

**New host records for fish louse,  
*Argulus foliaceus* L., 1758 (Crustacea, Branchiura)  
in Turkey**

*Nuovi ospiti per Argulus foliaceus L., 1758  
(Crustacea, Branchiura) in Turchia*

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**SUMMARY** - In the present study freshwater mullet *Liza abu* (Heckel, 1843) (Mugilidae), spiny eel *Mastacembelus mastacembelus* (Banks & Solander, 1794) (Mastacembelidae) and Asian catfish *Silurus triostegus* Heckel, 1843 (Siluridae) caught from Atatürk Dam Lake were examined for ectoparasites. Fish louse *Argulus foliaceus* L., 1758 (Branchiura, Argulidae) is reported for the first time from these fishes in Turkey.

**RIASSUNTO** - Nel presente studio alcuni soggetti di *Liza abu* (Heckel, 1843) (Mugilidae), *Mastacembelus mastacembelus* (Banks & Solander, 1794) (Mastacembelidae) and *Silurus triostegus* Heckel, 1843 (Siluridae) pescati nelle acque del bacino artificiale Atatürk sono stati sottoposti ad esame parassitologico per ectoparassiti. Dalle suddette specie ittiche sono stati isolati per la prima volta in Turchia crostacei appartenenti alla specie *Argulus foliaceus* L., 1758 (Branchiura, Argulidae).

**Key Words:** *Liza abu*, *Mastacembelus mastacembelus*, *Silurus triostegus*, *Argulus foliaceus*, Crustacea, Branchiura, Atatürk Dam Lake, Turkey.

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## INTRODUCTION

Atatürk Dam is a dam in Turkey, built on the Euphrates River and completed in 1990. It is one of the world's largest earth-and-rock fill dams, with the embankment 184 m high and 1820 m long. The dam is the centerpiece and the largest of the 21 dams of the Southeastern Anatolia Project. The Atatürk Dam Lake has a total area of 817 km<sup>2</sup>. The Lake was made by DSI (Devlet Su İşleri Genel Müdürlüğü /General Directorate of State Hydraulic Works) to supply power and for irrigation purpose.



Figure 1 - Sampling area.  
Figura 1 - Area di campionamento.

Eleven fish species are reported in the lake (<http://en.wikipedia.org>). The freshwater mullet, *Liza abu* Heckel, 1843, the spiny eel, *Mastacembelus mastacembelus* L., 1758, and Asian catfish, *Silurus triostegus* L., 1758 are distributed in Central Asia warm waters environment and are three of the most important species among the fish which have economic values in Atatürk Dam Lake (Duman & Çelik, 2001).

The freshwater fish louse, *Argulus foliaceus* L., 1758 (Crustacea, Branchiura) is a branchiuran parasite occurring on a wide range of fish species and also reported from amphibians (Kennedy, 1974; Fryer, 1982). It feeds by piercing the skin of their host, injecting a toxin and drawing off blood (Kabata, 1970; Shimura & Inouse, 1984). Heavy infestations can cause serious damage to the skin and subsequent mortality (Kabata, 1970; 1985).

*A. foliaceus* has been reported parasitizing several freshwater fishes from the different regions of Turkey (Öktener, 2003; Kahveci, 2004; Karatoy, 2004; Tabakoğlu, 2004; Uzunay & Soylu, 2005; Karatoy & Soylu, 2006).

There are no published records of parasitic fauna of *L. abu*, *M. mastacembelus*, *S. triostegus* in Turkey, therefore the aim of this study was to increase the knowledge on the parasite fauna of

these fish species in Turkey by reporting the presence of *A. foliaceus*.

## MATERIAL AND METHODS

One hundred fifty-five mullets, *Liza abu* Heckel, 1843 (Perciformes, Mugilidae), fourteen spiny eels, *Mastacembelus mastacembelus* L., 1758 (Synbranchiformes, Mastacembelidae) and one Asian catfish, *Silurus triostegus* L., 1758 (Siluriformes, Siluridae) caught by fishing line from Atatürk Dam Lake (South-East Anatolian Region) were examined for ectoparasites on summer 2006. Depth of lake was approximately 0.5-1.5 m. Parasites were collected from the gill of fish using dissecting pens, preserved in 70% ethanol and mounted in glycerin jelly.

Parasites identification was made using the following specific key: Wilson (1903), Fryer (1982), Kabata (1985), Rushton-Mellor (1994), Rushton-Mellor & Boxshall (1994) and Kabata (1996) on the basis of main morphological features (size, appendage morphology, urosome, respiratory areas). Hosts classification followed Beckman (1962), common name of hosts followed Froese & Pauly (www.fishbase.org). Ecological terms followed Bush *et al.* (1997).

## RESULTS

From the gills of 5 (2.9%) out of 170 subjects examined, only argulid crustaceans were detected. No ectoparasites were found in other districts of the body. All the argulids found during this survey were identified as females of *A. foliaceus* (Fig.2) showing a length range of 3-7 mm and a width range of 2.5-5 mm.

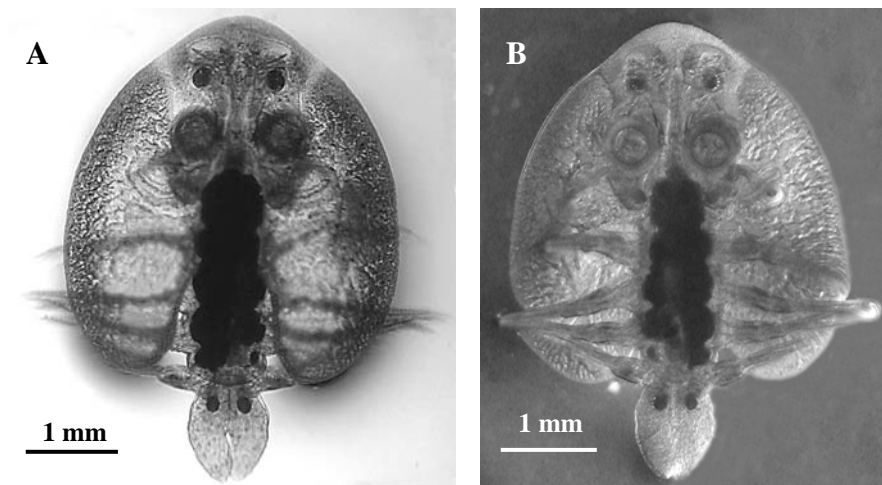


Figure 2 - Gravid female of *Argulus foliaceus*: A) dorsal view; B) ventral view.  
 Figura 2 - Femmina gravida di *Argulus foliaceus*: A) veduta dorsale; B) veduta ventrale.

The prevalence of *A. foliaceus* was 1.3% on *L. abu*, 14.3% on *M. mastacembelus*, 100% on *S. triostegus*. Prevalence and mean of infection intensity for freshwater mullet, spiny eel and Asian catfish are reported in Table 1.

Fish species	No. of fish investigated	No. of fish infested	Prevalence (%)	Mean Intensity	Total number of parasites
<i>Liza abu</i>	155	2	1.3	1	2
<i>Mastacembelus mastacembelus</i>	14	2	14.3	1	2
<i>Silurus triostegus</i>	1	1	100	1	1

Table 1 – Prevalence and mean of infection intensity.  
Tabella 1 – Dati di prevalenza e di intensità di infezione.

Specimens recovered did not differ significantly in size range or appendage morphology e.g. urosome with small spines, respiratory areas, cephalic area from descriptions made by Wilson (1903), Yamaguti (1963), Bykhovskaya-Pavlovskaya *et al.* (1962), Fryer (1982), Kabata (1985), Rushton-Mellor (1994), Rushton-Mellor & Boxshall (1994).

## DISCUSSION AND CONCLUSION

*Argulus foliaceus* L., 1758 has been described from cyprinid and salmonid fishes, Gobiidae, Gasterosteidae, Acipenseridae, frogs and toads in Europe, Central Asia and North America (Yamaguti, 1963). To date in Turkey, *A. foliaceus* has been recovered from several host species belonging to two families, Cyprinidae and Siluridae: *Abramis brama*, *Alburnus alburnus*, *Alburnus* sp, *Capoeta trutta*, *Carassius carassius*, *Ctenopharyngodon idella*, *Cyprinus carpio*, *Esox lucius*, *Leuciscus cephalus*, *Scardinius erythrophthalmus*, *Silurus glanis*, *Tinca tinca* and *Vimba vimba* (Öktener, 2003; Kahveci, 2004; Karatoy, 2004; Tabakoğlu, 2004; Uzunay & Soylu, 2005; Karatoy & Soylu, 2006).

Previous records of this parasite on gills and skin of *Liza abu* were reported by Mhaisen *et al.* (1986) in Shatt Al-Arab River (Southern Iraq) and *A. foliaceus* was also found on additional eight freshwater hosts in Iraq: *Barbus esocinus*, *B. grypus*, *B. luteus*, *B. xanthopterus*, *C. carpio*, *C. idella*, *Hypophthalmichthys molitrix*, *S. glanis* (Herzog, 1969; Mhaisen *et al.*, 1986; 1988; Ali & Hussein, 1986; Ali *et al.*, 1988; Khalifa, 1989; Hussein & Al-Hamdani, 1992; Al-Naiacemi, 1997; Al-Zubaidy, 1998; Al-Nasiri, 2000).

Our findings, according to Hine & Diggles (2005), confirm the low host specificity of *A. foliaceus*. This characteristic assumes great sanitary importance since *A. foliaceus* can play a role as a vector for spring viraemia of carp virus (SVCV) (Ahne, 1985), bacteria and flagellates (Kabata, 1985). Furthermore, it is intermediate host of skrjabillanid nematodes (Molnar &

Szekely, 1998) and can predispose fish to secondary bacterial and mycotic infection, especially when heavy infections occur.

The low prevalence and infection intensity values observed in this survey and the finding of *A. foliaceus* only from the gills could be explained by *post-mortem* abandonment of the host.

This short note represents the first report of *Argulus foliaceus* from the gills of *L. abu*, *M. mastacembelus* and *S. triostegus* in Atatürk Dam Lake in Turkey.

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#### REFERENCES

- Ahne W. (1985). *Argulus foliaceus* L. and *Piscicola geometra* L. as mechanical vectors of spring viraemia of carp virus (SVCV). *J. Fish Dis.*, 8: 241-242.
- Ali M.D. & Hussein J.H. (1986). Field and laboratory observations about infestation with fish louse *Argulus foliaceus* and its treatment method in fish. *8th scientific conference of Iraqi veterinarian doctors, 18-20 February 1986*: 46-47.
- Ali N.M., Abul-Eis E.S., Abdul-Ammer K.N. & Kadim L.S. (1988). The occurrence of fish parasites raised in man-made lakes. 1- protozoa and crustacean. *J. Biol. Sci. Res. Baghdad*, 19: 877-885.
- Al-Nasiri F.S. (2000). Parasitic infections of fishes in a man-made lake at Al-Amiriya region, Baghdad. *Msc. thesis, Baghdad Univ.*: 1-131.
- Al-Niaeemi B.H.S. (1997). A study on the parasites of the fish *Silurus triostegus* L. from Tigris River in Mosul city with special references to the histopathological effects caused by some infections. *Msc. thesis Mosul Univ.*: 1-116
- Al-Zubaidy A.B. (1998). Studies on the parasitic fauna of carps in Al-Furat fish farm, Babylon province, Iraq. *Ph. D. thesis, Babylon Univ.*: 1-141.
- Beckman W.C. (1962). The freshwater fishes of Syria and their general biology and management. *FAO Fish. Biol. Branch Tech. Pap.*, 8: 1-179.
- Bush A.O., Lafferty K.D., Lotz J.M. & Shostak A.W. (1997). Parasitology meets ecology on its own terms: Margolis et al., Revisted. *J. Parasitol.*, 84: 575–583.
- Bykhovskaya-Pavlovskaya I.E., Gusev A.V., Dubinina M.N., Izyumova N.A., Smirova T.S., Sokolovskaya I.L., Shtein G.A., Shulman S.S. & Epshtein V.H. (1962). Key To Parasites Freshwater Fishes of the USSR. *Izdatel'stvo Akademi Nauk S.S.S.R., Moskova, Leningrad*: 1-919.
- Duman E. & Çelik A. (2001). Atatürk Baraj Gölü Bozova Bölgesi'nde Avlanan Balıklar ve Verimlilikleri. *E.Ü. Su Ürünleri Dergisi*, 18, 1-2: 65-69.

- Fryer G. (1982). The parasitic copepoda and Branchiura of British freshwater fishes. A handbook and key. *Fresh. Biol. Assoc. Sc. Publ.*, 46: 1-87.
- Herzog P.H. (1969). Untersuchungen über die Parasiten der subwasser fische des Irak. *Arch. Fischereiwiss.*, 20, 2/3: 132-147.
- Hine P.M. & Diggles B.K. (2005). Import risk analysis: Ornamental Fish. *Biosecurity New Zealand, Ministry of Agriculture and Forestry, Wellington, New Zealand*: 1-264.
- Hussein J.H. & Al-Hamdani A.H. (1992). Field and Laboratory observations about infestation with fish louse *Argulus foliaceus* and its treatment method. *Iraqi J. Vet. Sci.*, 5, 2: 13-19.
- Kabata Z. (1970). Diseases of fishes: Book I. Crustaceans enemies of fishes. *New Jersey, US: T.F.H. Publications*: 1-171.
- Kabata Z. (1985). Parasites and Diseases of fish cultured in the Tropics. *Taylor & Francis (Eds.), London*: 1-318.
- Kabata Z. (1996). Parasitic crustaceans. *In Roberts L.S. and Janovy J. (Eds.). Foundations of parasitology 5th edition*: 513-534.
- Kahveci S. (2004). Durusu Gölü' nden Yakalanan Kızılkanat (*Scardinius erythrophthalmus* Lin., 1758) Balığının Metazoon Parazitleri. *Yüksek Lisans Tezi, Marmara Üniversitesi, Fen Bilimleri Enstitüsü*, 1-45.
- Karatoy E. (2004). Durusu Gölü Çapak (*Abramis brama* L., 1758) Balığının Metazoon Parazitleri. *Yüksek Lisans Tezi, Marmara Üniversitesi, Fen Bilimleri Enstitüsü*: 1-55.
- Karatoy E. & Soylu E. (2006). Durusu (Terkos) Gölü Çapak Balıkları (*Abramis brama* L., 1758) 'nın Metazoon parazitleri. *Acta Parasitol. Turc.*, 30: 233-238
- Kennedy C.R. (1974). A checklist of British and Irish freshwater fish parasites with notes on their distribution. *J. Fish Biol.*, 6: 613-644.
- Khalifa K.A. (1989). Incidence of parasitic infestation of fishes in Iraq. *Pak. Vet. J.*, 9, 2: 66-69.
- Mhaisen F.T., Al-Salim N.K. & Khamees N.R. (1986). The parasitic fauna of two cyprinid and a mugilid fish from Mehajeran Creek, Basrah. *J. Biol. Sci. Res. Baghdad*, 17, 3:63-73.
- Mhaisen F.T., Al-Salim N.K. & Khamees N.R. (1988). Occurrence of parasites of the freshwater mugilid fish *Liza abu* (Heckel) from Basrah, southern Iraq. *J. Fish Biol.*, 32, 4:525-532.
- Molnar K. & Szekely C. (1998). Occurrence of skrjabillanid nematodes in fishes of Hungary and in the intermediate host, *Argulus foliaceus* L. *Acta Vet. Hung.*, 46: 451-463.
- Öktener A. (2003). A checklist of metazoan parasites recorded in freshwater fish from Turkey. *Zootaxa* 394: 1-28.
- Rushton-Mellor S.K. (1994). The Genus *Argulus* (Crustacea, Branchiura) in Africa: Identification Keys. *Syst. Parasitol.*, 28: 51-63.

Rushton-Mellor S.K. & Boxshall G.A. (1994). The Developmental Sequence of *Argulus foliaceus*. *J. Nat. Hist.*, 28: 763-785.

Shimura S. & Inouse K., (1984). Toxic effects of extract from the mouthparts of *Argulus coregoni* Thorell (Crustacea: Branchiura). *B. Jpn. Soc. Sci. Fish.*, 50: 29.

Tabakođlu Ő. (2004). DSİ VI. Bölge Müdürlüğü Su Ürünleri Baş Mühendisliğinde Yetiştirilen Bazı Balık Türlerinin Parazitik Yönden İncelenmeleri. *Yüksek Lisans Tezi, Çukurova Üniversitesi, Fen Bilimleri Enstitüsü*: 1-47.

Uzunay E. & Soylu E. (2005). Sapanca Gölü'ndeki Sazan (*Cyprinus carpio* L., 1758) ve Karabalık (*Vimba vimba* Lin., 1758) 'ın Metazoan Parazitleri. *XI National Aquatic Products Symposium (20-22 September 2005, Çanakkale)*.

Wilson C.B. (1903). American parasitic Argulidae. *Proc. U. S. Nat. Mus.*, XXV: 635-742.

Yamaguti S. (1963). Parasitic Copepoda and Branchiuran of fishes. *Interscience Publs. New York*: 1-1104.