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A study of endohelminthes in some fish species caught between Kumlutarla-Gemici regions of Karakaya Dam Lake

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Introduction

Parasitic diseases has become widespread parallel to the increase of aquaculture in the World and Turkey. Therefore, studies on fish parasitology is also increasing. In a study conducted in Keban Dam Lake on *Acanthobrama marmid*, *Diplostomum* sp. infestation caused severe ocular disorders and death of the host, was found that the intensity of the eye lens parasite reached its maximum in September (Dörücü and İspir, 2001). In an other study performed in Koçkale Region of Keban Dam Lake where the city sewage spills, 14 parasites from same species belong to Neoechinorhyncidae familiy found that stuck to the small intestine of *Capoeta trutta*.

According to the microscopic examination and morphometric characteristics of the parasite it was found to be *Neoechinorhynchus rutili*. *N. rutili* previously identified in many fishes, and was confirmed by this study that also found in the Capoeta trutta (Sağlam and Sarıeyyüpoğlu, 2002).

In another study conducted in Euphrates River between the Keban Reservoir spillway and the starting to fill of Karakaya Dam Lake the area called Kumlutarla Village, it was carried out for 1 year and visited by 15 days intervals, total of 265 fishes caught by fishermen in that area was investigated. Captured fishes consists of *Onchorhynchus mykiss*, *Barbus rajanarum mystaceus*, *Copoeta copoeta umbla*, *Chondrostoma regium*, *Leuciscus cephalus orientalis*, *Chalcalburnus mossilensis*, *Acanthobrama marmid* and *Copoeta trutta* species and *Khawia sinensis*, *Bothriocephalus acheilognathi*, *Diphyllobothrium* sp. *N. rutili Neoechinorhynchus zabensis* parasite species were identified in this study (Ural *et al*., 2014).

In present study, parasitic fauna of fish obtained in Kumlutarla, Tabanbükü and Gemici regions of Karakaya Dam Lake were compared. In addition, prevalence, abundance and density of parasite species were calculated. Changes of parasitic infections found in the fish were also

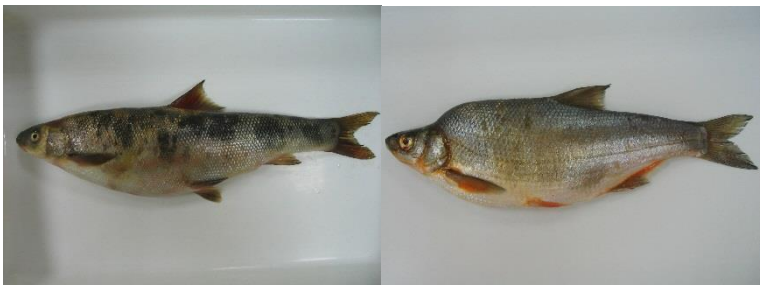
examined according to weight, age and gender of fish.

Materials and methods

Fish species

Fish species examined for endohelmith in this study classified by using Geldiay and Balık (2002) and listed below (Fig. 1).

Alburnus mossulensis *Chondrostoma regium* *Capoeta trutta*



Capoeta umbla *Acanthobrama marmid*

Figure 1: Fish species examined from Kumlutarla, Tabanbükü and Gemici stations (original).

Collection and examination of study materials

Fish samples, 10-95 individuals from each species, were collected and transported to Fish Disease Laboratory in Firat University, Faculty of Fisheries and classified by using Geldiay and Balık (2002). Total, standard and fork length of fish samples used in the study were determined. Body weights were measured with a digital scale. Age determination for *C. regium* ve *Acanthobrama marmid* was made from scales, for *Capoeta umbla* and *Alburnus mossulensis* from otolith and for *Capoeta trutta* from dorsal fin rays. Internal inspection of the fish was made in accordance with the post-mortem techniques and gender was determined with macroscopic examination of fish gonads (Pritchart and Kruse, 1982). The fish was opened with dissecting scissors starting from the anus until operculum. Macroscopic examination was done for the parasite in the body cavity and internal organs. Then the internal organs of the fish were transferred to the physiological water in petri dishes and examined under a stereo microscope. Parasites found were examined alive or stored in small vials containing AFA solution (alcohol-formalin-aseticacid) for later examination. For the diagnosis and photographing, parasites were transparented with lactophenol and then prepared with glycerol gel (Merdivenci, 1984; Arda *et al*., 2005). Parasite samples were detected

related at class, order and species level and recorded. For correct classification with help of clear body parts of parasites adaquate fixative and stains were used. (Pritchard and Kruse, 1982; Merdivenci, 1984; Chubb and Powell, 1996).

Statistical analysis

Prevalence, mean density and mean abundance values were calculated on the data obtained in the study as in Bush *et al*. (1997) to reveal the parasite ecology and given below (Tables 1,2,3,4,5,6).

Results and discussion

During the study, 595 fishes belonging to *A. mossulensis*, *C. regium*, *C. trutta*, *C. umbla* and *A. marmid* were examined for endohelmint and 3 parasite species have been found in 405 fish. *Diplostomum* sp. has been found in the eyes of *A. mossulensis*, *C. regium*, *C. trutta* and *C. umbla*; *K. sinensis* found in the abdominal cavity of *A. mossulensis* and *A. marmid*; *N. rutili* found in the intestine of *C. trutta*.

Morphological and anatomical features of parasite species and findings belong to those species are presented below. Size, weight, gender, age, infection rates, density and abundance of the parasite species according to the regions were determined and shown below (Table 1,2,3,4,5,6).

Diplostomum sp.

Front part of the body is leaf-shaped and the ventral part concave. The rear like a small conical shaped projecting from the posterior dorsal (Fig. 2). Usually there are a couple subsidiary organ called the lateral pull and there is no real parasite cysts.

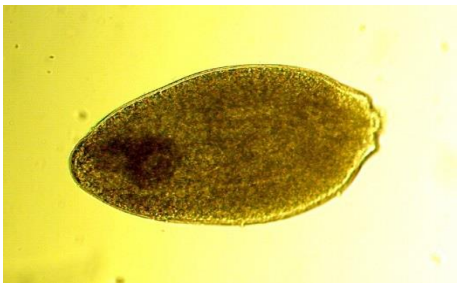


Figure 2: Microscope image of *Diplostomum* sp. metaserker (Original).

Neoechinorhynchus rutili (Müller, 1780)

Body is generally bent towards the ventral, rear end thin (Fig. 3). Hose is too short and six rows with three hooks exist on it.

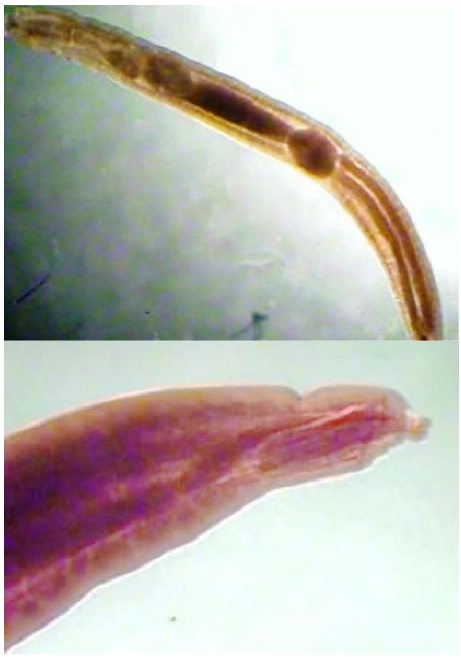


Figure 3: Microscope image of *Neoechinorhynchus rutili* (Original).

Khawia sinensis (Hsu, 1935)

Body slim long. There is only one reproductive organ on body's posterior without posterior segments. Testicles are many and extending to the cirrus sac from back of skolex. Ovary 'H' shaped and puckered between the uterus and ovary cirrus sac (Fig. 4).

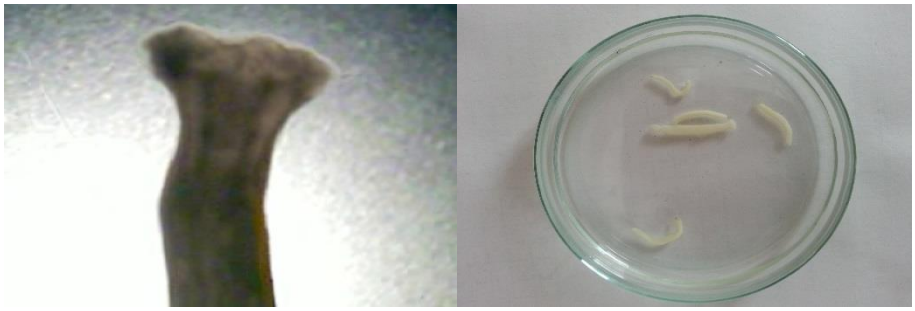


Figure 4: Microscope image of *Khawia sinensis* (Original).

Table 1: Total numbers and infection levels of fishes examined by region.

Regions	Total fish no	Non-infected Fish	Infected fish	Parasite No	Density	Abundance	Prevalence
Kumlutarla	203	82	121	2057	17,00	10,13	% 59,60
Tabanbükü	201	59	142	3557	25,04	17,69	% 70,64
Gemici	191	49	142	2537	17,86	13,28	% 74,34
Toplam	595	190	405	8151	20,12	13,69	% 68,06

Table 2: Distribution of parasite species in fishes by region in Karakaya Dam Lake.

Regions	Parasite species	Fish Species					Total
		(*A. mossulensis*)	(*C. regium*)	(*C. trutta*)	(*C. umbla*)	(*A. marmid*)	
Kumlutarla	*Diplostomum* sp.	30 (22)	820 (32)	24 (10)	138 (22)	705 (27)	1717
	Neoechinorhynchus rutili	-	-	334 (13)	-	-	334
	Khawia sinensis	1 (1)	-	-	-	5 (1)	6
Tabanbükü	*Diplostomum* sp.	26 (16)	1693 (40)	224 (26)	201 (27)	922 (28)	3066
	Neoechinorhynchus rutili	-	-	491 (31)	-	-	491
Gemici	*Diplostomum* sp.	31 (18)	936 (37)	232 (29)	242 (30)	626 (24)	2067
	Neoechinorhynchus rutili	-	-	470 (31)	-	-	470

Tablo 3: Mean weight and mean standard length of the fish caught from Kumlutarla, Tabanbükü and Gemici Regions of Karakaya Dam Lake.

Fish Species	Number of fish Examined	Mean Weight (g)	Mean Standart Lenght (cm)
Alburnus mossulensis	200	22,65	13,18
Chondrostoma regium	117	384,79	28,202
Capoetta trutta	103	373,37	26,515
Capoeta umbla	98	432,01	27,2959
Acanthobrama marmid	79	158,937	19,484

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Table 4: Infection rates in fish species by gender from Kumlutarla, Tabanbükü and Gemici stations.

Regions	Fish species	Gender \	Total	Infected	Non-infected	Prevalence (%)
Kumlutarla	*Alburnus mossulensis*	Female	36	12	24	% 33,33
		Male	33	10	23	% 30,30
	Chondrostoma regium	Female	18	17	1	% 94,44
		Male	20	15	5	% 75,00
	Capoetta trutta	Female	10	4	6	% 40,00
		Male	26	14	12	% 53,84
	Capoeta umbla	Female	13	10	3	% 76,92
		Male	20	12	8	% 60,00
	Acanthobrama marmid	Female	17	17	0	% 100
		Male	10	10	0	% 100
Tabanbükü	*Alburnus mossulensis*	Female	35	7	28	% 20,00
		Male	33	9	24	% 27,27
	Chondrostoma regium	Female	23	23	0	% 100
		Male	17	17	0	% 100
	Capoetta trutta	Female	16	15	1	% 93,75
		Male	18	16	2	% 88,88
	Capoeta umbla	Female	12	10	2	% 83,33
		Male	19	17	2	% 89,47
	Acanthobrama marmid	Female	20	20	0	% 100
		Male	8	8	0	% 100
Gemici	*Alburnus mossulensis*	Female	39	10	29	% 25,64
		Male	24	8	16	% 33,33
	Chondrostoma regium	Female	18	18	0	% 100
		Male	21	19	2	% 90,47
	Capoetta trutta	Female	15	15	0	% 100
		Male	18	18	0	% 100
	Capoeta umbla	Female	12	10	2	% 83,33
		Male	20	20	0	% 100
	Acanthobrama marmid	Female	18	18	0	% 100
		Male	6	6	0	% 100

Table 5: The prevalence of infection in fish species by age from Kumlutarla, Tabanbükü and Gemici regions.

Fish species	Age	Number of fish examined	Non-infected	Infected	Prevalence (%)
Alburnus mossulensis	I	159	119	40	% 25,15
	II	41	25	16	% 39,02
Chondrostoma regium	I	66	6	60	% 90,90
	II	46	2	44	% 95,65
	III	5	0	5	% 100
Capoetta trutta	I	40	13	27	% 76,50
	II	40	6	34	% 85,00
	III	23	2	21	% 91,30
Capoeta umbla	I	10	2	8	% 80,00
	II	56	7	49	% 87,50
	III	27	7	20	% 74,07
	IV	3	1	2	% 66,66
Acanthobrama marmid	I	48	0	48	% 100
	II	31	0	31	% 100
Total		595	190	405	% 68,06

Table 6: Comparison of parasitism rate and weight of fish from Kumlutarla, Tabanbükü and Gemici regions.

Regions	Fish species	Correlation coefficient (r)
Kumlutarla	*Alburnus mossulensis*	-0,36
	Chondrostoma regium	-0,34
	Capoetta trutta	-0,44
	Capoeta umbla	-0,005
	Acanthobrama marmid	-0,32
Tabanbükü	*Alburnus mossulensis*	-0,29
	Chondrostoma regium	+0,32
	Capoetta trutta	-0,03
	Capoeta umbla	-0,48
	Acanthobrama marmid	+0,93
Gemici	*Alburnus mossulensis*	+0,30
	Chondrostoma regium	-0,15
	Capoetta trutta	-0,75
	Capoeta umbla	-0,33
	Acanthobrama marmid	+0,49

Dörücü and İspir (2001), Karatoy (2004), Dörücü and İspir (2005), Uzunay and Soylu (2006), Aydoğdu *et al*. (2008), Özgül (2008), Karaman (2010) reported that they have identified *Diplostomum* sp. in their study.

Detecting *Diplostomum* sp. in this study are shown in agree with other studies.

However, the infection rate have reported as 50% by Aydoğdu *et al*. (2008) 16.6% by Karabulut (2009); 92.5% by Karatoy (2004); 100% Uzunay and Soylu (2006); 25.21% by Karaman (2010); 54% by Özgül (2008). In present study, infection rate was found as 93.38% in Kumlutarla, 95.77% in Tabanbükü and 97.88% in Gemici regions.

Diversity of the parasite infection rates between studies is thought to be caused by differences in the investigated fish species and the work area.

Again, Sağlam and Sarıeyyüpoğlu (2002), Dörücü and İspir (2005), Kır and Tekin Özan (2005), Dal (2006), Tekin Özan et al. (2006), Uzunay and Soylu (2006), Karaman (2010) reported in their study on freshwater fish that they have identified *Neoechinorhynchus Rutili*. However, Dörücü *et al*. (2008), Dörücü and İspir (2005), Sağlam and Sarıeyyüpoğlu (2002) have found *N. rutili* in *C. trutta*. Detecting *N. rutili* in this study show similarity by studies in terms of detecting parasites in fresh water fish. However, the rate of parasite infection are reported as 34.37% by Dörücü and İspir (2005); 1.25% by Kır and Tekin Özan (2005); 10.23% by Karabulut (2009); 38% Sağlam and Sarıeyyüpoğlu (2002); 71.4% by Dörücü *et al*. (2008) and 61.81% by Karaman (2010).

In our study, infection rate of *N. rutili* in *C. trutta* was determined as 36.11%, 73.52% and 93.93% for the Kumlutarla, Tabanbükü and Gemici regions respectivelly. These results showed similarity with the results in Dörücü and İspir (2001) (34.37%), Sağlam and Sarıeyyüpoğlu (2002) (38.0%) in Kumlutarla region; Dörücü *et al*. (2008) (71.4%) in Tabanbükü region; but different infection rate with 93.93% in Gemici

region is thought to be caused by differences in the investigated fish species. Again, Dörücü and İspir (2005) reported *Khawia armaniaca* in *C. umbla* and Ural *et al*. (2014) reported *K. sinensis* in *Acanthobrama marmid* in their study. The same species have been also identified in this study.

Only one of *A. mossulensis* was to be infected with *K. sinensis* (% 1,44) of 69 fish examined in Kumlutarla region. This parasite was found only in a male fish. Again, only one *K. sinensis* (3.02%) was seen out of 27 *Acanthobrama marmid examined in Kumlutarla reg*ion. This parasite found only in a male fish as five individuals. Findings in our study showed similarity with the results in Ural *et al*. (2014).

In this study, *Diplostomum* sp. was dominant parasite that found in the eyes of five fish species. In addition, *N. rutili* has also found in a high rate in the intestine of *C. trutta*.

K. sinensis were observed in *A. marmid* and *A. mossulensis*. Effects of fish length, weight, age and gender on infection rate in economically important fish species have tried to reveal in this study. Thus, when enough information obtained about the parasites, the environment in which it is thought will make living easier for them to overcome.

References

Arda, M., Seçer, S. and Sarıeyyüpoğlu, M., 2005. Balık hastalıkları, medisan yayın serisi: 61, II. Baskı Medisan Yayınevi, Ankara. 230 P.

Aydoğdu, A., Emence, H. and İnal, D., 2008. Gölbaşı Baraj Gölü (Bursa)'ndeki eğrez balıkları (*Vimba vimba* L. 1758)'nda görülen helmint parazitler. *Türkiye Parazitoloji Der*, 32(**1**), 86-90.

Bush, A.O., Lafferty, K. and Lotz, J.M., 1997. Parasitology meet ecology on its own ters: Morgolis *et al*. Revisited. *Journal Ecology Parasitology*, 83(**4**), 575-583

Chubb, J.C. and Powell, A.M., 1996. The examination of fish parasites, Department of Zoology Universty of Liverpool. pp. 87-90.

Dal, A., 2006. Atatürk Baraj Gölü (Adıyaman)'nde yetiştiriciliği yapılan gökkuşağı alabalığı (*Oncorhynchus mykiss*)'nda parazitolojik araştırmalar, Yüksek Lisans Tezi, Çukurova Ünv. Fen Bil. Ens. pp. 1-3.

Dörücü, M. and İspir, Ü., 2001. Seasonal Variation of *Diplostomum* sp. Infection in Eyes of *Acanthobrama marmid* Heckel, 1843 in Keban Dam Lake, Elazığ, Turkey, E.Ü. *Journal of Fisheries and Aquatic Sciences*, 18(**3-4**), 301-305.

Dörücü, M. and İspir, Ü., 2005. Keban Baraj Gölü'nden avlanabilen balık türlerinde iç paraziter hastalıkların incelenmesi, F.Ü. *Fen and Mühendislik Bilimleri Dergisi*, 17(**2**), 400-404.

Dörücü, M., Kan, N.İ. and Öztekin, Z., 2008. Keban Baraj Gölü'nden avlanan bazı balık türlerinde iç parazitlerin incelenmesi, *Journal of Fisheries Sciences*, 2(**3**), 484-488.

Geldiay, R. and Balık, S., 2002. Türkiye Tatlısu Balıkları (Ders Kitabı), IV. Baskı, Ege Üniversitesi Su Ürünleri Fakültesi Yayınları No:46 Ders Kitabı Dizini No:16, Ege Ünv. Ege Mes.Yük. Basımevi, Bornova / İzmir. 532 P.

Karabulut, C., 2009. Keban Baraj Gölü'nde dört farklı bölgeden (Koçkale,

Pertek, Çemişgezek, Keban) avlanan aynalı sazan (*Cyprinus carpio* L., 1758)'da endohelmintlerin araştırılması, Yüksek Lisans Tezi, Fırat Üniversitesi Fen Bil. Ens. Biyoloji Anabilim Dalı, Elazığ. 29 P.

Karaman, Z., 2010. Karakoçan Kalecik Baraj Gölü (Elazığ)'ünde Avlanılabilen Balıklarda Endohelmintlerin Araştırılması. Yüksek Lisans Tezi, Fırat Üniversitesi Fen Bilimleri Enstitüsü Su Ürünleri Yetiştiriciliği Anabilim Dalı Elazığ. pp. 1-66.

Karatoy, E., 2004. Durusu (Terkos) Gölünde'ki çapak balıkları (*Abromis broma*)'nın metazaon parazitleri, Yüksek Lisans Tezi, Marmara Ünv.Fen Bil. Ens. Su Ürn. Ana Bilim Dalı, İstanbul. 114 P.

Kır, İ. and Tekin Özan, S., 2005. Işıklı Baraj Gölü (Denizli)'nde yaşayan turna balığı (*Esox lucius* L., 1758)'nın endoparazitleri, mevsimsel dağılımları ve etkileri. *Türkiye Prz.Der*, 29(**4**), 291-294.

Merdivenci, A., 1984. Klinik Parazitoloji, Beta Basım Yayın Dağıtım A.Ş. Osman Aytaç Matbaası, İstanbul. 399 P.

Özgül, G., 2008. Almus Baraj Gölü'ndeki bazı Cyprinidae'lerde görülen balık parazitlerinin mevsimsel dağılımı, Yüksek Lisans Tezi, Gazi Osman Paşa Üniversitesi Fen Bilimleri Enstitüsü Su Ürünleri Anabilim Dalı, Tokat. 83 P.

Pritchard, M.H. and Kruse, G.O.W., 1982. The collectıon and preservatıon of animal parasites. Universty of Nebraska Press, Lincoln and London. 141 P.

Sağlam, N. and Sarıeyyüpoğlu, M., 2002. *Capoeta trutta* balığında rastlanan *Neoechinorhynchus rutili* (Acanthocephala) 'nin incelenmesi. *Türkiye Parazitoloji Dergisi*, 26, 329-331.

Tekin Özan, S., Kır, İ., Ayvaz, Y. and Barlas, M., 2006. Beyşehir Gölü kadife balığı (*Tinca tinca* L., 1758)'nın parazitleri üzerine bir araştırma. *Türkiye Parazitoloji Dergisi*, 30(**4**), 333-338.

Ural, M.Ş., Sağlam, N., Kaya, H. and Orsay, H., 2014. Fırat nehrinde avlanan bazı balık türlerinde endohelmintlerin araştırılması. D. A. B. 5. Su Ürn. Semp. 2014 Elazığ. 384 P.

Uzunay, E. and Soylu, E., 2006. Sapanca Gölü'nde yaşayan sazan (*Cyprinus carpio* Linnaeus, 1758) ve karabalık (*Vimba vimba* Linnaeus, 1758)'ın metazoan parazitleri. *Türkiye Prz.Derg*, 30(**2**), 141-150.