First Record of *Piscicola geometra* (Annelida, Hirudinea) on some Species of Cyprinidae from Euphrates-Tigris Basin in Turkey

M. Koyun, Y. Tepe and A. Mart

Department of Biology, Faculty of Arts and Sciences, Bingol University, 12000, Bingol, Turkey

Department of Biology, Faculty of Sciences, Ataturk University, 12000, Erzurum, Turkey

Corresponding Author: M. Koyun, Department of Biology, Faculty of Arts and Sciences, Bingol University, 12000, Bingol, Turkey

**ABSTRACT**

The present study was conducted to identify the parasitic infections of *Piscicola geometra*, on three different species of Cyprinidae in two reservoirs of the Euphrates-Tigris basin, Turkey. The investigation was carried out from May to November, 2013 for Dumlu creek and from September, 2014 to April, 2015 for Goynük stream. Fourteen parasites were recorded on seven of the 94 examined fish specimens. This study is to be the first record of *P. geometra* parasitizing on *Capoeta capoeta*, *Alburnus mossulensis* and *Cyprinion macrostomum* for freshwater fish parasite fauna.

**Key words:** *Alburnus mossulensis*, *Cyprinion macrostomum*, *Capoeta capoeta*, dumlu creek, goynük stream, *Piscicola geometra*

**INTRODUCTION**

The host fishes *Capoeta capoeta*, *Cyprinion macrostomum* and *Alburnus mossulensis* live in inland water of Eastern Turkey. Of these two species (*C. macrostomum* and *A. mossulensis*) are endemic in Euphrates and Tigris river system (Kuru, 2004). In general leeches (Hirudinea, Piscicolidae) are well known as ectoparasites and they are found nearly anywhere on the external body surface of fish. According to Epstein (2013) the first characteristic of the fish leeches of Palearctic was presented in the key to leeches by Johansson (1896) with additions. This work gives brief appearance characteristics of *Piscicola geometra*. The family Piscicolidae (fish leeches) introducing to the fish parasite fauna, began from publication of Johansson (1896) about “Necessity of studying the anatomy of the fish leeches to construct their classification”. Fish leeches can cause a negative effect on a host health. Undoubtedly, ulceration, hemorrhage and inflammation associated with leech attachment sites weaken the host and may predispose hosts to bacterial infections, tissue damage, osmoregulatory problems and act as vectors of pathogens (Ahne, 1985; Burreson, 2006). *Piscicola geometra* prefers oxygenated waters, mainly wave-washed shores of lakes and in fast-flowing streams and rivers. The aforementioned leeches use an reversible proboscis to penetrate the tissues of the host in order to suck their blood. This kind of leeches can move easily in most cases firmly attaches itself towards the gills or the base of host fins, where it remains for several days until it is satiated and then simply drops off. They can stay as a hunger for a long time. A satiated adult can remain unfed for 3-4 months in temperatures
of 10-15°C or even as long as 6 months in temperatures as low as 6°C (Mann, 1962). According to Arslan and Oktener (2012) to date, from the parasitic leech species \textit{P. geometra} has been studied from eleven freshwater host fishes in Turkey (Table 1).

The aim of present study was to investigate and identify of \textit{P. geometra} on some freshwater Cyprinid fish, naturally living in Dumlu creek (Karasu River, Erzurum) and Goynük stream (Bingol) from Euphrates-Tigris basin in Turkey.

\textbf{MATERIALS AND METHODS}

Ninety four samples were caught with gill nets (22-24 mm width) and casting nets, from May, 2013 to November, 2013 at Dumlu creek on Erzurum-Artvin Highway 21th km (40°01'52''N, 41°18'49''E, 1763 m) and from September, 2014 to April, 2015 at Goynük stream, Bingol (38°77'74''N, 40°57'70''E, 992 m) of Euphrates-Tigris basin, Turkey. The sampling area is shown in Fig. 1. Leeches has been examined with stereo microscope to identify the occurrence of \textit{P. geometra}. The parasites were removed with the aid of some tools. First, they were kept in a refrigerator at+4°C for one day to resting and then killed in warm formaldehyde solution of 4% (not boiled), preserved in 70% et hanol for later examinations. Total length and total weight of examined fish and total number of parasites were recorded. Identification of \textit{P. geometra} species was made based on Burreson (2006). The parasite on host fish was also photographed.

\textbf{RESULTS}

According to the available literature data, 11 host freshwater fish species were infected with this parasite in Turkey given before. In this study, totally 94 host sample were caught, 24 specimens from Dumlu creek and 70 specimens from Goynük stream. The fish were weighed, measured and examined for the presence of any parasites. \textit{Piscicola geometra} was detected on the gill of \textit{Capoeta capoeta} and the other fish (\textit{Alburnus} mossulensis and (\textit{Cyprinion macrostomum}) on dorsal, ventral, anal and caudal fins and totally eleven parasite samples were recorded (Fig. 2 and 3). During the study from Dumlu creek and Goynük stream infested fish were found at early spring and autumn seasons. In this time water average temperature in November was 21°C for Dumlu creek and 14°C in March for Goynük stream. The detail data for this study are given in Table 2.
Fig. 1: Study sampling sites of Dumlu creek and Goynük stream from Euphrates-Tigris basin, Turkey

Fig. 2: *Piscicola geometra* on anal fin of *C. macrostomum*

Fig. 3: *Piscicola geometra* on caudal fin of *A. mossulensis*
Fig. 4: *Piscicola geometra* total view

Table 2: *Piscicola geometra* on some Cyprinid fishes from Euphrates-tigris system Turkey

| Locations               | Studied fish species       | MW (g±SE)  | ML (cm±SE) | NIF | NTP |
|-------------------------|---------------------------|------------|------------|-----|-----|
| Dumlu creek (Erzurum)   | *Capoeta capoeta* (n = 24) | 62.60±33.96| 18.20±3.96 | 1   | 2   |
| Goynük stream (Bingol)  | *Alburnus mossulensis* (n = 30) | 25.28±8.16 | 14.76±1.76 | 4   | 8   |
|                         | *Cyprinion macrostomum* (n = 40) | 22.12±9.78 | 12.49±2.14 | 2   | 4   |

MW: Mean weight, ML: Mean length, SE: Standard error, NIF: Number of infected fish, NTP: Number of total parasite

**DISCUSSION**

The parasitic leech fauna in aquatic ecosystems still has not been studied sufficiently in Turkey and further studies are necessary. Only there are a few records for *P. geometra* from the eastern and southern parts of Turkey. It is necessary to intensify the studies on parasitic leeches from various lentic or lotic habitats of these different regions of Turkey. *Piscicola geometra* studies in Turkey were reported in only some fish species belonging to Cyprinidae and Esocidae families. Studied fishes (*C. capoeta, C. macrostomum* and *A. mossulensis*) in this study are also from Cyprinidae family. In this study, *P. geometra* was given as a first record in three fish species from two different locations (Dumlu creek and Goynük stream). Karatoy and Soylu (2006), in Terkos lake, detected the infestation rate of *P. geometra* on *A. brama* resembles to that of this study. Up to the present, *P. geometra* records in Cyprinus fishes in Turkey were only reported by Oktener et al. (2007) and Demirtas and Senel (2012a) in Çavuşçu and Terkos lakes, respectively. Average annual infestation percentages for aforementioned fish (*C. carpio*) were 8.3% in Çavuşçu Lake and 25.9% in Terkos Lake, the percentage reached up to 50% in August with the maximum value. These results for *C. carpio* differed from both our study and data from the other studies related to this parasite.

However, in the same study for *Tinca tinca* were accorded with our study. Because, parasitism of *P. geometra* in fishes was generally reported in seasons that have low water temperature and high dissolved oxygen rate (Mann, 1962). The present study accorded with Table 1 except for *C. carpio* in Terkos Lake (Demirtas and Senel, 2012a). Infestation rates for *P. geometra* were
given from some foreign countries. Willomitzer (1980) worked on *Ctenopharyngodon idella* in Yugoslavia, Opara and Okon (2004) on *Oreochromis niloticus*, which was cultured in South-eastern Nigeria Rainforest ponds and Rolbiecki et al. (2009) on a lake-trout (*Salmo trutta lacustris*), Bielecki and Dzika (2000) on roaches (*R. rutilus*) from the lake Ukiel, in Poland.

This study was carried in May, 2013 to November, 2013 in Dumlu Creek and in September, 2014 to April, 2015 in Goyünk Stream and first records were given for *P. geometra* in three fish species (*C. capoeta, C. macrostomum, A. mossulensis*) these belong to Cyprinidae family and we encountered with this parasite only in spring and winter months.

Finding of this parasite in *A. mossulensis* in Goyünk Stream on winter season could be proceeded from continually contributing of thermal waters that sustains the temperature of this water source above +10°C. According to the literature review, when leeches live freely, they prefer demersal area of the water and this situation depends on seasonal changing. Mann (1962), therefore, they cannot be detected in highest temperature months of summer and in winters when the water is quite cold, except some fish (*C. carpio* and *A. brama*). These reasons indicate that *P. geometra* has no parasitic effect on fish when the season is too hot and too cold.

Present study shows that *P. geometra*, on three different species of Cyprinidae (*C. capoeta, C. macrostomum* and *A. mossulensis*) in the Euphrates-Tigris basin for the first time. Up to this day according to the obtained literature data, 11 host freshwater fish species were infected with this parasite in Turkey given before (Table 1). This study is given in addition to previous studies (Fig. 4).

ACKNOWLEDGMENT
The author is very grateful to Prof. Dr. N. Sağlam from Department of Aquaculture and Fish Diseases, Faculty of Fisheries Elazığ-Turkey for his verification for of *P. geometra* and also thanks to Dr. T. Şisman for the samples from Dumlu creek (Erzurum).

REFERENCES
Ahne, W., 1985. *Argulus foliaceus* and *Philometra geometra* as mechanical vectors of spring viraemia of carp virus (SVCV). J. Fish Dis., 8: 241-242.
Akbeniz, E. and E. Soylu, 2008. Metazoan parasites of tench (*Tinca tinca* L., 1758) in the lake sapanca, Turkey. J. Fish. Aquatic Sci., 23: 13-18.
Arslan, N. and O. Emiroglu, 2011. First record of parasitic annelida-hirudinea (*Piscicola geometra* Linnaeus, 1761) on *Carassius gibelio* (Bloch, 1782) in Lake Uluabat (Turkey). Kafkas Univ. Vet. Fak. Derg., 17: 131-133.
Arslan, N. and A. Oktener, 2012. A general review of parasitic Annelida (Hirudinea) recorded from different habitats and hosts in Turkey. Turk. J. Zool., 36: 141-145.
Bielecki, A. and E. Dzika, 2000. Leeches (Hirudinea: Piscicolidae and Glossiphonidae) infecting lake fish in the Ukiel, Warinak and Wulpinskie. Preliminary study. Wiadomosci Parazytologiczne, 46: 123-126, (In Polish).
Burreson, E.M., 2006. Phylum Annelida: Hirudinea as Vectors and Disease Agents. In: Fish Diseases and Disorders: Protozoan and Metazoan Infections, Woo, P.T.K. (Ed.). 2nd Edn., CAB International, Oxon, UK., ISBN: 9780085199011, pp: 566-591.
Ceylan, M., Y.O. Boyaci, T. Meke, H. Inceoglù and A. Kara, 2010. A report of ectoparasite *Piscicola geometra* (Linnaeus, 1761) (Hirudinea: Rhynchobdellida) on roach (*Rutilus rutilus* (Linnaeus, 1758)) from Uluabat Lake. Turkiye Parazitol. Derg., 35: 207-209.
Demirtas, M., 2011. The seasonal distribution and effect of tench fish (*Tinca tinca* L., 1758) helminthes parasites living in terkos lake. Turkiye Parazitol. Derg., 35: 159-163.

Demirtas, M. and U. Senel, 2012a. The seasonal distribution of carp fish (*Cyprinus carpio* L. 1758) ectoparasites living in Terkos Lake. Erciyes Univ. Sci. Inst. J., 28: 152-159.

Demirtas, M. and U. Senel, 2012b. The seasonal infestation distribution of *Piscicola geometra* L., 1761 on some fishes (Cyprinidae) living in Terkos Lake. KSU J. Nat. Sci., 15: 52-58.

Epstein, V.M., 2013. From morphology to phylogeny (on the example of study of the fish leeches of Palearctic. J. V.N. Karazin Kharkiv Nat. Univ. Ser.: Biol., 18: 144-150.

Johansson, L., 1896. [Contribution to the knowledge of Swedish ichthyobdellids]. Uppsala Universitet, Uppsala, pp: 122.

Kahveci, S., 2004. The metazoan parasites of rud (*Scardinius erythrophthalmus* Linnaeus, 1758) caught in Durusu (Terkos). M.Sc. Thesis, Institute of Science Marmara University.

Karabiber, T., 2006. Metazoan parasites of roach (*Rutilus rutilus* L, 1758) from Lake Sapanca. M.Sc. Thesis, Marmara University, Istanbul.

Karatoy, E., 2004. Metazoan parasites of bream (*Abramis brama* Linnaeus, 1758) in the Lake Durusu (Terkos). M.Sc. Thesis, Institute of Science Marmara University.

Karatoy, E. and E. Soylu, 2006. Metazoan parasites of bream (*Abramis brama* Linnaeus, 1758) in the Lake Durusu (Terkos). Turkiye Parazitol. Derg., 30: 233-238.

Koyun, M., 2011. First report of *Tracheliastes polycolpus* (Copepoda: Lernaeopodidae) and *Piscicola geometra* L. 1761 (Annelida-Hirudinea) on *Capoeta umbla* at Murat River, Turkey. Asian J. Anim. Vet. Adv., 6: 966-970.

Kuru, M., 2004. Recent systematic status of Inland water fishes of Turkey. GU Gazi E. Fak. Derg., 24: 1-21.

Mann, K.H., 1962. Leeches-Hirudinea: Their Structure, Physiology, Ecology and Embryology. Pergamon Press, New York, Pages: 201.

Oktener, A., J.P. Trilles and I. Leonardos, 2007. Five ectoparasites from Turkish fish. Turk. Parazitol. J., 31: 154-157.

Opara, K.N. and A.O. Okon, 2004. Studies on the parasites of cultured *Oreochromis niloticus* (Cichlidae) in a rainforest fish pond in south eastern Nigeria. J. Aquatic Sci., 17: 17-20.

Ozdemir, Y. and M. Sarieyboglu, 1993. Some parasites of *Barbus capito pectoralis* caught in keban dam lake. J. Firat Univ. Sci. Eng. Fac., 5: 114-126.

Ozturk, M.O.G., 2002. Metazoan parasites of the tench (*Tinca tinca* L.) from Lake Uluabat, Turkey. Israel J. Zool., 48: 285-293.

Robbiecki, L., M. Sciazko and J. Schutz, 2009. Parasitic fauna of the lake brown trout, *Salmo trutta lacustris* (Salmonidae), a little known endemic fish from Polish waters. Wiadomosci. Parazytol., 55: 445-450.

Saglam, N., 1992. Investigation of external parasites on fish caught in Lake Keban. M.Sc. Thesis, Firat University, Elazig, Turkey.

Soylu, E., 1990. Surveys on the parasite fauna of the some fishes in Sapanca Lake. Ph.D. Thesis, Istanbul University, Istanbul.

Willomitzer, J., 1980. Seasonal dynamics of parasitoses in grasscarrp (*Ctenopharyngodon idella*) fry and fingerlings. Acta Vet. Brno, 49: 269-277.