

Full Length Research Paper

Occurrence of monogeneans on some cyprinid fishes from Murat River in Turkey

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This study was the first extensive survey of the parasites fauna of fishes from Murat River. During the two year period (2010-2011), 4 fish species were examined and 5 monogenean parasite species were recorded as follows: *Dactylogyrus elegantis* and *Dactylogyrus vistulae* in *Chondrostoma regium*; *Dactylogyrus elegantis*, *Dactylogyrus vistulae* and *Dactylogyrus prostrae* in *Squalius cephalus*; *Dactylogyrus alatus* in *Alburnus heckeli*; *Dactylogyrus rectotrabus* in *Garra rufa*. The prevalence in *C. regium* was 77.78%, in *S. cephalus* 85.0%, in *A. heckeli* 41.86%, while in *G. rufa* it was the lowest and amounted to 5.56%. The overall prevalence of monogeneans in the investigated cyprinid fishes from Murat River was 48.50%, and the mean intensity of infestation was 3.01. Among the monogenean species the highest prevalence occurred with *D. vistulae* (44.44%), and the greatest intensity of infestation was evident in the cases of infestation with *D. elegantis* (3.58). The greatest pathological effect was associated with the monogeneans *D. vistulae* and *D. elegantis*. To our knowledge, this is the first time *D. elegantis*, *D. vistulae*, *D. rectotrabus*, *D. prostrae* and *D. alatus* have been reported from Murat River fish. From this monogenean species, *D. rectotrabus*, *D. prostrae* represented the first record for parasite fauna of fishes in Turkey.

Key words: *Dactylogyrus elegantis*, *Dactylogyrus vistulae*, *Dactylogyrus alatus*, *Dactylogyrus prostrae*, *Dactylogyrus rectotrabus*, cyprinid fish, Murat River.

INTRODUCTION

Murat River is one of largest rivers of Turkey which is situated in the south eastern part of Turkey. It has tremendous local and international significance and inhabited with a considerable composition of fish fauna, with an average length of 722 km, located near Bingol city (38.8 N, 41.05 E).

Changes in the flow rate of Murat River are considered to negatively affect fish fauna. The river water is contaminated by domestic wastes from surrounding settlements. The level of contamination is relatively low, as there is limited industrial development at that location. Murat River is an important branch of the Euphrates River system. The literature includes some ecological and parasitological studies, as follows:

Ozdemir and Sarieyyupoglu (1993) examined the parasites of *Barbus capito pectoralis*, a fish species living in Keban Dam Lake, and recorded parasite types as *Khawia armeniaca*, *Ligula intestinalis*,

Neoechinorhynchus sp., and various parasites from the

order Pseudophyllidea and the family Piscicolidae.

Sarieyyupoglu and Saglam (1991) reported *Ergasilus sieboldi* and *Argulus foliaceus* ectoparasites in 15 *Capoeta trutta* individuals from a contaminated area of Keban Dam Lake. Sarieyyupoglu and Saglam (1995) recorded 11 ectoparasites of Cyprinid in Keban Dam Lake.

Also, Dorucu et al. (2008), reported *Neoechinorhynchus rutili* and *Diplostomum* sp. as endoparasites of *C. trutta*, *C. capoeta umbla*, *C. regium* and *Acanthobrama marmid* from Keban Dam Lake. Kurupinar and Ozturk (2009) reported *D. vistuale* in *L. cephalus* caught in Orenler Dam Lake in the Afyonkarahisar province of Turkey.

When the parasite fauna of Turkey are scanned, there were only two parasitic data records in Murat River (Koyun 2011a, b).

The first information on genus *Dactylogyrus* from the Turkish freshwater fish was given by Geldiay and Balik



Figure 1. *Dactylogyrus elegantis* (haptor disc) – original, x 300.

(1974), who recorded *D. vastator* from Bafa Lake and Cigli Stream in Izmir, in *Cyprinus carpio* and *Aphanius* sp. Oktener (2003) revived out investigations on the monogenean fauna of some Turkish freshwater fish found: *Dactylogyrus alatus*, *D. anchoratus*, *D. ancylostylus*, *D. asper*, *D. carpathicus*, *D. chalcalburni*, *D. cornu*, *D. crucifer*, *D. difformis*, *D. extensus*, *D. folkmanovae*, *D. fraternus*, *D. macrocanthus*, *D. minutus*, *D. sphyrna*, *D. vastator*, *D. vistulae*. Aydogdu et al. (2001) reports *Dactylogyrus vistulae* in *Leuciscus cephalus* from Doganci Dam Lake.

Dupont and Lambert (1986), observed from Lake Mikro Prespa (Greece) the following dactylogyrid species in fishes: *D. alatus*, *D. elegantis*, *D. prostaе*, and *D. vistulae* in *Barbus cyclolepis prespensis*. Jirsa et al. (2011), recorded in nase (*Chondrostoma nasus* L. 1758) from Austrian rivers *D. vistulae*, *D. chondrostomi* and *Dactylogyrus* spp., *Gyrodactylus* sp. and *Diplozoon paradoxum* as Monogenean parasites. Stojanovski et al. (2004, 2010) found *D. prostaе* in chub, *D. elegantis* and *D. vistulae* in nase, this is in line with some aspects of our study.

Murat River joins the Euphrates, Euphrates flows into the Gulf of Basra. Therefore, when viewed in North Africa and the work of the pre-Asian freshwater reservoirs, Al-Samman et al. (2006) reported 8 *Dactylogyrus* spp. fish farms of the Orontes valley and on natural water fishes in Syrian. One of them is *D. alatus*. Another study is about *D. microcirrus* recorded in *C. trutta* in the north of Iraq (Abdullah, 2009). *G. rufa* is a rarely studied fish in Euphrates system and Persian Gulf Basin. Only Gussev et al. (1993) studied this fish and recorded *D. rectotrabus* and *D. acinacus* from River Dez in Iran.

Monogeneans are very important in fish pathology. They have variable characteristics in hosting fishes, where they live as ectoparasites according to the chemical and physical characteristics of water. Monogenea also show sensitive indicator characteristics for the health of their hosts and water quality.

MATERIALS AND METHODS

Fishes were caught by gillnet and bagnet by researcher and by local fishermen during two year period (from spring 2010 to spring 2011). Fish specimens belonged to four genera and four species were examined, including *C. regium*, *S. cephalus*, *A. heckeli* and *G. rufa*. Random samples were taken, representing the different fish lengths in the river and a total of 200 fish specimens were examined and were transported alive to the laboratory. All helminth found in each individual fish were identified and counted.

Monogeneans were permanently mounted using the ammonium picrate glycerin procedure according to Gussev (1968) and Fernando et al. (1972). Parasites were identified according to Bauer (1985) and Pugachev et al. (2010). The most successful preparations for each parasite were photographed and displayed.

RESULTS AND DISCUSSION

During parasitological investigations of the gills of four cyprinid species from Murat River in Turkey, the presence of 5 monogenean species is established: *D. elegantis* (Figures 1 and 2), *D. vistulae* (Figures 3, 4 and 5), *D. alatus* (Figures 6 and 7), *D. prostaе* (Figures 8, 9 and 10), *D. rectotrabus* (Figures 11 and 12). All monogenean species found, represented the first record for the parasite fauna of fishes in Murat river. A total of 200 specimens of 4 fish species were examined, of which

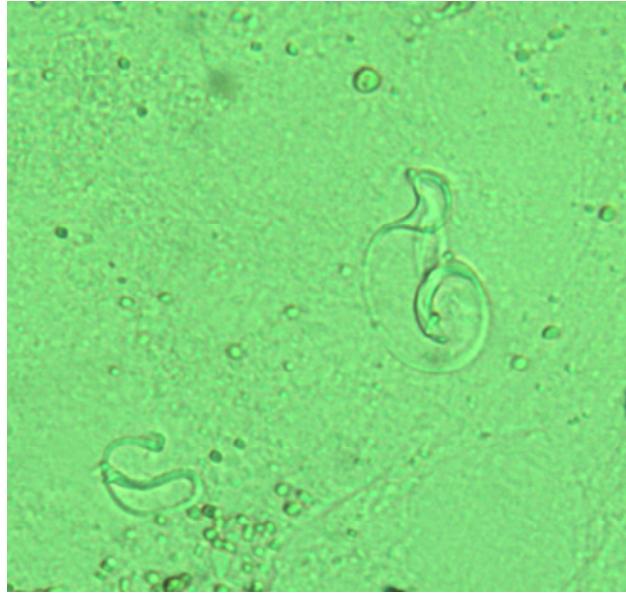


Figure 2. *Dactylogyrus elegantis* (copulatory organ) - original, x 300.



Figure 3. *Dactylogyrus vistulae* (total) - original, x 300.

97 (48.50%) were infested with monogeneans. The mean intensity of infestation was 3.01 (Table 1).

Nase (*Chondrostoma regium*): 36 specimens were examined, of which 30 (77.78%) had infestation with monogeneans. The mean intensity of infestation was 3.46. Two monogenean species were found: *D. elegantis* in 12 fishes (33.33%) with a mean intensity of infestation of 3.58, and *D. vistulae* in 16 (44.44%) with an intensity of infestation of 3.38.

Chub (*S. cephalus*): 60 specimens were examined, of which 51 (85.0%) had infestation. The mean intensity of infestation was 3.09. Three monogenean species were found: *D. elegantis* in 18 fishes (30.0%) with an intensity of infestation of 3.11, *D. vistulae* in 21 fishes (35.0%) with an intensity of infestation of 3.10 and *D. prostrae* in 12 fishes (20.0%) with an intensity of infestation of 3.33.

Ray-finned fish (*A. heckeli*): 43 specimens were examined, one monogenean species was found: *D. alatus*



Figure 4. *Dactylogyrus vistulae* (haptor disc) - original, x 300.

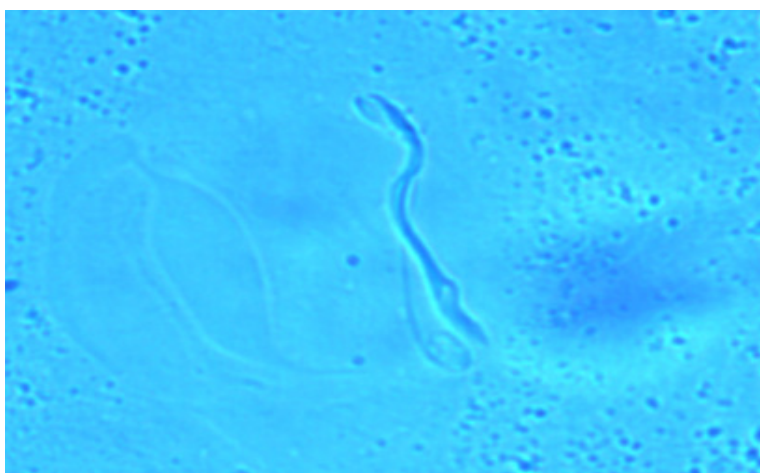


Figure 5. *Dactylogyrus vistulae* (copulatory organ) - original, x 300.

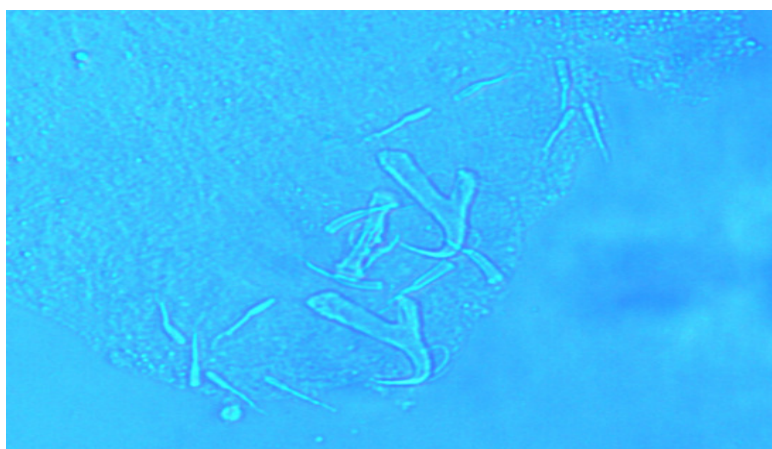


Figure 6. *Dactylogyrus alatus* (haptor disc) - original, x 300.



Figure 7. *Dactylogybus alatus* (copulatory organ) - original, x 300.



Figure 9. *Dactylogybus prostaе* (haptor disc) - original, x 300.

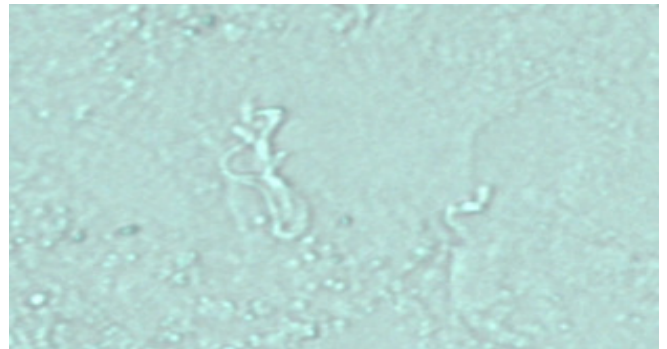


Figure 10. *Dactylogybus prostaе* (copulatory) - original, x 300.

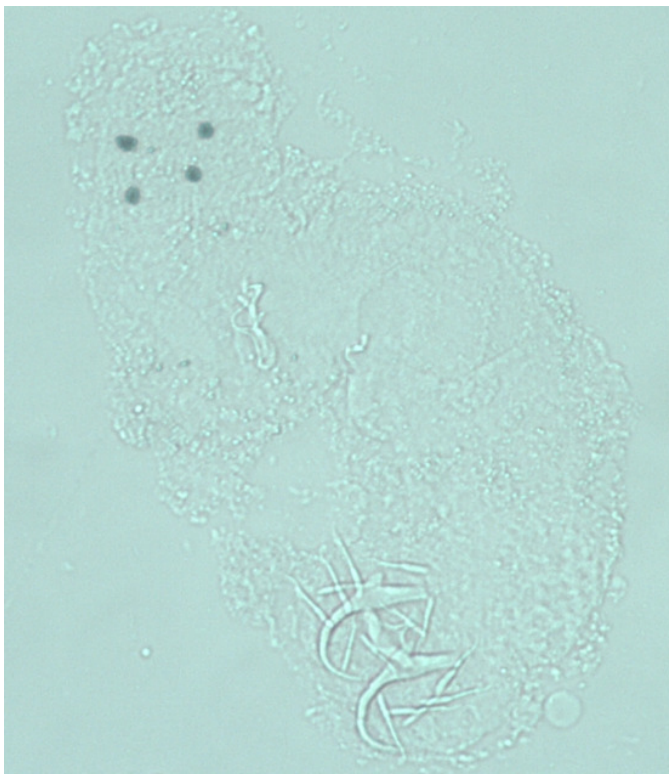


Figure 8. *Dactylogybus prostaе* (total) - original, x 300.

in 18 fishes (41.86%) with an intensity of infestation of 1.20.

Gara fish (*G. rufa*): 72 specimens were examined, one monogenean species were found: *D. rectotrabus* in 4 fishes (5.56%) with an intensity of infestation of 1.0.

Among the monogenean species individually, the highest prevalence occurred with *D. vistulae* (18.50%) and *D. elegantis* (15.0%), and the greatest intensity of infestation was observed in the cases of infestation with *D. vistulae* (3.38) and *D. elegantis* (3.58). The greatest number of parasite specimens was found in cases of infection with *D. vistulae* and *D. elegantis*.

The greatest prevalence and intensity of infestation with monogeneans in Murat River fishes occurs during the summer (prevalence 83.87% and intensity 3.85). Because of the summer condition which is usable for monogenean reproduction, and spring (prevalence 50.98%, and intensity 2.50), because of spawning, particularly of the cyprinid fishes. This conclusion complies with the findings of Thomas (1964), who emphasizes three factors why fishes are physiologically less resistant to parasites during the spawning period: Weaker condition, stress and disruption in the production of estrogen. Also, after winter, which is a latent period, the vernal period provides better conditions for development and reproduction of the parasites, enabling them to increase in number.

The greatest pathological effect was associated with



Figure 11. *Dactylogyrus rectotrabus* (haptor disc) - original, x 300.



Figure 12. *Dactylogyrus rectotrabus* (copulatory) - original, x 300.

Table 1. Prevalence and intensity of infestation with Monogenea among some fishes from Murat River.

Fish species	Parasite species	Season	Prevalence			Total parasites (Minimum – Maximum)	Main int. by seasons depending of the NIF)
			NEF*	NIF*	% infestation		
<i>C. regium</i>	<i>D. elegantis</i>	Spring	8	3	37.5	8 (1-3)	2.66
		Summer	12	6	50.0	30 (2-8)	5.0
		Autumn	8	3	37.5	5 (1-2)	1.66
		Winter	8	0	0	0	0
	in total <i>D. elegantis</i>		36	12	33.33	43 (1-8)	3.58
	<i>D. vistulae</i>	Spring	8	4	50.0	10 (1-2)	2.50
		Summer	12	8	66.67	40 (1-7)	5.0
		Autumn	8	2	25.0	4 (2-2)	2.0
		Winter	8	0	0	0	0
	in total <i>D. vistulae</i>		36	16	44.44	54 (1-7)	3.38
Overall infestation		36	28	77.78	97 (1-8)	3.46	
<i>S. cephalus</i>	<i>D. elegantis</i>	Spring	15	5	33.33	20 (2-7)	4.0
		Summer	19	9	47.36	38 (3-8)	4.22
		Autumn	14	4	28.57	8 (1-3)	2.0
		Winter	12	0	0	0	0
	in total <i>D. elegantis</i>		60	18	30.0	56 (1-8)	3.11
	<i>D. vistulae</i>	Spring	15	4	26.67	13 (1-4)	3.25
		Summer	19	12	63.15	46 (1-9)	3.83
		Autumn	14	3	21.42	3 (1-1)	1
		Winter	12	0	0	0	0
	in total <i>D. vistulae</i>		60	21	35.0	62 (1-9)	3.10
	<i>D. prostaе</i>	Spring	15	3	20.0	6 (1-3)	2.0
		Summer	19	7	36.84	30 (2-6)	4.28
		Autumn	14	2	14.29	3 (3)	2
		Winter	12	0	0	0	0
in total <i>D. prostaе</i>		60	12	20.0	40 (1-6)	3.33	
Overall infestation		60	51	85.0	158 (1-9)	3.09	
<i>A. heckeli</i>	<i>D. alatus</i>	Spring	13	6	46.15	8 (1-3)	1.33
		Summer	14	8	57.14	12 (1-3)	1.50
		Autumn	9	4	44.44	4 (1-1)	1.0
		Winter	7	0	0	0	0
	in total <i>D. alatus</i>		43	18	41.86	24 (1-3)	1.20

Table 1. Continues.

		Spring	19	0	0	0	0
<i>G. rufa</i>	<i>D. rectotrabus</i>	Summer	20	4	20.0	4 (1-1)	1.0
		Autumn	18	0	0	0	0
		Winter	15	0	0	0	0
		in total <i>D. rectotrabus</i>	72	4	5.56	4 (1-1)	1.0
Overall infestation	Spring	55	25	50.98	65 (1-7)	2.5	
Overall infestation	Summer	62	54	83.87	200(1-10)	3.85	
Overall infestation	Autumn	45	18	40.90	27 (1-3)	1.5	
Overall infestation	Winter	38	0	0	0	0	
Overall infestation		200	97	48.50	292(1-10)	3.01	

*NEF, Number of examined fishes; NIF, number of infected fishes.

the monogeneans, *D. vistulae* and *D. alatus*. However, other monogeneans can also act negatively on the health and condition of fish when they are met in sufficient numbers.

Some of the monogeneans detected in cyprinid fishes from Murat river are also present in other cyprinids from the other freshwater reservoir fishes, *D. alatus* in *Alburnus alburnus* (Koyun, 2007, 2011c), *D. vistulae* in *Rutilus rutilus* (Karabiber, 2006), *D. elegantis* in *Chondrostoma nasus prespensis* (Stojanovski et al., 2010).

Conclusion

In conclusion, the study determined 5 parasitic species present in fish from Murat River, which were not previously examined parasitologically in this river basin. These parasite types are new records for Murat River, and *D. prostae* and *D. rectotrabus* are also new records for Turkey.

In the light of these data, the geographical distribution of these parasites is extended. The density and infection rates of these parasites in the above mentioned fish species showed seasonal variations. The findings of this study are

expected to contribute to future studies to protect and develop the ecological potential of Murat River.

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REFERENCES

- Abdullah SMA (2009). Additional records of *Dactylogyru* (Monogenea) from some cyprinid fishes from Darbandikhan Lake, Iraq. *Jordan J. Biol. Sci.* 2(4): 145-150.
- Al-Samman A, Molnar K, Szekely C (2006). Infection of cultured and freshwater fishes with monogeneans in Syria. *Bull. Eur. Ass. Fish Pathol.* 26 (4): 170-173.
- Aydođdu A, Yildirimhan HS, Altunel FN (2001). Occurrence of helminth in chub (*Leuciscus cephalus*) of the Dogancı Dam Lake, Turkey. *Bulletin of the European Association of Fish Pathologists.* 21(6): 246-251.
- Bauer ON (1985). Guide for identification of parasites of the freshwater fish fauna of the USSR. Vol 2. Zoological Institute, Academy of Sciences of the USSR, Leningrad.

- Dorucu M, Kan NI, Oztekin Z (2008). Investigation of internal parasites of some fish species caught in Keban Dam Lake (Turkey). *J. Fish. Sci.* 2(3): 484-488.
- Dupont F, Lambert A (1986). Etude des communautes de Monogenes Dactylogyridae parasites des Cyprinidae du Lac Mikri Prespa (Nord de la Grece). Description de trois nouvelles especes chez un *Barbus* endemique: *Barbus cyclolepis prespensis* Karaman, 1924. *Ann Parasitol. Hum. Comp.* 61(6): 597-616.
- Fernando CH, Furtado JI, Gussev AV, Hanek G, Kakonge SA (1972). Methods for the study of freshwater fish parasites. Department of Biology, University of Waterloo, Waterloo, Ontario, Canada. p. 76.
- Geldiay R, Balik S (1974). Ecto and endoparasites found the freshwater fish of Turkey. Ege University, The Science Faculty Monographies, 14, Ege University Press, Bornova.
- Gussev AV (1968). Ammonium picrate as a fixative and mounting medium for slides of fish parasites. *Zool. Zhurnal.* 47: 935-936.
- Gussev AV, Jalali B, Molnar K (1993). New and known species of *Dactylogyru* Diesing, 1850 (Monogenea, Dactylogyridae) from Iranian freshwater cyprinid fishes *Systematic Parasitology.* 25: 221-228.
- Jirsa F, Konecny R, Frank C, Sures B (2011). The parasite community of the nase *Chondrostoma nasus* (L. 1758) from Austrian rivers. *J. Helminthol.* 85(3): 255-262.
- Karabiber FT (2006). Parasite fauna of roach (*Rutilus rutilus* L., 1758) in the Lake Sapanca M.Sc thesis, Marmara Univ. Sci. Institute, p. 53.
- Koyun M, Altunel FN (2007). Metazoon parasites of bleak (*Alburnus alburnus*) Crucian carp (*Carassius carassius*) and Golden carp (*Carassius auratus*) in Enne

- Dam Lake, Turkey. Int. J. Zool. Res. 1(2): 1-7.
- Koyun M (2011a) First report of *Tracheliastes polycolpus* (Copepoda: Lernaepodidae) and *Piscicola geometra* L. 1761 (Annelida-Hirudinea) on *Capoeta umbla* at Murat River, Turkey. A. J. Anim. Vet. Adv. 6(9): 966-970.
- Koyun M (2011b). First record of *Dogielius forceps* (Monogenea) on *Capoeta umbla* (Pisces, Cyprinidae) to Turkey, from Murat River. AACL BIOFLUX Aquaculture, Aquarium, 4(4): 469-473.
- Koyun M (2011c). Seasonal distribution and ecology of some *Dactylogyrus* species infecting *Alburnus alburnus* and *Carassius carassius* (Osteichthyes: Cyprinidae) from Porsuk River, Turkey, Afr. J. Biotechnol. 10(7): 1154-1159.
- Kurupinar E, Ozturk MO (2009). A Study on the helminth fauna linked to seasonal changes and size of the fish host, *Leuciscus cephalus* L., from Orenler Dam Lake, Afyonkarahisar. Acta. Parasitologica Turcica, 33(3): 248-253.
- Oktener A (2003). A checklist of metazoan parasites recorded in freshwater fish from Turkey. Zootaxa, 394: 1-28.
- Ozdemir Y, Sarieyyupoğlu M (1993). Some parasites of *Barbus capito pectoralis* caught in Keban Dam Lake. Firat Unive., J. of Sci. Engineering, 5(2): 114-126.
- Pugachev ON, Gerasev PI, Gussev AV, Ergens R, Khotenowsky I (2010). Guide to monogenoidea of freshwater fish of palaeartic and Amur regions. Sci.edit. Galli P, Pugachev ON, Kristsky D, Cover by Ledizioni- Ledipublishing. p. 567.
- Stojanovski S, Kull Z, Baker RA, Hristovski N, Caki P, Hristovski M (2004). Fauna of monogenean trematodes parasites of some cyprinid fishes from Lake Prespa (Macedonia). Acta Veterinaria (Beograd). 54(1): 73-82.
- Stojanovski S, Hristovski N, Cakic P, Hristovski M, Velkova-Jordanoska L, Blazekovic D (2010). Monogenean trematods of chub (*Leuciscus cephalus albus* Bonaparte, 1838) from lake Ohrid (Macedonia) Biotechnol. Biotechnol. Eq. 24 (Special Edition): pp. 623-627.
- Sarieyyupoglu M, Saglam N (1991). *Ergasilus sieboldi* and *Argulus foliaceus* in *Capoeta trutta* caught from polluted region of Keban Dam Lake. J. of Ege University Aquatic Products. 8: 31-42.
- Sarieyyupoglu M, Saglam N (1995). Some external parasites on cyprinids in Keban Dam Lake. Aquaculture, 129: 437-439.
- Thomas JD (1964). A comparison between the helminth burden of male and female brown trout *Salmo trutta* L. from natural population in the River Teify, West Wales. Parasitol. 54: 263-72.