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An investigation on *Gyrodactylus scardiniensis* infestation of *Squalius recurvirostris* from Turkey

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Abstract

In this study, *Gyrodactylus* infestation of on *Squalius recurvirostris* Özuluğ and Freyhof, 2011 from Düzağaç-Akdeğirmen Dam Lake were investigated between February 2012 and March 2013. One gyrodactylid parasite species was determined on fins of the host fish specimens: *Gyrodactylus scardiniensis* Glaser, 1974. The parasite species is a new record for the host fish species. Thus, a new locality was added to the global geographical spread of the mentioned parasite species in direction of the present study. General infection prevalence value of the parasite was recorded as 10.6% and the mean intensity value was recorded as 2.6 ± 1.7 . In addition, occurrence of the parasites was evaluated using seasonal data, length size and sex distribution of the host fish: *G. scardiniensis* caused infection in the host fish in all seasons, except spring. It was found on only first two age groups of the host fishes. And occurrence of the parasite was found in approximately value on both sex groups of host fishes, male and female.

Keywords: *Gyrodactylus scardiniensis*, *Squalius recurvirostris*

1. Introduction

Squalius is a cyprinid taxon showing broad geographical distribution in the western Palearctic region. Molecular studies have identified two main groups within this genus: Mediterranean line are found in the Iberian peninsula, Italy and the western Adriatic habitat. Others scattered in the region from the Ebro river in Spain to the Ural mountains in the east form the Euro-Asian lineage (Turan *et al.*, 2013) [14]. In recent years, Özlüğ and Freyhof (2011) [9] have re-examined the species of this taxon in Central and Western Anatolia and identified four new species. One of these species is *Squalius recurvirostris*.

In this study, it was aimed to identified to Gyrodactylid parasites in *Squalius recurvirostris* from Düzağaç-Akdeğirmen Dam Lake. It will be contribute to the parasite species linked to seasonal changes and both age and sex of the host fish. And, a new locality will be add to the global geographical spread of the mentioned parasite species in direction of the study.

2. Material and Methods

The study area, Düzağaç-Akdeğirmen Dam Lake is located in Sinanpaşa district of Afyonkarahisar province, Turkey. The coordinates are 38° 48' N and 30° 15' E (Anonymous, 2004) [2].

The host fish specimens were caught with trammel nets at depths from approximately one to two meters. The fishes were placed in plastic tanks containing the local dam lake water and transferred to the research laboratory where they were kept in air-conditioned fish tanks. Fish specimens were divided into five size groups using the reference data of Balık *et al.* (2004) [3]. Afterwards sacrificed of the host fish; the fins, gills and skin were dissected and placed in separate petri dishes with physiological water. All parts were thoroughly examined under a binocular microscope for the *Gyrodactylus* specimens. The specimens which were found on the host fish were removed using a preparation needle. While some parasite specimens were stored in 70% ethyl alcohol, other specimen's permanent preparation according to Langeron (1949) [8] were made. They were stained with Mayer's haematoxylin and identified using the reference keys of Bychovskaya-Pavlovskaya *et al.* (1962) [5]. Prevalence of the parasite on the host fish, mean parasite intensity, and minimum-maximum parasite numbers were estimated according to Bush *et al.* (1997) [4].

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3. Results

During the study, *Gyrodactylus scardiniensis* Glaser 1974 was found on the fins of the host fishes. The average infection prevalence value of the parasite was recorded as 10.6% and the mean intensity value was recorded as 2.6±1.7.

Infection values of parasitic species were divided into 4

groups on seasonal basis as spring, summer, autumn and winter. The distribution of the parasitic species linked to seasonal changes was given in table 1. According to this, *G. scardiniensis* caused infection in the host fish in all seasons, except spring. Infection values of the parasite was higher in winter than in other seasons.

Table 1: Infection value of the parasite species according to seasons. N: number of parasitic fish, infection prevalence (%), M-M: minimum-maximum number of parasites, X ± S.D: average number of parasites and standard deviation.

seasons	Examined fish number	Infection data	<i>G. scardiniensis</i>
spring	19	N & (%)	-
		X±S.D.	-
		M-M	-
Summer	23	N & (%)	2 (8,7)
		X±S.D.	2,0±0,0
		M-M	2-2
Autumn	13	N & (%)	2 (15,1)
		X±S.D.	1,0±0,0
		M-M	1-1
Winter	11	N & (%)	3 (27,3)
		X±S.D.	4,0±1,7
		M-M	2-5

Table 2: Infection value of the parasite species according to the host fish size groups.

Fish size groups	Examined fish number	Infection data	<i>G. scardiniensis</i>
I	25	N & (%)	4 (16,0)
		X±S.D.	2,5±1,7
		M-M	1-5
II	13	N & (%)	3 (23,1)
		X±S.D.	2,7±2,1
		M-M	1-5
III	12	N & (%)	-
		X±S.D.	-
		M-M	-
IV	11	N & (%)	-
		X±S.D.	-
		M-M	-
V	5	N & (%)	-
		X±S.D.	-
		M-M	-

The fish samples belonging to *Squalius recurvirostris* species examined in the research process were divided into five groups using the data of Balık *et al.* (2004). The distribution of the parasitic species linked to the host fish size was given in table 2. *Gyrodactylus scardiniensis* was found only in fishes of the first two age groups of the host fishes.

Table 3: Infection value of the parasite species according to the host fish sex groups.

sex groups	Examined fish number	Infection data	<i>G. scardiniensis</i>
female	33	N & (%)	3 (9,1)
		X±S.D.	2,6±2,1
		M-M	1-5
male	33	N & (%)	4 (12,1)
		X±S.D.	2,5±1,7
		M-M	1-5

Squalius recurvirostris specimens were divided into two sex groups according to sex: male and female. *Gyrodactylus scardiniensis* was found in both sex groups of host fishes, table 3.

4. Discussion

The host fish, *Squalius recurvirostris* is a new species defined by Özüluğ and Freyhof (2011) [9]. It was done the first parasitological study on the fish species. So, the parasite species was new recorded for the fish species. Thus, at the end of the study, a new host records and a new locality were added to the distribution of the parasite species.

It can be said that there is a direct interaction between ectoparasitic organisms living on organs such as skin, gill, and fin, and abiotic factors in direct contact with the environment (Khan and Thulin, 1991; Poulin, 2007) [6, 11]. Kurupinar and Öztürk (2009) [7] reported the highest infection rate of a monogenean parasite species in the spring period. Stonajovski *et al.* (2010) [12] suggests that an ectoparasitic monogenean parasite in *Leuciscus cephalus* caused more dominant infection in spring and winter, when water temperature was low. Açikel and Öztürk (2012) [1], which found *Gyrodactylus* sp. on gills of *Leuciscus cephalus*, indicates similar ecological findings. Yazmen (2012) [15] recorded that *Gyrodactylus scardiniensis* during the spring and winter season. According to the findings obtained in this present study, it can be stated that the most suitable life periods for *G. scardiniensis* recorded on the fins of *Squalius recurvirostris* is spring and later winter season, similar to the findings of the above researchers.

It was expressed that there was a link between the age or length groups of the host animals and their parasite infection values (Tieri *et al.*, 2006; Öztürk, 2014) [10, 13]. In this context, Açikel and Öztürk (2012) [1] encountered *Gyrodactylus* infection in small and medium size group of *L. cephalus*. Teri *et al.* (2006) [13] noted that immune systems develop better due to age-related increase in fish, and that lower-intensity parasitic infections occur in older fish.

Yazmen (2012) [15] was recorded the highest *Gyrodactylus scardiniensis* infestation in the smallest fish, but no encountered of infection on the largest group of host fish. In this study, the presence of infection for *Gyrodactylus scardiniensis* in only of young host fish supports the data of the above researchers.

It was found that infection occurrence of *Gyrodactylus* is higher in female host fish specimens than males (Kurupinar

ve Öztürk, 2009; Açikel and Öztürk, 2012; Yazmen, 2012) [1, 7, 15]. However, in the present study, there was no difference between male and female host fish infections.

5. Conclusion

As a result, it is the first study on *Gyrodactylus* parasites of *Squalius recurvirostris*, which is defined as a new fish species by Özüğü and Freyhof (2011) [9]. So the parasite species is a new record for the host species. More, a new record and a new locality was added to the distribution of the gyrodactylid parasite species, which is located in the south-eastern region of Europe.

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