Occurrence of helminths in tench (*Tinca tinca* L., 1758) of Kovada (Isparta) Lake, Turkey

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**Abstract**

In this study, helminth parasites in tench of Kovada Lake and seasonal variation of these parasites were investigated monthly from March 2003 to February 2004. A total of 6 species of helminth parasites were found on 51 of 105 fish examined. The following parasites were found: *Gyrodactylus medius*, *Asymphylodora tincae*, *Caryophyllaeus laticeps*, plerocercoids of *Ligula intestinalis*, *Proteocephalus torulosus* and *Bothriocephalus acheilognathi*. *Asymphylodora tincae* was the most common parasite species found in tench with infected fish collected in all months sampled. Infection levels peaked in December (42.8 %). Infection levels of the second most commonly found parasite *C. laticeps*, peaked in April (42.8 %). *Ligula intestinalis*, the third most common parasite was more prevalent in October (20 %). The fourth most common parasite *P. torulosus* was found only in June (27.2 %). The fifth most common parasite *G. medius* was found only in January. The remaining parasite, *B. acheilognathi* was only present in small numbers with a total of 5 individuals being collected from the intestine. *Proteocephalus torulosus* is a new record for freshwater fishes in Turkey. *Caryophyllaeus laticeps* was recorded for the first time in tench in Turkey.

**Introduction**

There have been few published reports on the parasite fauna of fish from Turkey, despite the clear importance of parasites from a practical and theoretical viewpoint (Burgu et al., 1988; Oguz, 1991; Oguz and Öztürk, 1993; Topçu, 1993; Aydogdu et al., 1996; Oguz et al., 1996; Öztürk et al., 2000; Aydogdu et al., 2000; Aydogdu et al., 2001; Barlas and Kir, 2001; Kir, 2002; Aydogdu and Öztürk, 2003). One of the most wide spread cyprinids in Turkey is the tench (*Tinca tinca*). To date, tench from three sites have been examined for the presence of parasites. In those studies, the following parasites were isolated *Myxobolus sp.*, *Dactylogyrus macracanthus*, *Dactylogyrus sp.*, *Asymphylodora tincae*, *Pomphorhynchos laevis*, *Acanthocephalus lucii*, *Ligula sp.*, *Eustrongylides sp.*, nematode larvae, *Piscicola geometra*, *Ergasilus sieboldi*, and *Argulus foliaceus* (Aydogdu et al., 1996; Yildiz, 2003; Öztürk, 2002). On the basis of these studies, it is clear that tench in Turkey have a depauperate parasite fauna when compared to surveys (Wierzbicka et al., 1998; Svobodova and Kolarova, 2004). The present study aims to increase our knowledge on the occurrence of parasites of *T. tinca* in Turkey.

**Materials and methods**

Fish were collected monthly from Kovada Lake (37°38′ N, 30°52′ E) in southwest Anatolia, at an altitude of 821 m. The lake is shallow (mean depth approximately 5 m) and has a surface area of around 1100 ha.
Fish were caught using net, hook or bow-net by local commercial fishermen. The specimens were placed in plastic tanks with local lake water and immediately transferred to the research laboratory where they were kept in an aquarium and sacrificed within 24 hours. During the dissection, the gill filaments, the eyes, the fins and the skin were examined. The gill filaments were placed in separate petri dishes with 1:4000 formaldehyde. The intestine was dissected and placed in separate petri dishes with physiological saline solution. To determine the presence of parasites, intestines and gills were thoroughly examined under a binocular microscope (magnification x 6.4). Parasites found on gills and in intestine were counted, fixed in formaldehyde, stained with aceto carmine and mounted in Canada balsam.


One-way Anova was used to compare data between months. Statistical analysis of data was carried out with SPSS statistical package programs.

Results
A total of 105 specimens were examined between March 2003 and February 2004, with a maximum of 12 tench being examined in any one month. The fish weighed between 45 and 665 g while their lengths ranged from 15.3 to 34.9 cm. One ectoparasite on the gills and five endoparasites in the intestine of tench were recorded namely Gyrodactylus medius (Monegenea), Asymphylodora tincæ (Digenea), Caryophyllaenus laticeps (Cestoda), plerocercoids of Ligula intestinalis (Cestoda), Proteocephalus torulosus (Cestoda) and Bothrioccephalus acheilognathi (Cestoda). The most common parasite was A. tincæ (overall prevalence 40.9%), and the least common G. medius, which was only recorded in a single fish in January 2004.

Frequency of infection for A. tincæ changed according to month (<0.05). The highest count of A. tincæ was in December and March (Table 1). The mean abundance was 3.3 % in October rising to 110.8 % in December.

The second most common parasite C. laticeps was also recorded in the host fish intestine (Total prevalence 3.8 %). The infection was recorded in April and June. The infection was the highest in April. The third most common parasite was L. intestinalis (Total prevalence 2.85 %). Three of 105 fish were infected by L. intestinalis. The infection was recorded in October and January. The infection was highest in October. The fourth most common parasite was P. torulosus (Total prevalence 2.85 %). Three out of 105 fish were infected by P. torulosus. The infection was recorded only in June. The fifth most common parasite was B. acheilognathi (total prevalence 1.9 %). This species occurred in the intestine of tench, the findings were in March, two fish containing a total of five parasites were found (Table 1).

Gyrodactylus medius was recorded in host gill. 1 of 105 fish was infected by G. medius (Total prevalence 0.9 %). The infection was recorded only in January (Table 1).
Table 1. The prevalence and abundance (in parenthesis) of metazoan parasites in tench (*Tinc a tinca*) in Lake Kovada between March 2003 to February 2004.

<table>
<thead>
<tr>
<th>MONTHS</th>
<th>Number of fish examined</th>
<th><em>Asymphylodrom tincae</em></th>
<th><em>Carophyllaenus laticeps</em></th>
<th><em>Ligula intestinalis</em></th>
<th><em>Proteocephalus torulosus</em></th>
<th><em>Bothriocephalus acheilognathi</em></th>
<th><em>Gyrodactylus medius</em></th>
</tr>
</thead>
<tbody>
<tr>
<td>March-03</td>
<td>8</td>
<td>100 (78.1)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>25 (0.62)</td>
<td>-</td>
</tr>
<tr>
<td>April-03</td>
<td>7</td>
<td>28.5 (12.4)</td>
<td>42.8 (8.71)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>May-03</td>
<td>12</td>
<td>50 (8.5)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>June-03</td>
<td>11</td>
<td>27.2 (6.3)</td>
<td>9.1 (1.18)</td>
<td>-</td>
<td>27.2 (0.72)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>July-03</td>
<td>7</td>
<td>42.8 (15.6)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>August-03</td>
<td>9</td>
<td>44.4 (6.9)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>September-03</td>
<td>7</td>
<td>42.8 (5.7)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>October-03</td>
<td>10</td>
<td>20 (33)</td>
<td>-</td>
<td>20 (0.7)</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>November-03</td>
<td>8</td>
<td>37.5 (6)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>December-03</td>
<td>7</td>
<td>42.8 (110.8)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>January-04</td>
<td>9</td>
<td>22.2 (3.6)</td>
<td>-</td>
<td>11.1 (0.33)</td>
<td>-</td>
<td>11.1 (0.77)</td>
<td>-</td>
</tr>
<tr>
<td>February-04</td>
<td>10</td>
<td>40 (6.7)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>TOTAL</td>
<td>105</td>
<td>40.95 (19.52)</td>
<td>3.8 (0.7)</td>
<td>2.85 (0.09)</td>
<td>2.85 (0.07)</td>
<td>1.9 (0.04)</td>
<td>0.95 (0.06)</td>
</tr>
</tbody>
</table>
Proteocephalus torulosus is a new record for parasite fauna of freshwater fishes in Turkey and C. laticeps was recorded for the first time in tench in Turkey.

Discussion

Five helminth parasites were found in the intestine of the host fish: 1 Trematoda, 4 Cestoda; and one on the gills: 1 Monogenea.

The study results (Table 1) show that the most common parasite is *A. tincae*. *Asymphylodora tincae* has been known as a parasite of various freshwater fishes, found most commonly in *T. tinca, Esox lucius, Alburnus alburnus*, and *Barbus sp.* in Turkey (Burgu et al., 1988), Poland, France and Switzerland (Wierzbicka et al., 1998; Hanzelova et al., 1999). This parasite was recorded every month. The infection was highest in December and March. The lowest infection by *A. tincae* in tench was recorded in January. Seasonal changes in the abundance of fish parasites can be influenced by various factors, affecting both components of the host parasite system, by temperature regulating maturation rate of the parasite (Granath and Esch, 1983), but also metabolism and food consumption of fish, availability of infective stages in the intermediate host (Klenov, 1972) and food preferences connected with the age of fish. Other researchers have reported similar results in their studies. Yýldýz (2003) reported that *A. tincae* was the most common parasite species in tench in Kapulukaya Dam Lake.

*Bothriocephalus aichelognathi* is a very common parasite of many freshwater fish species (eg. *Cyprinus carpio, T. tinca, Alburnus alburnus, Silurus glanis*) (Türkmen, 1990; Erkul, 1997; Koyun, 2001; Aydin, 2003). It was also found to be an intestinal parasite of *Leuciscus cephalus* in the Doðancý Dam Lake (Aydogdu, 2001). Despite the claim by many researchers that *B. aichelognathi* is a common parasite in freshwater fish, the present study shows it is rarely found in tench in Lake Kovada.

As indicated by Öktener (2003), *C. laticeps* usually occur in the intestine of *C. carpio, Rutulis frisi, Blicca bjoerkna, Vimba vimba* and *Barbus plebejus escherichii* in Turkey. This parasite is known to infect over 40 species of fish and mainly cyprinids (Riggs and Esch, 1987). Four of 105 fish were infected by this parasite and found in April and June. This study records *C. laticeps* for the first time in tench.

In this study, the third most common parasite *L. intestinalis* is a common intestinal parasite of many species of freshwater fishes (Aydogdu and Öztürk, 2003). It infects three hosts: The first intermediate host is a copepod, the second intermediate host is usually a cyprinid fish and the definitive host may be any bird which feeds on an infected fish. In this study, 3 of 105 fish were infected by this parasite and found in October and January. Ööe and Aydýn (1995) as well as Yildiz (2003) have previously recorded *L. intestinalis* on *T. tinca* in Turkey.

Three of 105 fish were infected by *P. torulosus* and found only in June. Burgu et al. (1988) and Yetim (1985) reported *Proteocephalus sp.*, *P. macrocephalus* and *P. osculates* on *Anguilla*
anguilla, S. glanis and C. carpio in Turkey. This study reports P. torulosus for the first time in freshwater fishes in Turkey.

The only species of ectoparasite on the gills was G. medius. One of 105 fish was infected by this parasite and found in January. A total of 7 parasites were found. Several studies have been published on seasonal changes of monogenean infection in fish (Chubb, 1977; Shulman, 1989). Furthermore, temperature is commonly regarded as one of the most important factors determining the occurrence and abundance of monogenean parasites (Scott and Nokes, 1984; Hanzelova and Zitnan, 1985; Gelnar, 1997). Aydogdu et al., (2001) recorded that the infection of Dactylogyrus folkmanovae was highest in spring and early summer. But in the present study, G. medius was found only in January, which is the coldest month on Kovada Lake. This difference may be due to water quality and nourishment of fish.

There can be no doubt that the parasite fauna is related to the host’s diet. The tench fed mainly on larvae of aquatic insects. The choice and composition of the food is very important for the diversity of the helminth fauna in this fish, and this is considerably influenced by local conditions.

References


Koyun M (2001). The helminthofauna of some fishes in Enne Dam Lake. Uludað University, Medical Institution, Doctora Thesis. 119 pp. (in Turkish) (with abstract in English).


