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# A Preliminary Investigation on Serious Mortalities of Fish in Balıklıgöl (Halil-ür Rahman Gölü, Şanlıurfa)

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**ABSTRACT**

This investigation was conducted in July 2005 when dead fish were encountered in Balıklıgöl. A parasitic copepod, *Lamproglena pulchella* Nordmann,1832 (Cyclopoida; Lernaeidae) in the gills of two cyprinid species was reported for the first time in Balıklıgöl (Şanlıurfa). The Infestation prevalence was 100 % on both *Cyprinus carpio* and *Capoeta trutta*. The mean intensity of infection was 7.2 individuals on *Cyprinus carpio* and 6.3 on *Capoeta trutta*. Intensity minimum-maximum on *Cyprinus carpio* and *Capoeta trutta* respectively was 4-16; 6-13. The aim of this work is to draw attention to the occurrence of *Lamproglena pulchella* with the poor environmental factors in Balıklıgöl which may be responsible for the cases of fish mortalities and the secondary infections which are emphasized in this work; and its use as a biomonitor species to evaluate the pollution and the biological quality of aquatic habitat.

**Key words:** Fish mortality, Balıklıgöl, pollution, biomonitor, *Lamproglena*, *Cyprinus*, *Capoeta.*

## 1.INTRODUCTION

The genus *Lamproglena* are typically gill parasites of freshwater fish, and as such they have the potential to cause fish losses in aquaculture. Over 40 species of the genus *Lamproglena* have been described [1]. *Lamproglena pulchella* was described for the first time on *Cyprinus jeses* in Europe by Nordmann [1832].

Several research projects on fish health, zooplankton and water quality have been carried out in Balıklıgöl [2, 3, 4]. Mortalities (which reached 10-15 in just one day according to authorities at the lake) among the fish have been seen frequently in Balıklıgöl [4, 5]. Parasitological studies in Turkey have been carried out on *C. carpio* and *C. trutta* in the present study. The existence of 31 parasite species (9 monogeneans, 2 digeneans, 9 cestods, 2 nematods, 3 acanthocephalans, 4 copepods, 1 acari, 1 hirudinid) on *C. carpio*; and 8 parasite species (3 monogeneans, 4 copepods, 1 acari) on *C. trutta* was determined by Turkish scientists [6]. This preliminary investigation was conducted on the serious mortalities in fish and the occurrence of *Lamproglena pulchella* in the gills of 2 fish species was found in Balıklıgöl.

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## 2. MATERIAL AND METHOD

Fish (*C. carpio, C. trutta)* were caught by netting. Parasites were dissected from the host in the laboratory (Harran University, Fishery Center). The parasites collected were fixed in 70% alcohol. Copepods were studied with a dissecting microscope. Specimens were dissected and cleared in lactic acid. For scanning electron microscope observations, *Lamproglena* specimens were removed from the fish and fixed in 3% glutaraldehyde in 0.1 M phosphate buffer (Ph 7.2) at $4^{o}C$ for 1 h. They were washed in the buffer before the post-fixation in 1% osmium tetroxide- in the same buffer- at $4^{o}C$ for 1 h. Then, the specimens were dehydrated through alcohol series and critical-point dried. After that, they were sputter-coated with gold [7]. SEM photographs were taken with a Jeol electron microscope. All the collected specimens were deposited in the Aquatic Products Center. The identifications and morphometric characteristics were performed according particularly to information obtained from Bykhovskaya-Pavlovskaya et al. [8], Cakic et al. [9] and Ho and Kim [10].

Balıklıgöl ($36^0$ 41' N $37^0$ 49' E, Şanlıurfa) is in a rural area in southeastern Turkey. The lake, with its pool-like appearance, is 17x157 $m^2$ in section and up to 1.5-2 m deep. Five cyprinid species occur in this lake. The lake receives water from a fountain at its base, and the surplus flows into the Fırat (Euphrates) River. The surroundings of the lake have been used as a public rest and picnic area and the location has historical and religious importance [5].

## 3.RESULTS

*Lamproglena pulchella* were found in the gills of carps, *Cyprius carpio* and *Capoeta trutta* (Figure 1). It was recorded with a prevalence of 100% on both *C. carpio* and *C. trutta*. The mean intensity of infection was 7.2 individuals on *C. carpio* and 6.3 individuals on *C. trutta*. Intensity minimum-maximum on *C. carpio* and *C. trutta* are respectively 4-16; 6-13.

Morphological features- such as shape of body (cylindrical), absence or presence of one seta of the V leg pair, and the length of antennae I relative to antennae II- are characteristic of previously described *Lamproglena pulchella*. Maxilla II consist of a massive basal joint with a powerful claw extending from it (Figure 2). Maxillipeds consist of 2 thick joints, provided with claws distally (Figure 3). The first four pairs of swimming feet are biramous, each ramus consisting of 2 joints (Figure 4). Thoracic legs V consist of small processes with one seta. The body is 4-5 mm long and 0.7mm wide.

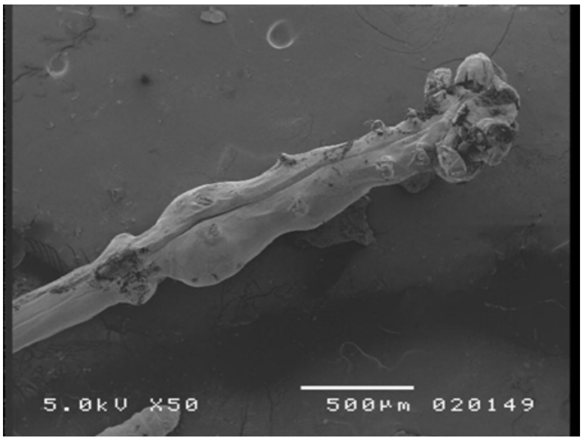


Fıgure 1. A photograph of *L. pulchella*

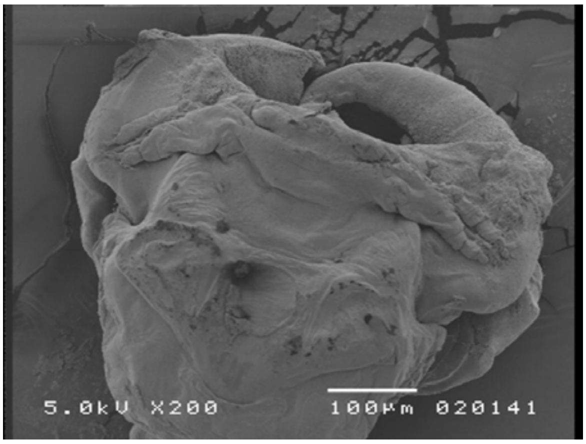


Fıgure 2. A photograph of maxilla

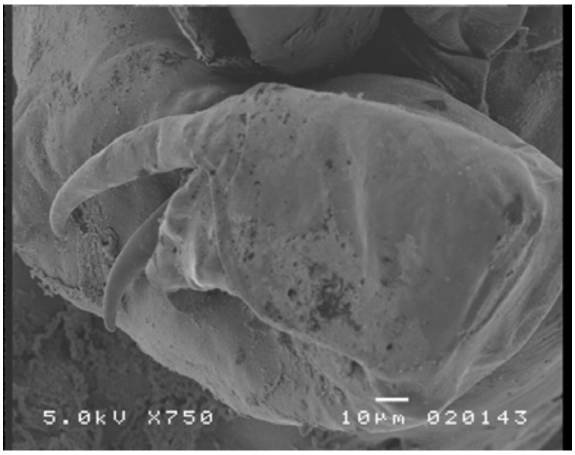


Fıgure 3. A photograph of maxilliped

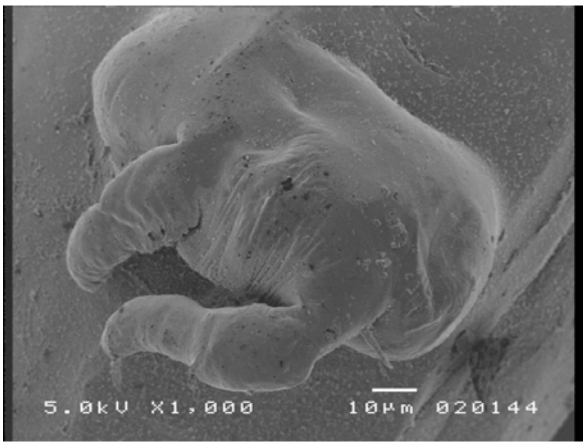


Fıgure 4. A photograph of leg 3

## 4.DISCUSSION

*Lamproglena pulchella* occurs on the cyprinid fish and *Esox lucius* in the rivers joining the Black Sea, Caspian Sea and Aral Sea [8]. *Lamproglena* occurs in Africa [11], Asia [12] and Europe [9, 13].

*Lamproglena pulchella* in Turkey was reported on *Scardinius erythrophthalmus* from Sapanca Lake by Soylu [14]; and on *Chondrostoma regium* and *Capoeta trutta* from Keban Dam Lake by Sağlam [15]. Although *Lamproglena pulchella* from Turkish freshwater fish has been reported, there is relatively little distribution information. Our finding of this parasite in the gills of *Cyprinus carpio* represents the first report in the carps of Turkey and also for Balıklıgöl (Şanlıurfa; the Southeast Anatolian Region).

In this study, it was shown that the infestation with *Lamproglena pulchella* on *C. carpio* and *C. trutta* is quite high from what was reported from other *Lamproglena* by other workers, such as 55.5 % in *Lamproglena* infestations in *Scardinius erythrophthalmus* [14] and 12.5 - 28.5 % in *Lamproglena* infestations in *Chondrostoma regium*, *Capoeta trutta* [15]. The incidences of the parasite recorded on *Scardinius erythrophthalmus* by Soylu [14] is 3.1 and max parasite 7; the incidences on *Chondrostoma regium* and *Capoeta trutta* 2.1, 2 by Sağlam [15]. The previous records of the parasite mentioned were low in comparison with the results obtained here. Also, Galli et al. [13] reported *Lamproglena pulchella* infestations on *Leuciscus cephalus* to be 51% prevalence and 2.1 incidences in polluted waters (Naviglio Grande Canal) and 34% prevalence and 1.8 incidences in unpolluted waters (Ticino River).

Parasites were collected from the fourth gill in this study. Tsotetsi et al. [16] also determined *Lamproglena clariae* in the fourth gill of *Clarias gariepinus*. This is possibly due to the protection and reduced turbulence in this area of the gill chamber as indicated by Sproston et al. [17].

Although *Lamproglena* were collected from polluted water in the current study, several authors provide information about a higher abundance of *Lamproglena* from less polluted waters. Marx and Avenant-Oldewage [18] investigated the morphology and prevalence/ intensity rates of *Lamproglena clariae* (Fryer,1956) on *Clarias gariepinus* from two locations in South Africa. They determined that the less polluted site, Balule, has a higher prevalence (55% in July 1994) and intensity (5 in May 1994); and lowest and highest of parasites per infested fish (1-17) in comparison to the polluted site, Mamba. Tsotetsi et al. [16] determined *Lamproglena clariae* (Fryer, 1956) on *Clarias gariepinus* with 100 % prevalence, 6.6 intensity in Vaal Dam (unpolluted waters) and 80 % prevalence, 5.7 intensity in Vaal River Barrage (polluted waters). Also, Galli et al [13] reported a *L. pulchella* infestation on *Leuciscus cephalus* with a 51% prevalence and 2.1 intensity in polluted waters (Naviglio Grande Canal) and 34% prevalence and 1.8 incidences in unpolluted waters (Ticino River).

Cases of mortality (maximum 1000 dead fish in March) among the fish have been seen frequently, especially in 2005 in Balıklıgöl [2, 5]. Based on our own results, the observations and the records (environmental factors and number of dead fish) of the authorities of the Ministry of Environment, and the information from the available literature, the causes of the fish mortalities can be explained as follows: In March 2005, suddenly, sewerage leakages from Şanlıurfa County flowed into the water of Balıklıgöl. This caused the water parameters to become negative. The dissolved oxygen, the temperature, and the pH measured as 4 ppm, 20-25°C and 8, respectively, according to the daily records of the authorities of the Ministry of Environment. The level of waste products should be low and particular attention paid to the presence of excessive carbon dioxide, which will be toxic to the majority of fish, and a build up of ammonia, which may cause the pH to go above 7.5 [19]. Environmental conditions (poor water quality, temperature fluctuation, poor nutrition, crowding etc.), usually produced in intensive fish farming systems, represent a considerable stress, making fish more susceptible to a wide variety of pathogens [20]. Also, a high feeding rate with unspoilt feeds (unknown origin) might have aggravated decomposition of organic matter.

In addition to the poor environmental circumstances, the Şanlıurfa Municipality distributed the contaminated water of Balıklıgöl to homes of the adjacent streets for general usage. The level of water in Balıklıgöl dropped from 1.5-2 m to 0.75-1m because of public use. This status is supported by observations made by Marx and Avenant-Oldewage [18] that reduced water levels in winter concentrate parasites, which increases the probability of infection.

The adult female parasite grips the gill filament with the strong maxillae using the maxillipeds as attachment and feeding appendages, penetrates the gill tissue with these appendages and consumes blood. This induces hypertrophy of the connective tissue, with degeneration of the blood capillaries in the filaments [17]. This copepod frequently moves from one to another gill septum, leaving behind thickenings that prevent the circulation and blood supply, thus decreasing gill capacity, i.e. the exchange of oxygen with the surroundings. This leads to respiratory problems and reduced viability of the fish. The injuries of the gill septa present suitable spores for secondary bacterial and viral, as well as fungal, infestations [9]. Paperna [21] suggested that high infestations in *Lamproglena clariae, L. intercedens* and *L. monodi* may interfere seriously with respiration of their host fishes. A comprehensive pathology was not performed in the present study; however, diffused hemorrhages on the body surface, swelling of the visceral cavity, in general cases, the presence of fungal infection by *Saprolegnia* sp., dystrophic and deformed filaments in the gill arch were observed.

The occurrence of *Lamproglena pulchella* with the poor environmental factors in Balıklıgöl may be responsible for the cases of fish mortality and the occurrence of secondary infections which is reported in this work. It may be used as a biomonitor species to evaluate the pollution and the biological quality of the aquatic habitat, supporting Galli et al [13]'s finding.

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