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The Infection of European Chub (*leuciscus Cephalus* L.,1758) With *Ligula Intestinalis* Plerocercoids In Çamkoru Lake (Turkey)

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Abstract: In this study, as well as giving data of parasite fauna related to *Leuciscus cephalus*, inhabiting in Turkish waters, monthly distribution of *Ligula intestinalis* infections, detected in the studies that were carried out in Çamkoru Lake, parasitic situations according to ages and sexes, average body length and the number of individuals are provided.

Key words: *Leuciscus cephalus*, *ligula intestinalis*, metazoon parasites, camkoru Lake

INTRODUCTION

On the grounds of the fact that environmental stress factors over aquatic systems have increased in recent years, a number of pathogenic organisms, threatening the health of animals inhabiting in these resources, have come out. European chub (*Leuciscus cephalus* L., 1758) has been living in Turkish waters widely and many bioecological studies have been carried out. However, the number of studies, evaluating the parasite infections of this species which economic value is quite high is rather limited.

There have been 14 parasite infection records of *L. cephalus* in Turkish inland waters, Among the parasite species, the most detected one is *L. intestinalis* with 6 records.

The tapeworm *Ligula intestinalis* has a three-host lifecycle. The coracidium larva penetrates the gut wall of a copepod microcrustacean and develops into the procercoid form in the haemocoel. The infected copepod is ingested by a planktivorous cyprinid fish and the procercoid then develops into a plerocercoid larva located in the host's abdominal cavity. The cycle of the parasite is completed when the fish is preyed upon by a piscivorous bird and the plerocercoid then matures in the host's intestine[10] (Table 1).

Table 1: Infections, observed in *Leuciscus cephalus* inhabiting in Turkish freshwaters

Host	Location	Author and Record
Argulus foliaceus	Nif, Kocacay Brooks	Geldiay and Balik[1]
Ergasilus sieboldi	No locality	Geldiay and Balik[1]
Ligula intestinalis	Elazig Region Lakes	Cantoray and Ozcan[2]
	Hamidiye-Eskisehir Pazar-Ankara	Keskin and Erk'akan[3]
	Yesilköy Pond Balikesir	Bulgen[4]
	Gelingüllü Dam Lake	Ekmekçi and Kirankaya[5]
	Çamkoru Lake	This study
Philometra ovata (syn = P. abdominalis)	Seysuyu Stream	Keskin[6]
	Enne Dam Lake	Koyun[7]
	Çamkoru Lake	Innal and Keskin[8]
Philometra intestinalis	Ankara region	Burgu et al.[4]
Allocreadium isoporum	Enne Dam Lake	Koyun[9]
Pomphorhynchus laevis	Enne Dam Lake	Koyun[9]

MATERIALS AND METHODS

In this study, the data related to parasite species of *Leuciscus cephalus* were presented by scanning the resources, detected and published after scientific studies, carried out in Turkish waters. The data analysed in this study concern a population *L. intestinalis* from Lake Çamkoru (Çamlidere-Ankara). European chub population were caught monthly with gill-nets of various mesh sizes (10, 17, 23, 30, 40 and 50 mm) between August, 2002 and August, 2003. Immediately after the transfer to the laboratory of Hacettepe University's Çamkoru Natural Researches in Ankara, Fish were visually inspected for the presence of larval cestode infection in the body cavities and the cestodes were identifed according to[11]. as *Ligula intestinalis*. The dataset consists of 368 chub, following capture each fish was measured (fork length, to the nearest mm and total weight; gr) and then dissected sexual state (immature, female, male), its age (by counting the number of scale rings) and the number of *L.intestinalis* present, together with their individual length and weight (Total weight; g, referred to as W in the text) were measured and weighed to the nearest 1.0 mm and 0.1 g, respectively.

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RESULTS

In this study, comprising August 2002 and August 2003, 368 *L. cephalus* samples were examined. The population of *L. cephalus* differs in I-X age groups. *L. intestinalis and P. ovata* were observed in *L. cephalus*. In (Table 2) *L. intestinalis* infection condition and the number of *L. cephalus*, examined according to date and prevalence (%) is given. In (Table 3), *L. intestinalis* infection condition and the number of *L. cephalus*, examined according to sexes and ages are given and in (Table 4), *L. intestinalis* infection conditions according to length and weight is given.

DISCUSSION

A number of pathogen organisms, threatening fish health, were discovered in scientific researches that have been started in Turkey in recent years for the protection of water resources and with the aim of making use of what it presents in the future. In terms of parasitic infections, reported in *L. cephalus* in Turkish inland waters, the most common infection is the one that is caused by *L. intestinalis*

In this study, comprising August 2002 and August 2003 period in Çamkoru Lake, 368 *L. cephalus* samples were examined. The number of individuals in which *L. intestinalis* infection was observed is 26 and it is of 7, 07%. The number of detected *L. intestinalis* individuals is 33 and the number of detected individuals in the fish were minimum 1, maximum 3. While *L. intestinalis* infection was not observed in November, the most infection was observed in September with the percentage of 17, 86%.

L. intestinalis is observed in I and II age groups, as the most intense it is observed in II age group with 40%. In I age group, sex determination could not be done and in II age group it was found that all infected individuals were male. 22 individuals of 33 *L. intestinalis* individuals were observed in belonging to I age group, in II age group 11 individuals were observed.

The number of infected individuals is less than the one that[3] found. Not any *L. intestinalis* infection was observed in November, the most infection was observed in September with 17, 86%. In the study that[9] stated *L. intestinalis* infect in I, II, III, IV and V age groups and affect the fish so much between July and September.

The average body length of *L. intestinalis* individuals were 4, 1 cm in I age group and 5, 4 cm in II age group.The body length of detected individuals in the fish were minimum 2, maximum 3. This number is lower than the number that[6] (3-41 cm) and Keskin-Erk'akan (4-17,1 cm in Hamidiye-Eskisehir) found. The number of parasites in one *L. cephalus* individuals differs between 1-3 and average number of parasites are 1,27. This number is lower than the number that[3] (min., 1-max., 21) and[4] (average, 3) in Hamidiye-Eskisehir and Pazar-Ankara found.

Table 2: *L. intestinalis* infection condition of *L. cephalus*

Date	No.Examined	No. Infected	Prevalence (%)
AUG.02	48	5	10,42
SEP.02	28	5	17,86
OCT.02	46	1	2,17
NOV.02	17	0	0
APR.03	28	3	10,71
MAY.03	34	1	2,94
JUN.03	50	3	6
JUL.03	65	3	4,62
AUG.03	52	5	9,62

Table 3: *L. intestinalis* infection condition of *L. cephalus*, examined according to sexes and ages

Age	Sex	No. Examined	No. Infected	Prevalence (%)	Total Infection
I	Immature	57	20	35,09	22
II	Female	23	0	0	
	Male	15	6	40	11
III-X	Female	177	0	0	0
III-VIII	Mk	96	0	0	0

Table 4: *L. intestinalis* infection conditions of *L. cephalus* according to length and weight

		Infected *L. cephalus*		*L. intestinalis*	
Age	Sex	Fork length (mm)	Total weight (gr)	Length (mm)	Weight (gr)
I	Immature	91,7	9,88	41	0,18
II	Female	-	-	-	-
	Male	132	35,83	54	0,27

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