Monogenean and cestode parasites of
Pseudophoxinus antalyae, Bogutskaya 1992 and
Cyprinus carpio, Linnaeus 1758 from Kepez
Antalya, Turkey

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Abstract
In this study, a total of 72 Pseudophoxinus antalyae and 58 Cyprinus carpio have been investigated
during February through August 2004. In P. antalyae the prevalence and mean intensity level of
Dactylogyrus sphyrna was 2.7% and 1.5±0.5 respectively, D. ergensi was 38.8% and 16.1±1.09 and
Paradiplozoon homoion was 73.6% and 8.15±0.47. Two monogeneans were found on the gills of C.
carpio namely D. extensus at a prevalence of 23.6% and a mean intensity of 13.5±2.49 and P. homoion
with a prevalence of 1.3% and mean intensity of 1.0. In the intestine of C. carpio Caryophyllaeus
laticeps occurred at a prevalence of 48.2% and mean intensity of 4.03±0.43. Paradiplozoon homoion
was the dominant species in P. antalyae, whilst in C. carpio the dominant species was C. laticeps.
This report provides the first record of Dactylogyrus ergensi in Turkey.

Introduction
To date there have been no studies on the parasite fauna of Pseudophoxinus antalyae which is an endemic fish species in Antalya, Turkey. On the other hand, the parasites of C. carpio in Turkey have been extensively studied (Oguz, 1991; Oguz et al., 1996; Öztürk, 2000; Özer & Erdem, 1998, 1999; Aydogdu et al., 2001a; Aydogdu & Altunel, 2002; Cengizler et al., 2001; Uzunay & Soylu, 2006). The present paper demonstrates the results of the parasitological investigation of P. antalyae and C. carpio.

Materials and methods
The investigation was carried out during February through August 2004 with monthly
intervals, at each time period about ten Pseudophoxinus antalyae and eight Cyprinus carpio were caught from Kepez I hydro-electric power plant loading pond (N 36°57' 289", E 30°37' 624º). Fish were collected using seine nets and traps. Maximum depth of the pond is about 10 m, water amount changes between 9 and 20 lt/sec in a year. The fish were dissected immediately after sacrifice. Parasites found in the host were removed using a needle. Monogeneans belonging to genus Dactylogyrus were mounted by flattening and were fixed with glycerin-ammonium picrate. Permanent preparations of monogeneans were also made in lactophenol or glycerin-gelatine. For Paradiplozoon, the haptor of each specimens

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was excised and fixed in a mixture of glycerin and ammonium-picrate. Measurements were made using a light microscope according to Simkova et al. (2001) and Khotenovsky (1985). Attachment clamp, central hook sickle and egg of the diplozoid species and sclerotised parts of *Dactylogyrus* specimens, ovarium and head of cestode are shown in figure. Cestode parasites were fixed in Bouin’s fluid under coverslip pressure and then cleared in lithium carbonate, stained with aceto-carmine. All slides were studied with Nikon Diapot 300 microscope and photographs were recorded by Sony CCD Iris color-video camera line. Drawings of the specimens were made from computer screen. Measurements are presented in μm unless otherwise indicated. The following references were used for species determination; Bykhovskaya-Pavlovskaya et al. (1962); Gussev (1985); Markevic (1951); Khotenovsky (1985). Preparation of the slides was made according to Bylund et al. (1980) and Fernando et al. (1972).

**Results**

A total of 72 *P. Antalyae* (14.7-17 cm total length) and 58 *C. carpio* (23-48 cm) were examined. The list of the parasites found in fish that have been examined together with the data concerning their prevalence and intensity of infestation are given in table 1. Data on the morphology of the parasites are given below. Unless otherwise stated, all measurements are in μm.

**Figure A.** *Dactylogyrus ergensi* (Molnar, 1964). Small worm, total length 475, width 97. Length of anchor 40, base 35, point 8, inner root 9, outer root 5. Size of connecting bar 25 × 3. Total length of copulatory organ 33. Length of vaginal tube 45, diameter 1.


**Figure C.** *Dactylogyrus extensus* (Mueller & Van Cleave, 1932). Large worm, total length 1500, width 300. Total length of anchor 70-77. Inner root 26-33, outer root 12-15. Size of connecting bar 16 × 43. Total length of copulatory organ 70-83.

**Figure D.** *Paradiplozoon homoion* (Bychowsky & Nagibina, 1959). Length of body 2475 - 3700, anterior part of body 1700-2500, posterior part of body 625 - 1100. Length × width of 3rd clamp 80-97 × 163-180. Length of median plate 102. Length of central hook sickle 22.

**Figure E.** *Caryophyllaeus laticeps* (Annenkova-Khlopina, 1919). Body unsegmented, sexually mature specimens are about 15-30 mm long and 1.0-2.0 mm wide. Vitellaria extends between cephalic end and anterior margin of ovary. Testes lying in three longitudinal rows. Cirral bursa 445-293. Seminal receptacle occurs above bridge of ovary. Ovary H shaped, eggs oval 68-47.

**Discussion**

A total of five parasite species were recorded in *P. antalyae* and *C. carpio* from Kepez I
Figure 1. Sclerotised parts of haptor and reproductive organs
A: Dactylogyrus ergensi; B- D: sphyrna; C- D: extensus; D: Paradiplozoon homoion; E: Caryophyllaeus laticeps
a: Median hook; b: dorsal connecting bar; c: ventral connecting bar; d: marginal hook; e: male copulatory organ; f: vaginal armour; g: attachment clamp; h: central hook sickle; i: egg; k: ovarium; l: head.
hydroelectric power plant loading pond. The parasites of *Clarias lazera* and *Carassius carassius* have been studied from this pond (Soylu & Emre, 2005). All parasites found in *P. antalyae* were monogeneans, two species belonging to *Dactylogyrus* genus and one species belonging to Diplozoidae family. Most monogeneans typically parasitize gills of fish. When monogeneans occur in small numbers they produce little effect upon the host, when they attain high infection levels, in overcrowded host population like fishponds, they are usually pathogenic (Chapman et al., 2000). In the present study *Paradiplozoon homoion* was found to be a common parasite of *P. antalyae*. Only one specimen of *P. homoion* was found on the gills of *C. carpio* and should be regarded as an accidental infection. Adult specimen of *P. homoion* was found in all months studied from *P. antalyae*. *Paradiplozoon homoion* was found in maximum 15 specimens from one individual fish. Parasites into post oncomiracidial stage (diporpa) and juvenile (two diporpa fuse together and form larval stage) were found. Öztürk (2000) recorded *P. homoion* on the gills of *Rutilus rutilus* in Manyas Lake, Aydogdu et al. (2001b) found *P. megan* on *Leuciscus cephalus* as diplozoid in Dogancý dam lake in Bursa. Diplozoids are large bodied monogeneans. *Eudiplozoon nipponicum* and *Diplozoon paradoxum* are widely known in parasitology (Matejusova et al., 2002). There are 60 species of diplozoids described to date, of which 15 were recorded in Europe (Khotenovsky, 1985). For species identification of diplozoids five measurements of third pair of clamps and length of central hook sickle are important characters. However, the length of the median plate of the third pair of clamps is more stable for species identification of diplozoids than the length or width of the clamps (Matejusova et al., 2002). Water temperature, host size and geographical origin has been implicated in morphometrical variability of monogenean parasites. In the present study *Dactylogyrus sphyrna* were found rarely on the gills of 2 of 72 examined *P. antalyae*. *Dactylogyrus sphyrna* were recorded by some investigators in Marmara region including from *Rutilus rutilus* and *Blicca bjoerkna* (Soylu, 1991), from B. Bjoerkna (Öztürk, 2000) and from *Vimba vimba* (Uzunay & Soylu, 2006).

*Dactylogyrus extensus* was found to be the second most common parasite of *C. carpio* with 23.6 % prevalence. Oguz et al. (1996),

<table>
<thead>
<tr>
<th>Host Fishes</th>
<th>Parasite species</th>
<th>No. of fish infected</th>
<th>Prevalence %</th>
<th>Intensity range</th>
<th>Mean intensity ±SE</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>P. antalyae</em></td>
<td><em>D. sphyrna</em></td>
<td>2</td>
<td>2.7</td>
<td>1-2</td>
<td>1.5±0.5</td>
</tr>
<tr>
<td><em>P. antalyae</em></td>
<td><em>D. ergensi</em></td>
<td>28</td>
<td>38.8</td>
<td>8-23</td>
<td>16.14±1.09</td>
</tr>
<tr>
<td><em>P. antalyae</em></td>
<td><em>P. homoion</em></td>
<td>53</td>
<td>73.6</td>
<td>1-15</td>
<td>8.15±0.47</td>
</tr>
<tr>
<td><em>C. carpio</em></td>
<td><em>D. extensus</em></td>
<td>17</td>
<td>23.6</td>
<td>2-35</td>
<td>13.53±2.49</td>
</tr>
<tr>
<td><em>C. carpio</em></td>
<td><em>P. homoion</em></td>
<td>1</td>
<td>1.3</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td><em>C. carpio</em></td>
<td><em>C. laticaps</em></td>
<td>28</td>
<td>48.2</td>
<td>1-8</td>
<td>4.03±0.43</td>
</tr>
</tbody>
</table>

Table 1. Parasites of *Pseudophoxinus antalyae* (n=72) and *Cyprinus carpio* (n=58).
Öztürk (2000) and Uzunay & Soylu (2006) recorded *D. extensus* from *C. carpio* in Uluabat, Manyas and Sapanca Lake respectively.

*Dactylogyrus ergensi* is a typical monogenean for *Chondrostoma nasus* (Gussev, 1985; Simkova et al., 2004). *Dactylogyrus ergensi* was recorded on the gills of *Leuciscus cephalus* by Galli et al. (2002). In the present study, small form of *D. ergensi* was found. *Dactylogyrus ergensi* is closely related to *D. dirigerus*, although subtle morphological differences do occur. *Dactylogyrus ergensi* is the first record of Turkey and *P. antalyae* is a new host for this monogenean.

*Caryophyllaeus laticeps* was found in the intestine of *C. carpio* with 48.2 % prevalence as dominant parasite. *Caryophyllaeus laticeps* was recorded in common carp from Dalyan Lagoon, Karacabey by Aydogdu et al. (2001a), from Manyas Lake in *V. vimba* by Öztürk & Altunel (2001) from Iznik Lake in *R. frisii* by Aydogdu et al. (1997) from Sapanca Lake in *V. vimba*. and *C. carpio* by Uzunay & Soylu (2006).

In conclusion the present study is the first for parasites of *P. antalyae*, and the parasites found on *P. antalyae* are new records for helminth fauna of Turkey. At the same time, *D. ergensi* is a new record for Turkey. There was no risk related to epidemic level of values of parasite species except *P. homoion* on *P. antalyae*.

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**References**


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