow, and Bohai Seas; the northeast, northwest, and southeast Atlantic Ocean; and Cuba (Lom, 1970; Arthur and Lom, 1984; Dobberstein and Palm, 2000; Xu et al., 2001; Arthur et al., 2004). In addition, it has been reported from European eels, *Anguilla anguilla*, in freshwater (Madsen et al., 2000). This study is the first report of *T. jadranica* in Turkish brackish waters of the Black Sea.

Morphometric data obtained from specimens of *T. jadranica* in this study were in agreement with those reported by Lom (1970), Dobberstein and Palm (2000), Madsen et al., (2000), and Xu et al. (2001), but slightly smaller than those reported by Arthur and Lom (1984) and Arthur et al. (2004). The morphometric data of *T. domerguei* fall within the size ranges given by several authors (Lom and Stein, 1966; Lom, 1970; Özer, 2003a, 2003b), and this species was found to be among the most variable of the trichodinid species. *T. jadranica* and *T. domerguei* are well-known cosmopolitan species. As can be seen in Figure 7, the data collected related to the environmental factors also show fluctuations; thus, the variation in the dimensions of both *T. jadranica* and *T. domerguei* throughout the sampling period can be explained by the differences in environmental factors as well as a result of host influences.

The mean intensity levels of the mobiline ciliates (*T. jadranica* and *T. domerguei*) fluctuated seasonally (see Table 2). These data were different from the seasonal mean intensity values for *T. domerguei*, the only species found on the round goby, *Neogobius melanostomus* (Özer, 2003a, 2003b). This difference could be related to the different host species and environmental factors, with the former factor possibly having more effect. However, when the environmental factors are considered, it can be seen that the maximum mean intensity values recorded in winter coincided with a decrease in water temperature values in the present study (Figure 7). This result is also supported by the data presented by Kristmundsson et al. (2006), even though the trichodinid species studied were different. Moreover, throughout the investigation period, *T. domerguei* and *T. jadranica* were present at the same time. In the present study, *T. jadranica* was possibly the main factor causing higher prevalence and mean intensity levels in winter. Although the data for *T. domerguei* and *T. jadranica* were combined and calculated as a total for mobiline ciliates rather than species by species, *T. jadranica* was found more commonly than *T. domerguei* on the stained slides (100:7). Palm and Dobberstein (1999) observed a similar increase in the *Trichodina* population density on flounder in winter, attributing this increase to the bacterial biomass in the environment. Similarly, Ogut and Palm (2005) and Ogut and Akyol (2007) also found an increase in the abundance of trichodinids in winter months. The observed high level of prevalence and mean intensities of infestation in winter and spring was probably due to, as the above authors suggested, seasonal eutrophication or organic pollution in the sampling areas.

The size of the juvenile flounder was a factor affecting the intensity of mobiline ciliates (*T. jadranica* and *T. domerguei*) in this study, and the differences in the mean parasite intensities between the different fish length classes were statistically significant. Larger-sized juvenile flounder had higher numbers of parasites. The severity of many ectoparasitic infections increases with host size, possibly as a result of increasing exposure period and a larger space for the feeding and breeding of the parasite. Özer and Erdem (1998) and Özer (2003a, 2003b) noted a tendency of increase in the mean intensity of *Trichodina* spp. in relation to the length of the host fish. Our findings on the intensity levels of mobiline ciliates agree with those reported by the above mentioned authors.

The fins are a preferred attachment site for sessiline ciliates (*Riboscyphidia* sp., *Ambiphrya* sp., and *Vorticella* sp.), probably because the ciliates benefit from nutrients such as bacteria and detritus in their environment. These findings have also been supported by the data of Özer and Erdem (1999) and Kuperman et al. (2001).

The sessiline ciliates on juvenile flounder were observed only from May to October 2003, when water temperatures ranged from 27.5 to 19.1 °C (Figure 7). The present data are comparable to those of Tassaduqe et al. (2003), in which these ciliates were found only in March (14.4 °C), April (29.4 °C), and September (31.7 °C). Similarly, Jayasree et al. (2001) found a tendency of an increase in the abundance of the sessiline ciliates in relation to water temperature.

No specimens of sessiline ciliates were found on the larger-sized juvenile flounder (103-123 and >123 mm length classes). The juvenile flounder in these length classes were caught between late autumn and winter months only. The absence of sessiline ciliates in the larger-sized fish length classes could be a result of catching these juvenile flounders only in the colder times of the sampling.

In conclusion, this paper is the first report on the epizoic ciliate fauna of the juvenile flounder in Turkey. While in the present study *T. jadranica* is a new record for Turkish parasite fauna, the juvenile flounder is a new host record for *T. domerguei* in Turkey.

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