First Record of Two *Paradiplozoon* (Monogenea) from Cyprinid Fishes in Iraq*

*Maysaa Ibraheem Al-Jubori¹, Fatima Shihab Al-Nasiri²*

**ABSTRACT**

During the period from July to the end of October 2012, a total of 92 specimens of Cyprinid fishes (15 *Aspius vorax*, 77 *Cyprinion macrostomum*) were collected from Tigris river passing through Tikrit city, Salah Al-Deen province. The gills of these fishes examined microscopically for monogenean parasites belonging to the family Diplozoidae. Five specimens of *Paradiplozoon ergensi* and one specimen *Paradiplozoon rutili* were detected in the gills of one *Aspius vorax* fish. Moreover, two specimens of *Paradiplozoon rutili* were detected in one *Cyprinion macrostomum* fish. This is the first record of *Paradiplozoon ergensi* and *Paradiplozoon rutili* in Iraq. A description and morphometrics of these two parasites are presented.

**Keywords:** *Paradiplozoon*, Monogenea, fishes, Iraq.

**INTRODUCTION**

Diplozoids are monogenean parasites that inhabit the gills of fish, and generally considered as parasites of Cyprinid fishes. They are fish ectoparasites with a unique, direct life cycle in which a free-swimming oncomiracidium hatches from the egg, and invades a fish host where it develops into the larval stage called diporpa. Then, two diporpa contact each other and twist their bodies and remain in permanent copula, which grows into an adult stage (Duijn, 1973; Pečinková *et al.*, 2007). Infected gills appear pale and damaged and consequently the gill respiratory function is decreased (Amlacher, 1970; Al-Nasiri, 2003).

According to the shape of the posterior part of the body, five genera (*Diplozoon*, *Eudiplozoon*, *Inustiatus*, *Paradiplozoon* and *Sindiplozoon*) are recognized in the family Diplozoidae (Pugachev *et al.*, 2010). In Iraq, eleven species of diplozoids are so far recorded in fishes of different regions of Iraq, as suggested by many surveys in this context (Rahemo, 1980; Khamees, 1983; Al-Daraji, 1986; Rasheed, 1989; Al-Nasiri, 2003; Al-Saadi, 2007; Al-Saádi, 2007; Al-Nasiri, 2009; Al-Nasiri and Mhaisen, 2009; Al-Nasiri, 2010). However, more extensive surveys is needed to recognize more species of these parasites, and based on this, the current study aimed to inspect fishes from Tigris River in Tikrit city (Salah Al-Deen province) for more species of Diplozoidae family.

**MATERIALS AND METHODS**

During the period July-October 2012, two-week surveys on the parasite fauna of fishes were performed in Tigris River passing through Tikrit city, Salah Al-Deen province in Iraq (300 km north the capital Baghdad). A total of 92 specimens of cyprinid fishes (15 *Aspius vorax* and 77 *Cyprinion macrostomum*) were collected and inspected for parasites. Monogenean were...
spread on glass slides, fixed in 70% ethanol, and mounted in glycerin jelly under coverslip (Gussev et al., 1993). Measurements were made with a slide micrometer. Drawings were made with the aid of a drawing tube. Identification of parasites species were done according to (Reference)

RESULTS

Five specimens of Paradiplozoon ergensi were detected in gills of one Aspius vorax. In addition, Paradiplozoon rutili was also observed in gills of fishes. One specimen from each of Aspius vorax and Cyprinon macrostomum fish was infected with one, two specimens of Paradiplozoon rutili, respectively.

Paradiplozoon ergensi (Fig. 1) and Paradiplozoon rutili (Fig. 2) are recorded herein for the first time in Iraq. Therefore, the following is a short account on their morphology and morphometrics, which were based on all collected specimens. All measurements were given in millimeters.

Paradiplozoon ergensi (Pejčoch, 1968)

The total body (Fig. 1A) length is 3.0-7.5; anterior part 1.5-4.8; posterior part (Fig. 1B) 1.3-2.7. The anterior end of the posterior part of the body has minute folds, which disappear near the haptor. Size of clamps (Fig. 1C): I: 0.07-0.08 × 0.10-0.15; II: 0.07-0.09 × 0.11-0.18; III: 0.06-0.10 × 0.12-0.18; IV: 0.06-0.10 × 0.09-0.18. The anterior end of median sclerite is widened and connected to the clamps jaws by two sclerites. Length of hooks anchors (Fig. 1D) is 0.027, handles 0.050-0.057. Diameter of suckers is 0.05-0.09. Size of eggs (Fig. 1E) is 0.40 × 0.19.

Paradiplozoon rutili (Glæser, 1967)

The total body (Fig. 2A) length is 3.2-8.1; anterior part 1.6-6.7, posterior part 1.0-2.6. Posterior part (Fig. 2B) has small folds. Size of clamps (Fig. 2C): I: 0.10-0.18 × 0.13-0.27; II: 0.10-0.20 × 0.17-0.36; III: 0.10-0.23 × 0.19-0.38; IV: 0.10-0.21 × 0.16-0.35. The anterior part of the median sclerite is fish tail shaped and connected to the clamps jaws by two short sclerites. Length of hooks anchors (Fig. 2D) is 0.027-0.030, handle 0.055-0.066. Diameter of suckers is 0.06-0.15. Size of eggs (Fig. 2E) is 0.36 × 0.14.

DISCUSSION

The description and measurements of Paradiplozoon ergensi and Paradiplozoon rutili encountered in the present study are in agreement with those of Gussev (1985) and Pugachev et al. (2010).

According to the unpublished data of Mhaisen (2013) on parasites and disease agents of fishes of Iraq, eleven diplozoid species were recorded from fishes of Iraq. These diplozoids include eight species of Paradiplozoon, two species of Diplozoon and one species of Eudiplozoon (Al-Nasiri, 2010; Mhaisen, 2013).

Paradiplozoon occur in Eurasia and Africa (Aioanei, 1996). Paradiplozoon ergensi was identified in northern Italy (Galli and Crosa, 2000) and from Ohrid and Prespa lakes in Macedonia (Stojanovski et al., 2009). Paradiplozoon rutili was recorded in Baltic Sea basin (Aioanei, 1996) and collected from cyprinid fish Lepiscus cephalus in Lambro River in Italy (Galli et al., 2002). Also, it was identification from Abramis brama and Rutillus rutillus in man-made waterway in northern Germany (Rückert et al., 2007).

Paradiplozoon ergensi and Paradiplozoon rutili were not recorded previously from fishes of Iraq, and has now appear in Iraq. This might be the result of human-mediated transport and trade of the host fish. When fish are introduced into a new geographical regions, their parasites may also follow (Galli et al., 2005). For example, the occurrence of Eudiplozoon nipponicum in Europe is considered to be introduced from Asia (Cited by Gao et al., 2007). The establishment success of parasites (both in new geographical areas and new hosts)
has been recorded (Galli et al., 2003) and perhaps it depends on the complexity of the parasites with a life cycle that requires more than one host (Bauer, 1991). Diplozoids are monogenean with direct life cycle (Pečinková et al., 2007), and this can facilitate their transmission from fish to others and lead to their appearance in new geographical regions with the aid of host (i.e. fishes) transmission.

Table (1) shows a list of the diplozoid parasites of the fishes of Iraq, arranged alphabetically, with their first record on fish hosts.

The present record of Paradiplozoon ergensi and Paradiplozoon rutili brings the total number of diplozoids, recorded in Iraq to 13 species.

<table>
<thead>
<tr>
<th>Parasite species</th>
<th>Host</th>
<th>Locality</th>
<th>First record (Reference)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diplozoon kasimi</td>
<td>Cyprinion macrostomum</td>
<td>Tigris River at Mosul city</td>
<td>Rahemo (1980)</td>
</tr>
<tr>
<td>Diplozoon paradoxum</td>
<td>Barbus luteus</td>
<td>Al-Husainia Creek in Karbala province</td>
<td>Al-saadi (2007)</td>
</tr>
<tr>
<td>Eudiplozoon nipponicum</td>
<td>Cyprinus carpio</td>
<td>Man-Made Lake at Baghdad city</td>
<td>Al-Nasiri (2003)</td>
</tr>
<tr>
<td>Paradiplozoon amurensis</td>
<td>Cyprinion macrostomum</td>
<td>Tigris River at Tikreet city</td>
<td>Al-Nasiri (2010)</td>
</tr>
<tr>
<td>Paradiplozoon barbi</td>
<td>Chondrostoma nasus; Chondrostoma regium; Cyprinus carpio</td>
<td>Tigris River at Baghdad city</td>
<td>Rasheed (1989)</td>
</tr>
<tr>
<td>Paradiplozoon bliccae</td>
<td>Cyprinion macrostomum</td>
<td>Tigris River at Tikreet city</td>
<td>Al-Nasiri (2009)</td>
</tr>
<tr>
<td>Paradiplozoon cyprini</td>
<td>Barbus grypus</td>
<td>Tigris River at Tikreet city</td>
<td>Al-Nasiri and Mhaisen (2009)</td>
</tr>
<tr>
<td>Paradiplozoon ergensi</td>
<td>Aspius vorax</td>
<td>Tigris River at Tikreet city</td>
<td>Present study</td>
</tr>
<tr>
<td>Paradiplozoon homoion</td>
<td>Barbus xanthopterus</td>
<td>Al-Husainia Creek in Karbala province</td>
<td>Al-Saadi (2007)</td>
</tr>
<tr>
<td>Paradiplozoon megan</td>
<td>Aspius vorax; Barbus xanthopterus</td>
<td>Al-Husainia Creek in Karbala province</td>
<td>Al-Saadi (2007)</td>
</tr>
<tr>
<td>Paradiplozoon rutili</td>
<td>Aspius vorax; Cyprinion macrostomum</td>
<td>Tigris River at Tikreet city</td>
<td>Present study</td>
</tr>
<tr>
<td>Paradiplozoon pavlovskii</td>
<td>Aspius vorax</td>
<td>Mehaijran Canal, South of Basrah</td>
<td>Khamees (1983)</td>
</tr>
<tr>
<td>Paradiplozoon vojteki</td>
<td>Barbus xanthopterus</td>
<td>Al-Husainia Creek in Karbala province</td>
<td>Al-Saadi (2007)</td>
</tr>
</tbody>
</table>
Figure 1: *Paradiplozoon ergensi*: A: Whole mount, B: Posterior end, C: Clamp, D: Anchor, E: Egg.
Figure 2: *Paradiplozoon rutili*; A: Whole mount, B: Posterior end, C: Clamp, D: Anchor, E: Egg.
REFERENCES


Mhaisen, F.T. 2013. Index-catalogue of parasites and disease agents of fishes of Iraq. Unpubl. Data, [Mhaisenf@yahoo.co.uk].


تشخيص نوعين من طفيليات الجنس Paradiplozoon (المخزمات أحادية المشأ)
لأول مرة من الأسماك في العراق*

ميساء الجبوري* وفاطمة الناصري**

ملخص

تم خلال المدة الممتدة من شهر تموز ولغاية نهاية تشرين الأول 2012 جمع 92 سمكة تعود إلى العائلة الشبوطية (تضمائدة 15 سمكة شلق و 77 سمكة بنيتي كبير الفم) من نهر دجلة المار في مدينة تكريت، محافظة صلاح الدين. تم فحص الأسماك مجهرياً لعرض الكشف عن الطفيليات من الديدان المخزمة العائدة إلى عائلة Diplozoidae. تم فحص المخزن من خلال 6.66% سمكة شلق وتشذبة إصابة مقدارها 5 طفيلي. أما الشخص المعظم Paradiplodoozoon ergensi فقد شهد من خلال 1.29% سمكة بنيتي كبير الفم (تشذبة إصابة مقدارها 2 طفيلي)، ومن خلال 6.66% سمكة شلق وتشذبة إصابة مقدارها 2 طفيلي. وبعد تشخيص المخزن Paradiplodoozoon rutili والمخزن Paradiplozoon ergensi إعطاء الوصف والقياسات لكل من النوعين في الدراسة الحالية.

الكلمات الدالة: Paradiplozoon، المخزمات أحادية المشأ، الأسماك، العراق.

* * *

جزء من رسالة ماجستير للباحث الأول.

** قسم علوم الحياة، كلية العلوم، جامعة تكريت، تكريت، العراق.


-680-