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First record of *Ligophorus cephali* (Monogenea: Ancyrocephalidae) on *Liza aurata* from AL-Sinn marine fish farm (Syria)

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□ ABSTRACT □

This Study was performed to detect the occurrence of ectoparasites on *Liza aurata*. Morphology, site of infection (skin, mouth cavity, nostrils and gills) and prevalence of the parasites were investigated.

Fish samples (45 individuals) were collected from AL-Sinn fishfarm in Syria between 26 April and 20 December 2016.

Ligophorus cephali was isolated for the first time in Syria mari-cultured *Liza aurata*. This parasite species belongs to Monogenea: Ancyrocephalidae.

The highest rate of infestation with parasite was recorded during summer (26.7%), while in autumn was (10%). And No infections were recorded in winter and spring.

Key words: *Liza aurata*, *Ligophorus cephalic*, Monogenea, AL-Sinn marine fish farm, Syrian coast.

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أول تسجيل للطفيلي *Ligophorus cephali* (Monogenea:Ancyrocephalidae) عند أسماك البوري دهبان *Liza aurata* المرباة في مزرعة السن البحرية (سورية)

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□ ملخّص □

أجريت الدراسة بهدف التقصي عن الإصابة بالطفيليات الخارجية عند سمك البوري دهبان *Liza aurata*، وتحديد الصفات المورفولوجية للطفيليات ومكان الإصابة ونسبتها على الأسماك المدروسة.

جمعت العينات السمكية (45) فرداً من مزرعة السن البحرية (سورية) في الفترة الممتدة بين 26 نيسان و20 كانون الأول 2016. فحص الجلد والتجويف الفموي والفتحتين الأنفيتين والتجويف الغلصمي والغلاصم لجميع الأفراد المصطادة.

عزل في هذا البحث وللمرة الأولى في سورية الطفيلي *Ligophorus cephali* وهو من الديدان وحيدات الجيل (Monogenea: Ancyrocephalidae) من غلاصم سمك البوري دهبان. سجلت أعلى نسبة إصابة بالطفيلي في فصل الصيف وبلغت (26.7%) وشدة إصابة بلغت 1طفيلي/ سمكة، وفي الخريف بلغت نسبة الإصابة (10%) بينما لم تسجل أية إصابة في فصلي الشتاء والربيع.

الكلمات المفتاحية: أسماك البوري دهبان *Ligophorus cephali, Liza aurata*، وحيدات الجيل Monogenea ، المزرعة البحرية في السن، الساحل السوري.

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Introduction

The mugilids are among the most cosmopolitan teleost fishes and are widely distributed in fresh, brackish waters and coastal marine waters of the tropical and temperate regions of the world. They are known to be euryhaline fishes and are prevalent in coastal lagoons due to their high mobility and tolerance to environmental conditions such as temperature and salinity.

Large data about the systematics of the parasites of mugilids are available in scientific papers, but works dealing with quantitative data and ecology are scarce; some research has been carried out in the United States (Rawson, 1976), the Black Sea and the Mediterranean (D'Amelio and Gerasi, 1997). Dmitrieva *et al*. (2012) also provided updated information on *Ligophorus* species, which are all specific to mugilids. The currently known species of *Ligophorus* have been recorded from an area restricted to north Atlantic, the Mediterranean Basin, off the coasts of northwestern Pacific, and the Pacific coast of South America (Dmitrieva *et al*., 1996; Pan, 1999; Yang, 2001; Sarabeev and Balbuena, 2004; Sarabeev *et al*., 2005; Rubtsova *et al*., 2006, 2007; Dmitrieva *et al*., 2007). Species of *Ligophorus* (Ancyrocephalidae, Monogenoidea) parasitize marine fish and are highly specific for mullet species and includes 60 valid species of monogeneans infecting the gills of grey mullets (Mugilidae) (Dmitrieva *et al*. 2012; 2015, El Hafidi *et al*. 2013; Sarabeev *et al*. 2013; Soo *et al*. 2015).

In Syria, studies on the parasitic fauna of *Liza aurata* are very rare and still incomplete. There are only one study that aimed to identify some parasitic Metazoans that internally parasitize some species of Mugilidae in the coastal water of Lattakia city. This study included 408 fishes belonging to four species of Mugilidae (namely: *Liza aurata, Chelon labrosus, Liza ramada, Mugil cephalus*) collected from three environmentally different regions of the coastal water of Lattakia city. The results showed that Marine Research region was the most wealthy region with fish endoparasites, where 9 species of endoparasites were identified: 7 species belong to Trematoda , and 2 species to Acanthocephala (Kerhely, 2011).

The aim of the present research is to reveal the ectoparasite fauna of *Liza aurata* from AL-Sinn marine fish farme in Syria, Morphology, site of infection and prevalence of the parasites were investigated.

Materials and Methods:

Live specimens were collected from AL-Sinn marine fish farm, located in the coastal area of Syria, in the village of Arab Al Molk, about 7 km from Banias city. The farm has 24 ponds: 12 circular (15.9 m in diameter and 1.5 m height) and 12 rectangular (34 ×2×1,5 meters) (Figure 1).

Two species *Liza aurata* and *Siganus rivulatus*, have been introduced in 2015 to this farm; with an average of 50 fish (1-3 g each) per m^3, and with age ranged from six months to one year.

Monthly samples of *Liza aurata* (Risso, 1810), were collected between 26 April and 20 December 2016 using fishing nets.

Fish were transferred alive directly to the laboratories of Higher Institute for Marine Research at Tishreen University. Fish samples (45) were examined directly after killing it by beat on the head. Fish weight ranged between 6.3 and 253.5 gram and length between 6.5 and 30.3 cm, The age of examined fish ranged between 1-2 year.

Figure (1): A satellite image of Al-Sinn fishfarm appears the arrangement of ponds.

Skin surface, fins, mouth cavity, nostrils and gills of each specimen were examined by naked eyes for any attached parasites. Gills were carefully removed and placed in separate Petri dishes to remove any excess gill mucus, and examined for parasites under a microscope.

Monogenea worms were isolated from wet smears using fine needles, then placed in a drop of water on a glass slide, then fixed directly in 10% formaldehyde, then washed and stained using carmine stain (Lucky,1977; Pritchard and Kruse, 1982).

The preparations were then studied microscopically to determine the morphometric character of the taxonomically important parts of the body.

Taxonomic identification of monogenea is based upon the morphology of the posterior attachment organ (shape and dimensions of the chitinized parts of opisthohaptor), and the shape and dimensions of copulatory organ and the presence or absence of eyespots. (Bykhovskaya-Pavlovskaya *et al*., 1964; Euzet and Combes, 1969; Euzet and Suriano, 1977; Anderson, 1981a; Euzet and Sanfilippo, 1983).

The prevalence (%) was calculated as the percentage of the total number of fish infected out of the total number of fish examined. The mean intensity was calculated as the number of parasites in infected fish (Bush *et al*., 1997).

Results and discussion

The current study is the first to report on the ectoparasites fauna of *Liza aurata* captured from the AL-Sinn marine fish farm in Syria. One parasite species on the gill was identified: The parasitic Monogeneans *Ligophorus cephali* belonging to the genus *Ligophorus* Euzet & Suriano, 1977, (Figur1). According to Mariniello *et al*. (2004), the discrimination of

Ligophorus can be achieved on the basis of differences in the shape and size of sclerotized parts of the haptor, copulatory organ, and vagina.

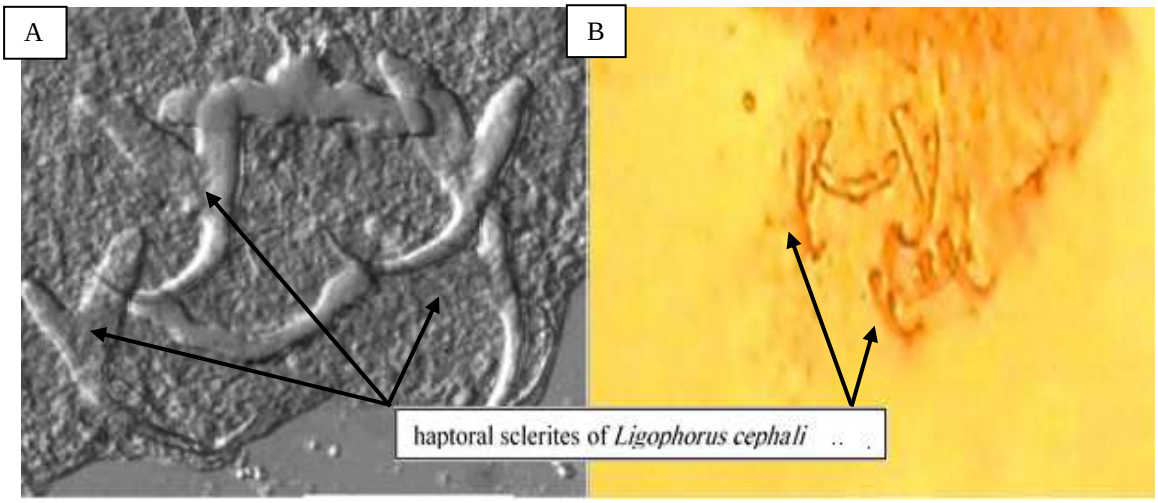

Figure 1: A-*Ligophorus cephali* – haptoral sclerites according to (El Hafidi *et al.,* 2013), B- haptoral sclerites from the present study

Ligophorus is a genus of the family Ancyrocephalidae, parasites on the gill of Mugilidae (Teleostei). Ancyrocephalidae has an Hapteur armed with 14 hooks and 2 pairs of large hooks (hamuli) joined by 2 transverse bars (1 dorsal and 1 ventral). 3 pairs of cephalic glandular clusters and 4 prepharyngeal eyespots are present and Simple digestive branches are united posteriorly in a ring. Medial testicle, left vas deferens, seminal vesicle and a prostatic reservoir are present with a long and thin tubular cirre with an accessory piece. The Median ovary is pretesticular. Sclerified vagina is on the ventral right submedian. Seminal spherical receptacle is in front of the ovary. Parasites of Mugilidae (Euzet and Suriano, 1977).

In *Ligophorus*, the pairs of ventral and dorsal anchors are connected, respectively, by ventral and dorsal transverse bars (Rodríguez-González *et al*., 2015).

In *L. cephali*, as in other species of the genus, these bars are dissimilar in shape and size (Siquier and Ostrowski de Núñez, 2009; Sarabeev *et al*., 2013) and the ventral bar appears to be more rigid than the dorsal one (Dmitrieva *et al*., 2012).

In this rasearch, out of 45 fish samples examined, only 6 were infected with *Ligophorus cephali*. The highest rate of infestation with parasite was recorded during summer (26.7%) and the intensity was 1 parasite /fish, and during Autumn was (10%), while no infections were recorded in winter and spring. (Figure 2).

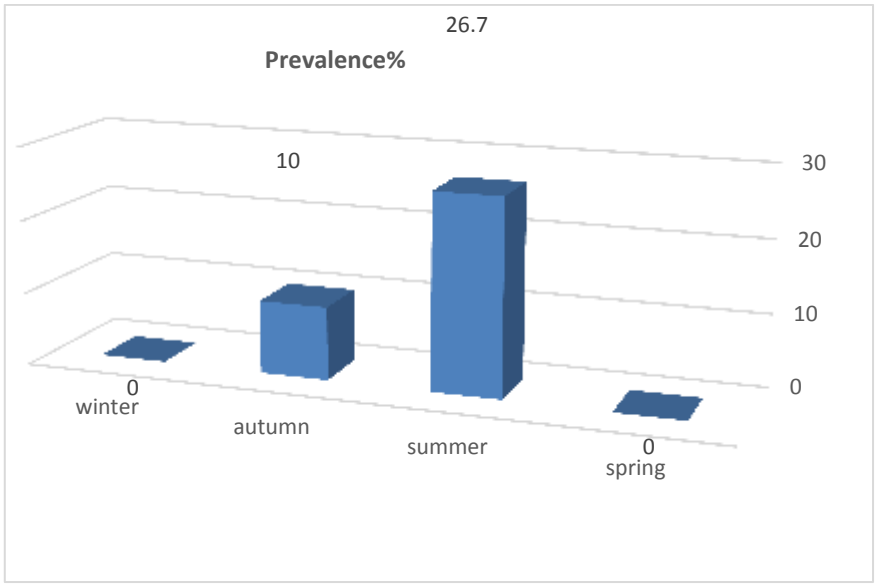

Figure 2. A Diagram of seasonal changes of infection with *Ligophorus cephali* on *Liza aurata* in AL-Sinn fishfarm

Among monogenea, *Ligophorus* spp. (*L. cephali and L. mediterraneus*) reported to have the highest prevalence, especially in *Liza* species (Merella and Garippa 2001). Because all mugilids studied to date have been infected with more than 1 species of *Ligophorus*, it is natural to assume that this genus is far more diverse than currently described. Strict host-specificity is a common phenomenon among monogeneans and the species of some *Ligophorus* are strictly specific to mugilids; including *L. cephali* and *L. mediterraneus* on *M. cephalus*; *L. szidati* and *L. vanbenedenii* on *Liza aurata* (Mariniello *et al*., 2004; Sarabeev *et al*., 2005; Rubtsova *et al*., 2006; Dmitrieva *et al*., 2009).

Studies on monogenean parasites of *Liza aurata* are very limited, and only 7 parasite species reported from Mediterranean, Azov and Black Seas so far (Gaevskaya & Dmitrieva 1997; Dmitrieva & Gaevskaya 2001; Mariniello *et al*., 2004; Sarabeev & Balbuena 2004; Merella & Garippa 2001; Ragias *et al*., 2005; Dmitrieva *et al*., 2012). *Ligophorus cephali* was identified as a new species by Rubtsova *et al*. (2006) with some data regarding to its infection values.

In North Aegean Sea, *Liza aurata* is parasitised by *Ligophorus* spp. (43.4%) (Ragias *et al.* 2005). Öztürk (2013) reported *Ligophorus cephali*, *Ligophorus mediterraneus* as a new records for Turkish parasite fauna, and the juvenile *Liza aurata* is a new host record for *Ligophorus cephali* and *L. mediterraneus* (18.7%) from Sarıkum Lagoon Lake which connected to the Black Sea at Sinop, Turkey. Öztürk and Özer (2014) reported high prevalence values of 97.8 % for *L. cephali* and *L. mediterraneus* on *L. aurata* captured in Lower Kızılırmak Delta located by the coasts of the Black Sea in the northern part of Turkey. Özer and Kirca (2013) have identified *Ligophorus cephali* and *L. mediterraneus* (97.83%) in the gills of *L. aurata* from Lower Kızılırmak Delta in Samsun, Turkey for the first time making the sum of 9 monogenean species reported from this fish species where survive. *Ligophorus* spp. were 98% on *L. aurata* in the study of Merella and Garippa (2001).

However, it has been recorded in the present study that the prevalence (26.7%) values of *L. cephali* on *Liza aurata* is lower than values recorded from its typically parasites, this difference could be related to the different fish size and possible reflecting the effects of differing geographical area and/or host factors. Fuentes and Nasir (1990) noted that the infection rate incerased with the size of the host (*Mugil curema*).

Conclusions:

- This paper is the first to confirm the existence of *Ligophorus cephali* as ectoparasite on *Liza aurata* in Syria.
- -In the present study, we report a new record for Syrian parasite fauna, and *Liza aurata* is a new host record for *Ligophorus cephali*.
- The highest rate of infestation with parasite was recorded during summer (26.7%) and the intensity was 1 parasite/ fish, the prevalence was (10%) in Autumn, while no infections were recorded in winter and spring.

Recommendations:

- Classification of internal parasites of the fish species studied.
- Classification of fish parasites in the Syrian marine waters with a view to developing the taxonomic database.
- Study the effect of parasites on the productivity of fish in the Syrian marine waters to form a scientific and knowledge base that helps us developing mari-culture on the Syrian coast.

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