Biological and Applied Environmental Research

Vol. 3 (1): 37-41, 2019

ISSN: 2002-6153
Biol. Appl. Environ. Res.
www.baerj.com
editor@baerj.com

The First Record of the Copepod *Caligus cordyla* Pillai, 1963 (Copepoda: Siphonostomatoida), Parasitic on Carangid Fish *Megalaspis cordyla* (Linnaeus, 1785) in Northwest of the Arab Gulf, Iraq

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Abstract: The copepod *Caligus cordyla* Pillai, 1963 was found attached on the gill filaments of one species of carangid fishes, *Megalaspis cordyla* (Linnaeus, 1758) which was collected from northwest of the Arab Gulf during the period from October 2013 till July 2014. This represents the first record of *C. cordyla* in the Iraqi territorial waters of the Arab Gulf. With this record, five specific *Caligus* species are so far known from fishes of Iraq, in addition to one unidentified *Caligus* species. *M. cordyla* is now considered as a new host for this parasite in the Arab Gulf. With this record, *M. cordyla* is considered as a host for three copepod species in Iraq as well as a host for four cestode species and one nematode species.

Keywords: *Caligus cordyla*, *Megalaspis cordyla*, Arab Gulf, Iraq.

Introduction

Over 72.2 % of the earth surface is covered by water, and fishes are ubiquitous inhabitants of this ecosystem. There are 33,700 recognized fish species in the World (Froese & Pauly, 2018). The fishes are the most successful vertebrate group and play extremely important ecological role (Noga, 2010).

Diseases and parasites affecting fish hosts can cause high mortalities in both cultured and wild species fishes. Such losses are considered as one of the major barrier against threat to the expanding of fish industry (Overstreet, 1990). Parasitic crustaceans are common on fish hosts in coastal marine and brackish waters. There are three major groups of Crustacea which include fish parasites. These crustacean groups include Isopoda, Branchiura and Copepoda (Pillai, 1967).

Among the 332 marine fish species of Iraq, 56.8% of these species belong to the order Perciformes which includes 38 families of which the family Carrangidae is represented with 33 species (Ali et al., 2018). Despite this number of carangid species, the parasitic fauna of only six species were investigated (see Mhaisen et al., 2018). Al-Ataby (2012), Al-Ataby et al. (2012) and Al-Niaeem et al. (2013) were the only articles concerned with the copepodal fauna of only two (out of 33) carangid species in Iraq.

The present study was designed to investigate the parasitic copepods from the torpedo scad *Megalaspis cordyla* in the northwest part of the Arab Gulf within the Iraqi territorial marine waters.

Received Oct. 24, 2018, accepted Jan. 20, 2019

Materials and Methods

A total of 214 fish specimens of the carangid fish *M. cordyla* were examined for ectoparasites during the period from September 2010 to February 2011. They were captured by trawl net from the Iraqi marine waters, northwest Arab Gulf (latitudes 47° 30' to 48° 15', longitude 30° 50' to 30° 00'). The fishes were transported to the laboratory, and copepod parasites were removed from the gill filaments and kept in 70% ethanol.

Before dissection, the copepods were cleared in lactic acid by using the wooden slide method (Humes & Gooding, 1964). Measurements were made by using an ocular micrometer. Drawings were down by using a camera Lucida. Copepods were identified on the basis of their morphological features according to Pillai (1963, 1967) and Kabata (1979a, b). Two copepod specimens were sent to Prof. Dr. Geoffrey A. Boxshall, Department of Zoology, British Museum (Natural History), London on 8th August 2012 for confirmation of the identification.

Results

***Caligus cordyla* Pillai, 1963 (Figs. 1 & 2)**

Number of copepods: Four females.
Number of measured specimens: Two females.
Number of infected fishes: 20.
Host: *Megalaspis cordyla* (Linnaeus, 1758) Family Carangidae.
Site of infection: Gills.
Locality: Northwest Arab Gulf within the Iraqi territorial waters.
Material deposition: Voucher specimens were deposited in the British Museum (Natural History), London under the accessions BMNH 2012-227-228.

Female: Body length 5.9 mm long with a carapace elegantly rounded, nearly equal in length and width, postero-median lobe hardly projecting beyond the lateral lobes which are curved to close the posterior sinuses. Genital segment enlarged with narrowed anterior area (10 × 8 mm).

Abdomen broad, broadly fused to genital complex. Antenna, 3-segmented, proximal segment small, second segment unarmed, distal segment with a long curved claw. Maxilliped, 3-segmented, proximal segment armed, middle segment unarmed, distal segment with basal seta.

Leg 1, long, vestigial endopod tipped with two setules, first segment of exopod with row of setules on posterior edge and small hyaline membrane. Leg 2, small with large plumose inner seta on posterior edge, both outer and medial edges of base with large marginal membrane. The present investigation indicates the first occurrence of *C. cordyla* in Iraq and the Arab Gulf.

Discussion

About 2,000 species of parasitic arthropods have been described and the majority of which belong to the family Caligidae of the subclass Copepoda of the class Hexanauplia. The family Caligidae has come under intense scrutiny with the development of culturing fishes in sea cages, due to the most notorious pests affecting wild and cultured marine fish species (Lester & Hayward, 2006).

Among studies concerning caligid copepods in Iraq, Mhaisen et al. (2018) enlisted 13 species of the family Caligidae. These incuded three species of the genus *Annuretes* (Adday, 2013; Al-Hasson et al., 2014; Al-Hasson, 2015; Khamees & Adday, 2017), five identified *Caligus* species in addition to one unidentified *Caligus* species (Al-Daraji, 1995; Jori & Mohamad, 2008; Al-Ataby, 2012; Adday, 2013; Khamees & Adday, 2013; Venmathi Maran et al., 2014; Al-Hasson, 2015), three species of the genus *Hermilius* (Adday, 2013; Venmathi

Maran et al., 2014) and one species of the genus *Mappates* (Al-Hasson, 2015; Al-Niaeem et al., 2017).

According to a recent account on marine fish parasites of Iraq (Mhaisen et al., 2018), the carangid fish *M. cordyla* is so far infected with four cestode species (*Callitetrarhynchus gracilis*, *Callitetrarhynchus* sp., *Progrillotia* sp. and *Pseudogrillotia spratti*), one nematode species (*Philometra megalaspidis*) and three crustacean species (*Caligus cordyla*, *Lernanthropus corniger* and *L. indicus*).

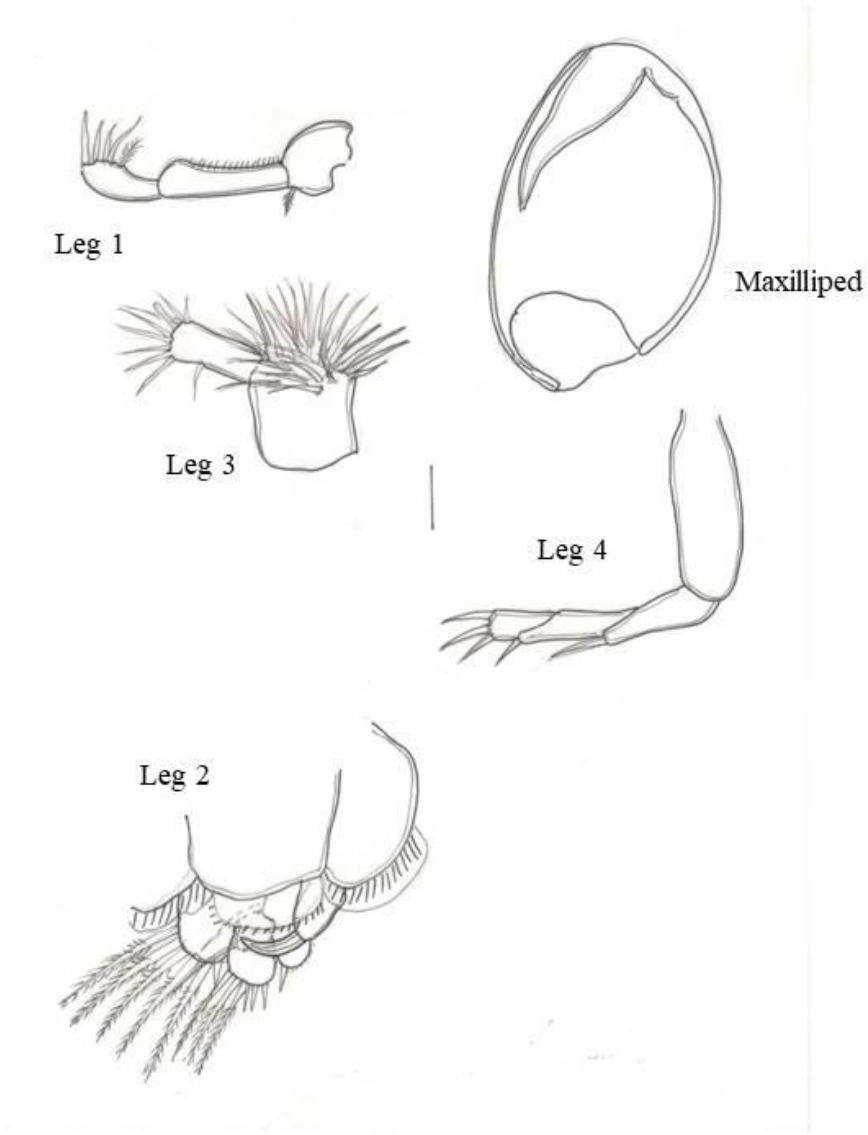

Figure 1: *Caligus cordyla*, maxilliped and leges, scale bar= 0.05 mm.

Figure 2: *Caligus cordyla*, adult female, scale bar= 0.2 mm.

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