Advanced Underwater Sciences

http://publish.mersin.edu.tr/index.php/aus/index

e-ISSN: 2791-8734

The First Record of Argulus japonicus Thiele, 1900 Infestations on Telescope fish (Carassius auratus) of Mersin in Turkey

Cafer Erkin Koyuncu[*1]

[1]*Mersin University, Faculty of Fisheries, Mersin, Turkey*

Keywords
Argulus japonicas
Ectoparasite
telescope fish
Carassius auratus
Mersin

ABSTRACT

Argulus japonicus (Crustacea: Branchiura), or the fish louse, is an ectoparasite of the skin or gill of the fresh water fish species. Clinical signs in infected fish include scratching or flashing on pond aguarium or other objects. It causes pathological changes due to direct tissue damage and secondary infections. In the present study, telescope fish (Carassius auratus), taken from a goldfish aquarium with symptoms such as abnormal swimming, poor growth and death, were examined for ectoparasites. The parasites collected from the skin and fins of fish were identified as A.japonicus. Treatment was carried out by trichlorfon. After administration, no parasite was observed on the fish. This study is the first report of infection with A. japonicus of telescope fish (Carassius auratus)of Mersin in Turkey.

1. INTRODUCTION

Ornamental fish culture has rapidly developed in different countries. Crustaceaparasitic infestation is the most important disease affecting ornamental fish and it causes economical losses for this growing industry in intensive culture systems. (Roberts, 2010)

Argulids have been recognized as pest of cultured trout in Europe and carp in China since the 17 th centrury(Kabata 1985).The three best known species are Argulus foliaceus, A. japonicus and A. coreconi.They cause mortalities of fish in aguarium, in lakes and estuaries, and occasionally cause problems in sea-caged salmonids (Menezes et al.1990; Rushton-Mellor, 1992). Secondary infestions by fungi and bacteria reduce the commercial value of parasitized carp and goldfish (Shimura, 1983a).

Argulus japonicus has a worldwide distribution. It has been introduced with aguarium fish from orient and now is common wherever Goldfish but has found (Cressey, 1978). In North America it infests primary goldfish but has been found on Cyprinus and Ictalurus(Amin, 1981). In Europa it infests Carassius, Cyprinus and other genera inculuding Exos,Perca,Tinca and Sardinus (Freyer, 1982, Woo, 1995). It feeds by piercing the skin of their host, injecting a toxin and drawing off blood (Kabata, 1970). Heavy infestations can cause serious damage to the skin and subsequent mortality (Kabata, 1970; 1985).

This study is the first report of infection with A. japonicus of Telescope fish (Carassius auratus) of Mersin in Turkey. Also, in this study was determination of causes of death in telescope fish and treatment of infested fish as well.

* **Corresponding Author**

*(ekoyuncu@mersin.edu.tr) ORCID ID 0000-0002-5264-7055

Cite this article;

Koyuncu C E (2021). The First Record of Argulus japonicus Thiele, 1900 Infestations on Telescope fish (Carassius auratus) of Mersin in Turkey. Advanced Underwater Sciences, 1(1), 16-20

Research Article

Received: 01/09/2021; Accepted: 30/09/2021

2. MATERIALS AND METHOD

In May month 2019a goldfish producer referred to, Department of Aquaculture of Faculty of FisheriesMersin University,Mersin in Turkey. He complained of abnormal swimming, poor growth and death in telescope fish aquarium. Examination of fish showed around the head, typically behind the fins and small red spots on the skin .Fish samples were weighed, measured and thereafter the operculum, fins and body surface were examined for ectoparasites.The research material consisted of 100 telescope fish (Carassius auratus). Parasites were easily observed with the naked eyes and were removed using a small probe or forceps and fixed in 70% ethanol. A hand lens was used to distinguish the external parts and general structure. Under the light microscope, these parasites were identified at Argulus foliaceus according to the rounded lobes of abdomen and the posterior emargination not reaching the mid-line and posterior lobes cephalothoracic carapace not extended beyond the beginning of abdomen.Specimens were examined and photographed using a phase contrast microscopy (Nikon H550L). Parasites identification was made using the following specific key: Wilson 1903, Bykhovskaya-Pavlovskaya et al.1962;Fryer, 1982; Kabata 1985;Gresty et al.,1993;Rushton-Mellor,1994; Kabata1996 ;Wadeh et al.2008on the basis of main morphological features (size, appendage morphology, urosome, respiratory areas).

3. RESULTS

The fish weighed 4.2-5.5 g and were 5.2-5.7 cm in size.Fish infested with A. japonicushad brown-grey points on the skin and fins due to parasitic irritation and tissue damage. Parasites were collected from around the operculum and body surface).The mean number of parasites per fish was 1-5. From body surface of 33 (33%) out of 100 subjects examined, only argulid crustaceans were detected. The prevalence of A.japonicus was 28 % on telescope fish. All the argulids found during this survey were identified as adult females and males of A. japonicus.

The dimensions were male (n=10)a length range of 3,7(2.9–4.4) mm and a width range of 2.6(2.2-3) mm, abdomen a length range of 1.2 (1.1–1.3) mm and abdomen a width range of 1.0 (0.9–1.1) mm. The dimensions were female (n=27) a length range of 5,45(4,9-6,0) mm and a width range of 4,5(3,8-5,1)mm. abdomen a length range of 1.5 (1.3–1.7) mm and abdomen a width range of 1.15(0.8–1.5) mm.The parasite has rounded lobes of abdomen and the posterior emargination reaching the mid-line and posterior lobes cephalothoracic carapace extended beyond level of the middle of abdomen. The head show features are typical of A.japonicus in dorsal view.Legs of the males of species of Argulus japonicus to show the differences in the clasping apparatus .The parasite identified as A. japonicus by the looking morphologic key characteristics under phase contrast microscopy .

The owner was recommended to disinfect the aquariums and equipment to remove completely eggs, and treatment of fish with trichlorfon (0.25 mg/l at temperatures below 27 ºC, or with 0.50 mg/l above 27 ºC) . Yıldız and Kumantaş 2002;Tokşen, 2006). During treatment, neither adverse effects nor mortality was observed throughout the trichlorfon bath. All fish were checked in terms of parasite following the treatment. No parasite was observed on the fish.

4. DISCUSSION

Goldfish is one of the major ornamental fish for which more than 100 varieties have been produced with selective hatching and many people are interested in their breeding and rearing. Besides their breeding in different fish farms in Turkey, different species of goldfish are imported annually from Southeast Asian countries.Studies carried out on goldfish and koi confirms the Argulus as the most prevalent parasite (Noga 2010).Argulus are good swimmers. Adults and larvae can easily migrate among many hosts. So, Argulus can induce morbidity and mortality in cultured fish populations (Kabata 1985).Also, this ectoparasitic species is widely adaptable and can live in freshwater habitats.

Argulus sp. was reported from different fish species worldwide (Woo 1995, Buchmann&Bresciani 1997).A.foliaceus has been reported parasitizing several freshwater fishes from the different regions of Turkey (Geldiay & Balık 1974; Sarieyyüpoğlu &Sağlam 1991; Özerand Erdem,1999; Yıldızet al2002,Koyuncu,2002;Öztürk&Aydoğdu2003;Kahveci, 2004; Karatoy, 2004;Kır et.al. 2004;Tabakoğlu, 2004;Tekinet.al. 2005;Öztürk, 2005,Uzunay & Soylu 2006; Karatoy & Soylu 2006; Öktеneret.al 2006,Tokşen2006,Alaş et al. 2010, Öktener et al. 2010, Öztürk, 2010; Pekmezci, et al, 2011). In the present study, A. japonicuswas first reported fromorandagoldfish(Carassıus auratus)of Mersin in Turkey.

In this study, it was determined that the general morphology and dimensions of both sexes of A. japonicus are similar to those described by other authors (Fryer, 1982; Kabata, 1985; Gresty et al.1993; Rushton-Mellor, 1994; Kabata 1996, Wadeh et. al.2008).

A.japonicus infestations cause the skin irritation manifested by flicking of the fins (Richards, 1977; Bauer 1991). This is often accompanied by increased mucus production over the skin surface and the appearance of small haemorrhages (Richards, 1977). In this study, abnormal swimming, rubbing themselves against the wall of aquarium and lack of appetite were observed in diseased fish. The skin and fins have numerous brownish grey points and hemorrhagic areas.

It is known that Argulus infections lead to secondary parasitic infestation of the skin (Bauer 1991). Some authors reported that Costia necatrix accompanied by A.foliaceus in infected fish, and also Trichodina sp., Trichodinella sp.,Apiosoma sp.andDactylogyrus sp. were observed in skin and gills preparation (Burgu &Oğuz, 1984; Bauer, 1991; Yıldız &Kumantas 2002). In this study, no other parasites were observed on the body surface.

There are several reports of hundreds of Argulus species occurring on a single fish, and Fryer (1982) stated that a tench in Europe was found with thousands

Argulus sp. In this study, 1 to 5 parasites were found on the fish examined. This might be related to the early stage of infection. Pathogenesis was severe because these fish were small a lot of parasites being found on the fish. Also aquarium fish were affected heavily by ectoparasites due to the very fine structure of the skin.

The treatments of Argulus infestations include the use of common chemicals such as salt (NaCl) . potassium permanganate (2-5 mg/l bath), formaldehyde and formalin . The most effective treatment against argulusosis is organophosphates. Organophosphates, usually 2-3 doses at one-week intervals, are needed to treat the emerging larvae and juveniles. Treatments such as trichlorfon (0.25 ppm for several hours) and emamectin benzoate have been used to eradicate Argulus japonicus. (Öge, 2002).The owner was recommended to treatment of fish with trichlorfon (0.25 mg/l at temperatures below 27 ºC, or with 0.50 mg/l above). All fish were checked in terms of parasite following the treatment. No parasite was observed on the fish.

5. CONCLUSION

As a result, importation of ornamental fish is carried out in many countries without any special management and strict quarantine. So, in the case of any infestations, diseases come into the country through these infested fish, especially parasitic infestations, that threatens native fish and aquaculture industry of that country. One of the important issues related to parasitic infestations of ornamental fish is the infestation transmission from imported fish to native fish and their habitation as natives in new region. Therefore, imported fish should be examined for their health and for parasitic infestations in order to prevent the burst of new parasitic fauna to different countries and stop direct economic losses caused by mortality derived from infestations appeared in relocation.

ACKNOWLEDGEMENT

I would like to thank Dr. Georffrey Freyer for friendly advices and for his help in identifying A. japonicus.

Author contributions

All contributions belong to the author in this paper.

Conflicts of interest

The author declares no conflicts of interest.

Statement of Research and Publication Ethics

The author declare that this study complies with Research and Publication Ethics

REFERENCES

Amin O M (1981). On the crustacean ectoparasites of fishes from southeast Wisconsin, T Transactions of the American Microscopical Society, 100:142-150.

Alaş A, Öktener A & Solak K (2010). A study on the morphology of Argulus foliaceus Lin.,1758 (Crustacea; Branchiura) procured from Çavuşcu Lake (Central Anatolia- Turkey) with scanning electron microscopy, Turk J Biol 34: 147-151.

Bauer R (1991). Erkrankungen der Aquarienfishe. Verlag Paul Parey. Berlin und Hamburg.

Buchmann K & Bresciani J (1997). Parasitic infections in pond-reared rainbow trout Oncorhynchus mykiss in Denmark. Inter-Reseach. DAO, 28: 125-138.

Burgu A & Oguz T (1984). The results of parasitological examination of Carassius fish. Ankara Univ. J. Vet. Faculty.,31: 197-206.

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.

Cressey R F (1978). Marine flora and fauna of Northrastern United State Crustacea: Branchiura. NOAA. Tech. Rep. NFMS Circular, (414):1-10.

Geldiay R & Balık S (1974). Mainly endo and ecto-parasites observed on the fresh water fish in Turkey. Ege Üniv. Matbaası, İzmir.

Gresty K A, Boxshall G A &Nagasawa K (1993). The Fine Structure and Function of the C Cephalic Appendages of the Branchiuran Parasite, Argulus japonicus Thiele, Philosophical Transactions: Biological Sciences, 339: 119-135.

Fryer G (1982). The parasitic copepoda and Branchiura of British freshwater fishes. A handbook and key. Fresh. Biol. Assoc. Sc. Publ.,46: 1-87.

Kabata Z (1970). Diseases of fishes: Book I. Crustaceaas 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 balıklari (Abramis brama L., 1758) 'nın metazoan parazitleri. Acta Parasitol. Turc.,30: 233-238.

Koyuncu E C (2002). Histopathology, Effects, Incidence and Determination of Ectoparasites on Aquarium (Cyprinidae and Poecilidae) In some The Fish farming and Their Control. Çukurova University PhD.Thesis.Science Institution, Adana, 114 .

Kır İ, Ayvaz Y Barlas, M & Tekin, Ö S (2004).Karacaören baraj gölü'nde yaşayan sazan (Cyprinus carpio L., 1758)'lardaki parazitlerin mevsimsel dağılımları ve Etkileri, Acta Parasitologica Turcica28(1): 45-49.

Menezes M A, Ramos T G & Silva A M (1990). Rainbow trout culture failure in a small lake as result of massive parasitosis related to careless fish introduction. A Aquaculture 89:123–126.

Noga E J (2010). Fish disease: diagnosis and treatment, Wiley-Blackwell.

Öge S (2002). Chemotherapy for parasites of freshwater fish. Turk Parazitol Derg. 26:113- 118.

Öktener A, Hussain A A, Andrea Gustinelli A & Fioravanti M L (2006). New host records for fish louse, Argulus foliaceus L., 1758 (Crustacea, Branchiura) in Turkey, Ittiopatologia,3:161-167.

Özer A. & Erdem O (1999). The Relationship Between Occurrence of Ectoparasites, Temperature and Culture Conditions: AComparison of Farmed and Wild Common arp (Cyprinuscarpio L., 1758) in the Sinop Region of Northern Turkey. J.Natural istory, 33: 483-491.

Öktener A, Alaş A, & Solak K (2010). Findings of fish lice, Argulus foliaceus (Crustacea; Branchiura) in Turkey. Electronic Journal of Ichthyology 1:9-14.

Öztürk M O (2005). Eber Gölü (Afyon)'ndeki Sazan (Cyprinus carpio L.)'ların Metazoon Parazitleri Üzerine Bir Araştırma,Acta Parasitologica Turcica, 29 (3): 204-210.

Öztürk, M O & Aydoğdu A (2003). Metazoan Parasites of Grey Mullet (Mugil cephalus L.) from Karacabey Bayramdere Lagoon. Ankara Üniversitesi Veteriner Fakültesi Dergisi, 50:53-58.

Öztürk M O (2010). An investigation on Argulus foliaceus infection of rudd, Scardinius erythrophthalmus in Lake Manyas, Turkey. Scientific Research and Essays 5 (23): 3756- 3759.

Pekmezci G Z, Yardımcı B, Bolukbas C S, Beyhan Y E & Umur S (2011). Mortality d due to heavy infestation of Argulus foliaceus (Linnaeus, 1758) in pond-reared carp, Cyprinus carpio L. 1758 (Pisces). Crustaceana,84: 533-537.

Roberts H E (2010). Fundamentals of Ornamental Fish Health, 1. Edition ed. 28108pp), USA, NY: Blackwell Publ

Richards R (1977). Diseases of aquarium fish-2. Skin diseases. Vet. Rec.,101: 132-135.

Rushton-Mellor S K (1992). Discovery of the fish louse, Argulus japonicus Thile (Crustacea:Brachiura), in Britain. Aquacult. Fish. Mngmt, 23,269-271.

Rushton-Mellor S K (1994). The Genus Argulus (Crustacea, Branchiura) in Africa: identification Keys. Syst. Parasitol.,28: 51-63.166.

Sarieyyüpoğlu M & Sağlam N (1991). Ergasilus sieboldi and Argulus foliaceus observed o on Capoeta trutta caught in the polluted region of Keban Dam Lake (inTurkey). E.Ü. Su Ürün. Derg.,8: 143-154.

Shimura S (1983a). Seasonal occurence, sex ratio and - site preference of Argulus coregoni Thorell (Crustacea:Branchiura) parasitic on cultured freshwater salmonids in Japan. Parasitology 86:537-552.

Tekin Ö S & Kır İ (2005). Kovada Gölü Havuz Balığı (Carassius carassius L. L,1758)'nın Parazitleri Üzerine Bir Çalışma,Acta Parasitologica Turcica, 29 (3): 200-203.

Tokşen E (2006). Argulus foliacesus (Crustacea: Branchiura) Infestation on Oscar, A Astronotus ocellatus (Cuvier, 1829) and its Treatment, E.U. Journal of Fisheries & Aquatic Sciences, 23:(1-2): 177–179.

Uzunay E & Soylu E (2006). Sapanca Gölü'nde Yaşayan Sazan (Cyprinus carpio L., 758) veKarabalık (Vimba vimba L.,1758)'ın Metazoan Parazitleri,Acta Parasitologica Turcica, 30 (2): 141-150.

WadehH Yang J W & Li G.Q, (2008). Ultrastructure of Argulus japonicus Thiele, 1900 (Crustacea: Branchiura) collected from Guangdong, Parasitol Res 102:765–770.

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

Woo P T K (1995). Fish Diseases and Disorders.CAB International. 200-202.

Yıldız K & Kumantas A (2002).Argulus foliaceusinfection ın a goldfish (Carassius auratus) Israel of Journal Veterinary medicine.57 (3):118-120.

© Author(s) 2021.
This work is distributed under https://creativecommons.org/licenses/by-sa/4.0/