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Author Affiliation:
[1]Department of Zoology, Faculty of Science, Tishreen University, Lattakia, Syria
[2]Higher Institute for Marine Research, Tishreen University, Lattakia, Syria

Contact List
Rassin K Kanaan rassin kanaan@tishreen.edu.sy
Mohamad Y Galiya galiyamo@scs-net.org
Taghrid M Layka taghrid.masoud.layka@tishreen.edu.sy

ORCID List
Rassin K Kanaan 0009-0007-1940-0994
Mohamad Y Galiya 0000-0002-5057-7663
Taghrid M Layka 0000-0002-3393-7399

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First record of the parasite *Clavellisa scombri* (Copepoda: Lernaeopodidae) on the Gills of the *Scomber japonicus* fishes in Marine water of Syria

Rassin K Kanaan[1], **Mohamad Y Galiya**[1], **Taghrid M Layka**[2]

ABSTRACT

The current research aims is to identify the external parasites that infect *Scomber japonicus* fish in the marine waters of the coast of Latakia Governorate. During the period from 1/1/2024 to 10/1/2024, were collected 100 individuals of fish, and were examined an external part such as the Skin, Gills, Operculum, Oral Cavity, and Nostrils. Research results showed that the gills infected with the parasite *Clavellisa scombri* from the Lerneapodidae family of Copepoda Crustaceans. With an infection rate of 7% and an infection intensity of 1. This is the first record of the infection of *Scomber japonicus* with the parasite *Clavellisa scombri* in Syrian marine waters.

Keywords: External Parasites, Copepoda, *Scomber japonicus*, *Clavellisa scombri*, Syrian marine waters

1. INTRODUCTION

Marine fish are of great economic importance due to their uses in fishing for nutrition, medicines, cosmetics and animal feed production. Fish has taken the most significant role in marine fishing operations. The World Fisheries and Aquaculture Report issued by the FAO, (2024) indicated that global production of fisheries Fish and aquaculture rose during 2022 to 223.2 million tons of Scombreidae fish are among the most traded fish in all parts of the world, due to the wide spread of their species in all marine environments and the quality of their meat. This prompted many researchers to study the characteristics and health status of fish of this family. Like other fish, they are exposed to diseases resulting from Parasitic, fungal, and bacterial infections, causing a deterioration in their health condition, and thus decrease in their productivity and difficulty in marketing them Aladatohun et al., (2013), in addition to its effect on the reproductive process of fish, it reduces the fertility of the host (Rohde, 2005).

Some species of parasitic crustaceans live mainly on fish Benkirane et al., (1999) and are either parasitic on the outer surface or on protected parts that is closely linked to the external environment, such as the gills and the mouth (Rosim et al., 2013). The gills are the most preferred place for many it is of parasitic species that feeds on the delicate tissues of the gills and the blood inside the gills, which affects the respiratory process (Lester and Haeoard, 2006). Many international studies have been conducted that reported the infection of *S. japonicus* fish with parasitic Crustaceans, including a study by researcher Hendricks, (2019), which showed that *S. japonicus* fish infected with one species of copepod that belongs to the order Lerneapodidae, which is *Clavillesa scombri*, and another study in Spain and Italy by researcher Paladini et al., (2009) showed infection *Scomber* fish with *Caligus* crustacean parasite.

Locally, it has been recorded that some species of marine fish are infected with parasitic crustaceans, as the study of Hassan et al., (2018) showed that the gills of the Striped sea bream fish *Lithognathus mormyrus* was infected with two parasites belonging to the Class of Crustaceans *Hatschekia sp* all the gills an infected with an infection rate of (14.28%) and an infection intensity of (2,2). The parasite *Gnathia sp* was isolated from the external gill arch with an infection rate of (8.57%) and infection intensity (1.67). The study of revealed that the fish species *Trachurus trachurus* was infected with the parasite *Gnathia sp* from only one individual during the winter. However, we didn't find any stydy on parasites that infect *S.japonicus* in the Syrian marine environment, which prompted us to conduct the current research.

2. MATERIALS AND METHODS

Samples were collected from 100 individuals of *S.japonicus* fish from the marine waters of the coast of Latakia Governorate (Figure 1) during the period extending from 1/1/2024 – 10/1/2024, and were transferred directly to the postgraduate laboratory in the Department of Zoology – Tishreen University, to study their infection parasites and identifying them while they are alive because most ectoparasites die or leave the host after it dies according to (Duijn, 1973).

Figure 1 Schematic map of fish sample collection locations (Source: Google Earth)

Laboratory examination

Length and weight measurements of fish were performed. The external parts (Skin, Gills, Operculum, Oral Cavity, and Nostrils) were examined first with the naked eye and magnifying glass in search of large-sized parasites, and then swabs were taken from the mucous material of the skin and placed on glass slides and examined under an Optical Microscope with magnification (40×), as for the gills, the gills were removed and placed in Petri Dishes, and a little seawater was added to it to prevent it from drying out. The gills scanned onto glass sheets, an examined under an Optical Microscope with magnification (40×). we took some pictures of the parasites at the site of their parasitism with a digital camera, then isolated them with a fine needle and preserved them in 70% Ethyl alcohol. The samples were then stained using Carmen stain for Classification.

Classification of parasites

The isolated parasites were classified using approved taxonomic keys according to (Williams and Bunkley-Williams, 2019).

Determine the rate and Intensity of infection

The Prevalence rate and Intensity of infection determined based on the two relationships used by (Bush et al., 1997; Margolis et al., 1982):

Prevalence rate (Extensity) = number of infected fish * 100 / number of fish examined

Intensity = number of parasites isolated / number of infected fish

3. RESULTS AND DISCUSSION

The research results during the macroscopic examination showed that the gills of *S. japonicus* fish infected with the parasite *Clavellisa scombri*, which belongs to the Lerniapodidae family. As soon as the gill cover lifted, could see the parasite attached to the first on the Gill raches (Figure 2). 7 individuals of the parasite mentioned above found, the infection rate was (7%) and the severity was (1), as shown in (Table 1). All isolated parasites were located on the external gill arch.

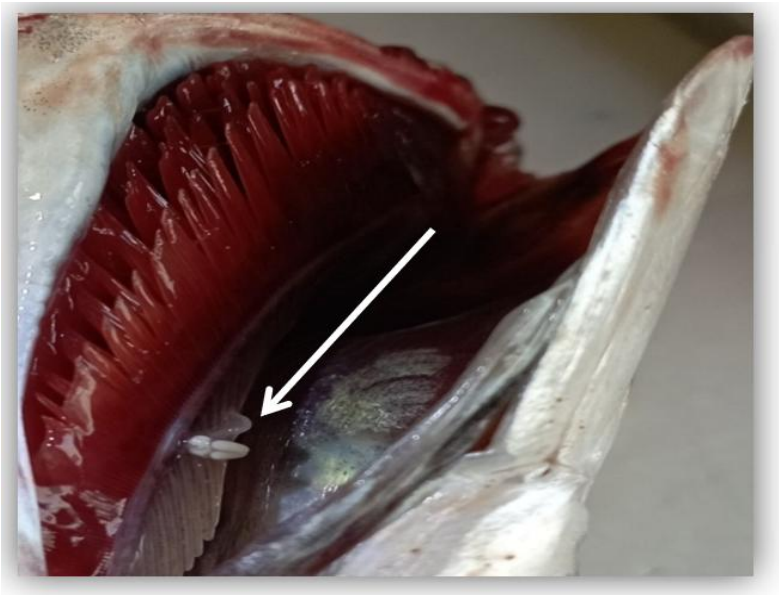

Figure 2 Shows the location of the C.scombri parasite on the external gill of a S.japonicus fish(Total length:26,5 cm - Weight:173,3 g) caught on 1/5/2024.

Classification of the parasite *Clavellisa scombri*:

Class: Copepoda

Order: Siphonostomatoida

Family: Lernaepodidae

Genus: *Clavellisa*

Species: *C. scombri*

General description of the parasite *C.scombri*:

Female: The body is symmetrical on both sides. Its length ranges between (5.4-8.5 mm). The Cephalothorax of females is cylindrical and elongated, composed of a small Head with a stiff dorsal shield and a long, cylindrical Neck. The combined length of the neck and head is twice as along Trunk, trunk short and broad, somewhat circular in shape, with noticeable bubble in the back end is as shown in (Figure 3). The short upper and lower jaws are joined along their length or only at the distal end and articulate with the anterior end of the trunk, anterior to the base of the head (Williams and Bunkley-Williams, 2019).

Male: The body of the male is oval with a conical proboscis on the front, its length ranges between (0.3-0.4 mm), the division is not clear, the oral opening is on the ventral side, the jaws are long and equipped with a strong claw on the outer end. The male is found

attached to the female's body, either between the two egg sacs or on the neck, but no male individual was found when examining the fish in the current research (Williams and Bunkley-Williams, 2019).

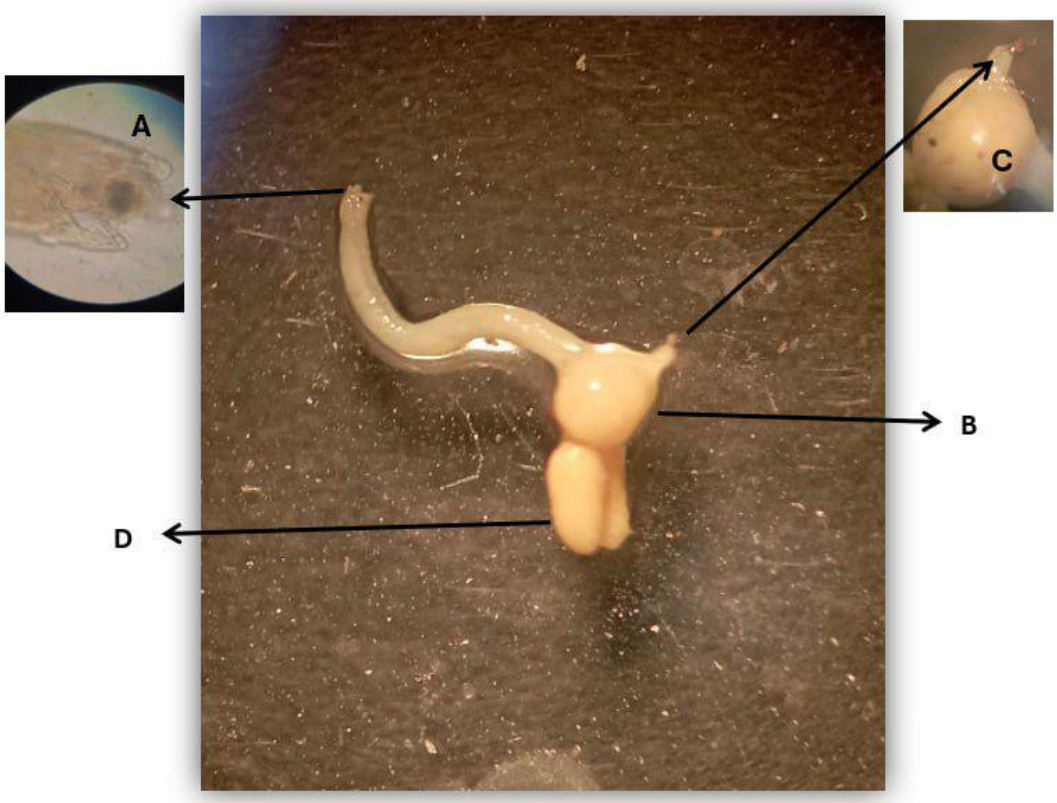

Figure 3 The general appearance of the female *C.scombri* parasite and body parts, A- Cephalothorax, B- Trunk, C- Bulla, D-Eegg sacs

There is no reproductive process; it moves by swimming with a gliding force, and the *C. scombri* species is considered a specialized parasite of the Scomber genus. Still, the infection rate is usually low, and thus the damage is low (Williams and Bunkley-Williams, 2019). Our study agreed with a study Oliva et al., (2008) on two regions in South America and two regions in the Madeira Islands.

In Madeira the infection rate was (7.9%) and the intensity was (1.5), and in Rio da Janeiro the infection rate was (2%) and the intensity was (1), in Callao the infection rate was (20%) and the intensity was (1.7), while in Antofagasta the infection rate was (6.5%) and the intensity was (1.8). The results of this study also agreed survey a study conducted by Mele et al., (2014) on 30 individuals of S. colias fish the infection rate reached (7%). The results of the current research also agreed with the study of Youssef et al., (2016) on S.scomber fish the number of infected fish was 4 out of 45, with an infection rate of (6.6%) and infection intensity of (1.5).

Table 1 Monthly changes in the appearance of the parasite C.scombri on S.japonicus fish during the research period

Month	Total number of fish	Number of infected fish	Length of infected fish	Weight of infected fish	Number of parasites isolated	Infection rate %	Mean intensity
January	10	2	25,5-27	162,5-186,5	2	20	1
February	12	2	24,5-25	151,5-155	2	16,5	1
March	13	2	26,5-27,5	179,9-180	2	15,3	1
April	7	-	-	-	-	-	-
May	8	1	26,5	173,3	1	12,5	1

June	21	-	-	-	-	-	-
Jule	12	-	-	-	-	-	-
August	11	-	-	-	-	-	-
September	6	-	-	-	-	-	-
	100	7	-	-	7	7	1

4. CONCLUSIONS AND RECOMMENDATIONS

In this research, the parasite C.scombri was recorded for the first time on S.japonicus fish caught in Syrian marine waters. The research falls within the directions of scientific bodies to pursue studies which concerned with the characteristics of the marine environment. We recommend completing parasitic studies on economic marine fish species in Syria to form a complete database on the parasites that infect them

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Author Contributions

All authors contributed to the study conception and design. Material preparation, data collection and analysis were performed by Rassin Kassir kannan, Mohamad Younis Galiya and Taghrid Masoud Layka Which the first draft of the manuscript was written by Rassin kassir kanaan and all authors commented on previous versions of the manuscript. All authors read and approved the final manuscript.

Ethical approval

In this article, as per the animal regulations followed in Department of Zoology – Tishreen University, Syria, the authors were observed and recorded first time, the parasite *Clavellisa scombri* (Copepoda: Lernaeopodidae) on the Gills of the *Scomber japonicus* fishes in Marine water of Syria. The Animal ethical guidelines are followed in the study for species observation, identification & experimentation.

Informed consent

Not applicable.

Conflicts of interests:

The authors declare that there are no conflicts of interests.

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Data and materials availability

All data associated with this study are present in the paper.

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