First record of *Lernaeolophus sultanus* (Milne-Edwards, 1840) in *Trachurus trachurus* (L, 1758) from the western Libyan coast

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Abstract

The main purpose of this study, was to identify and describe the presence of the parasite *Lernaeolophus sultanus* (Milne-Edwards, 1840) in Atlantic horse mackerel fish, *Trachurus trachurus* (L, 1758) in the western coast of Libya. A total of 108 individuals of *T. trachurus* fishes were collected during June of 2022. A copepod parasite was isolated from the host, and preserved in 70% alcohol after which examined by a compound microscope. An adult female of the parasite *L. sultanus* was removed from the buccal cavity of the host. The results of this study was the first time record of *L. sultanus* in *T. trachurus* captured from the western coast of Libya.

K*eywords: Lernaeolophus sultanus, Trachurus trachurus*

المستخلص:

الهدف من هذه الدراسة هو التعريف بوجود الطفيلي *Lernaeolophus sultanus* في أسماك الصاورو الأسود *Trachurus trachurus* بالساحل الغربي لليبيا. تم تجميع 108 فردًا من أسماك *T. trachurus* خلال يونيو 2022. تم عزل الطفيلي من العائل وحفظه في 70٪ كحول، إثر ذلك تم فحصه بواسطة المجهر المركب. تبين وجود أنثى بالغة من الطفيلي *L. sultanus* موجودة بالتجويف الفمي للعائل. هذا البحث يعتبر أول تسجيل للطفيلي *L. sultanus* في أسماك الصاورو الأسود *T. trachurus* بساحل ليبيا الغربي.

الكلمات المفتاحية: *Lernaeolophus sultanus*، *Trachurus trachurus*

Introduction:

The Pennellidae Burmeister, 1835 (Copepoda: Siphonostomatoida) members are parasitic on marine fish and Mammalia, unusual that they utilize intermediate hosts in their life; The nauplii are free-swimming, searching for a fish or an invertebrate to develop and mate; Adult males are also free swimming but adult females are parasites and search out the definitive host after

metamorphosis and they enter the body surface of the host (Blaylock et al, 2005; Nashad et al, 2020).

Pennellidae was found in the Atlantic Ocean, Indian Ocean, Pacific Ocean, Mediterranean, and Black sea (Suárez-Morales and Ho, 1994; Nashad et al, 2020). It includes about 138 species and 24 genera (Walter & Boxshall, 2020).

The genus Lernaeolophus (Heller, 1865) is one of these genera, it contains three species *Lernaeolophus sultanu*, *Lernaeolophus striatus*, and *Lernaeolophus aceratus*.

L. sultanus was the most reported species in the Mediterranean, Australia, Atlantic Ocean, Indian Ocean and Pacific Ocean (Suárez-Morales and Ho, 1994; Varvarigos, 2007; Cavalcanti et al, 2013; Nashad et al, 2020), it was first described by Milne Edwards (1840). this species shows low specificity from marine fish and was reported in 13 families of Teleosts fish (Raibaut et al, 1998; Walter & Boxshall, 2020; Nashad et al, 2020) .

The Atlantic horse mackerel, *Trachurus trachurus* (Perciformes: Carangidae). is widely distributed in the Atlantic Ocean, the Mediterranean Sea, and the Black Sea. (Carbonara et al, 2012) it is a migratory, semi-pelagic fish, living in schools, and feeding on small fish and crustaceans (Mackenzie et al, 2004; Nasri et al, 2021).

This study provides identify and describes the morphological characteristics of one parasitic species belonging to Pennellidae that was reported from the west coast of Libya (Southern of the Mediterranean) infecting *T. trachurus*, This species is *Lernaeolophus sultanus.*

Materials and methods:

This study was conducted on the west coast of Libya. A total of 108 individuals of *Trachurus trachurus* (L, 1758) were collected randomly during June of 2022 from the fishing port of Tripoli city, the fish were transferred immediately in an ice box to the fish laboratory of the Zoology department, Faculty of Science, Tripoli University, and they were immediately examined. The body surface, fins, buccal cavity, eyes, and gills were examined for the presence of ectoparasites, Copepod parasites were isolated from the buccal cavity of fishes, and preserved in 70% alcohol. The parasite identifications and morphometric measurements of the copepods were performed according to the Australian Museum Scientific publication, 2010.

Results:

Systematic account:
Order : Siphonostomatoida Burmeister, 1835
Family : Pennellidae Burmeister, 1835
Genus : Lernaeolophus Heller, 1865
Lernaeolophus sultanus (Milne Edwards, 1840).

Materials examined:

One female *L. sultanus* specimen was removed from the buccal cavity of *Trachurus trachurus* fish (total length 18.8cm and total weight 46g). This parasite has a cephalic holdfast, deeply embedded in the maxillae of the host tissues (Figure 1).

Fig (1) *Lernaeolophus sultanus* in *Trachurus trachurus*

Description of the parasitic female:

An adult female *L. sultanus* specimen with a total length of 18.5 mm was reported, its body was macroscopic and divided into a head, neck, trunk, and abdomen (Figure. 2).

Fig (2) Morphology of adult female of *Lernaeolophus sultanus*

The head is broad, about 2mm long, bearing three branched process antlers; two lateral antlers, and one dorsal antler, that help hold the muscular tissues of the *Trachurus trachurus*. One of the lateral antlers was damaged when the parasite was isolated from the host. The neck

is cylindrical and severely sclerotized, Oral side is usually round. After the neck comes to the tubular trunk that is flexed and protruding outside. The abdomen is shorter than the trunk, it has many-branched appendages and spiral egg sacs that carry the stacked Ova (Figure. 3).

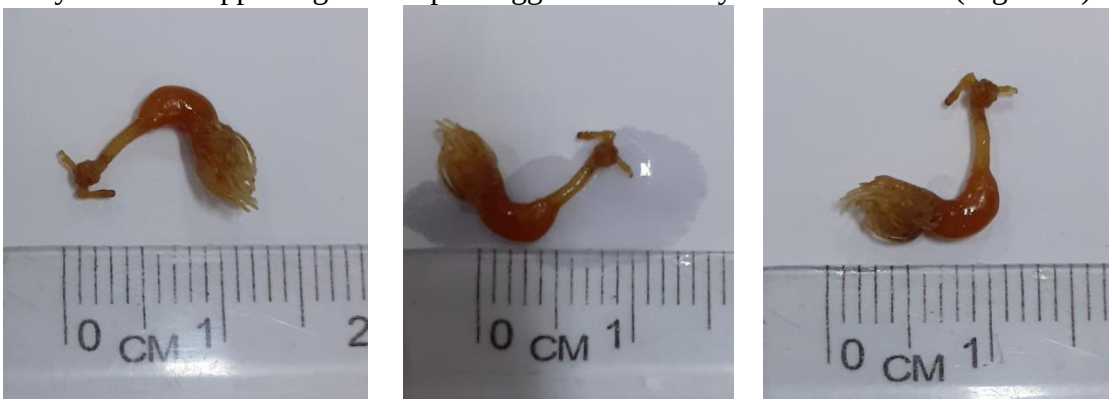

Fig (3) Morphometric measurments of *Lernaeolophus sultanus*

Effect of This Parasite:

The fish infected with this parasite had less weight than the uninfected fish at the same length, which may indicate the effect of this parasite on the health and growth of the host; Where the weight of the infected fish was 46 g, while the weights range of the uninfected fish were 51-62 g.

Remarks:

Lernaeolophus sultanus was recorded in the Mediterranean, However, the present study, indicated its presence for the first time in the western coast of Libya.

Discussion and Conclusion*:*

The parasites represent an important source of information about biodiversity and ecosystem conditions (Sures et al, 2017; Luque et al, 2017; Ferreira et al, 2020).

Copepod parasites belonging to Phillidae were reported from different sites of the world. The most recent studies are from Turkey (Öktener and Trilles, 2004), Brazil (Cavalcanti et al, 2013; Ferreira et al, 2020), and Greece (Varvarigos, 2007) but, no previous study was reported concerning this copepod parasite species from the western Libyan coasts before.

Lernaeolophus (Heller,1865) has been reported from about 30 species of marine teleosts fish belonging to 13 families (Walter & Boxshall, 2015), its presence on many sites of the host fish, such as tongue, the bony vault of the mouth, the buccal cavity, operculum, and eye sockets.

several previous studies have shown *L. sultanus* Was infects several species of fish, including *Diplodus vulgais* (Öktener and Trilles, 2004), *Lutjanus synagris* (Ferreira et al,2020), on farmed sea bass, *Dicentrarchus labrax*, and sharp snout sea bream, *Diplodus puntazzo* (Varvarigos, 2007), *Boops boops* and *Pagellus acarne* (Ramdane et al, 2009); and *Sphyraena barracuda* (Nashad et al, 2020).

Parasites appear related to the host biology, such as diet and migration, This is the reason for the wide variation in the presence of parasites internally or externally in the host (Luque, 2004; Luque et al, 2004; 2017; Cardoso et al, 2018)

Parasitism affects the host when healthy signs of infection are present or absent (Hudson et al, 2002). The pathological parasitic effects are often associated with weight loss, hematological alteration, and death of host fish (Pavanelli et al, 2008; Ferreira et al, 2020).

L sultanus in the present study found in the buccal cavity of *T. trachurus,* was reported by Ramdane et al, 2009 in the bony mouth vault of *Boops boops* and Pagellus acarne, was damaged by the embedded holdfast of the parasite; The damage is reduced growth rate has been reported in *Diplodus puntazzo* from Greek coastal marine fish farms (Varvarigos, 2007), this was pointed to the possibility of transfer from wild to farmed fish. As reported by Ferreira et al, 2020 in Brazil was found L sultanus in the maxillae and caused massive loss of bone structure of the maxillae.

There are many scientific papers on other parasites that infect T. trachurus focused on *Anisakis simplex* (Tantanasi. and Tamvakis, 2012; Azbaid et al, 2012; 2016; Shawket et al, 2017) on the contrary, The lowest previous reports were studying this specie of fish, *T. trachurus* with copepod parasites.

The results of this study contribute to knowledge and describe one of the parasitic copepod species that infect *T. trachurus* from the west Libya coast.

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