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Original Article

Caligus lagocephali, Pillai, 1961 (Copepoda: Caligida: Siphonostomatida) from *Morone labrax* (as a new host) in Suez Canal area

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Abstract:
In this study 200 marine fish samples, *Morone labrax* were collected from Suez Canal area and investigated for presence of Caligid parasites, in the period from January 2014 to December 2014. The study revealed that 80 out of 200 (40%) were infested with a different *Caligus* species (*C. minimus,C.longipedis* and *C. lagocephali*). In respect to its incidence, it showed that *Caligus* species present all over the year, spring represent season of high prevalence while winter is the season of low prevalence. *Morone labrax* represent new host record for *Caligus lagocephali* with a percent of 1% infestion from total examined fish (2 out of 200), *C.lagocephali* females only were obtained .It characterized by its creamy color, wide angle between frontal plates, well developed processes located proximally on the inner margin of the female maxilliped, sternal furca with tapering tines and the genital complex nearly 1.50 time longer than abdomen and has no distinct postero-lateral lobes. Genital complex and abdomen combined about two times longer than cephalothorax. Outer margin of the second endopodal segment of second leg densely ornamented with fine spinules.

Key words: *Morone labrax*, *C. lagocephali*, Suez Canal area, Egypt

Introduction

Caligid copepods, in a general known as sea lice, it's a members of family Caligidae Burmeister, 1835. The Caligidae currently comprises 28 genera and more than 400 species **(Boxshall and Hulsey, 2004)**. Genus *Caligus* is the most species within the family Caligidae, established by **Muller (1785)**. According to their mouth parts, the Caligids have tubular mouth, their mandibles are flat, long blades with the distal end carrying a row of teeth on one margin **(Kabata, 1974)**. The *Caligus* species known as *Productus*-group created by **Boxshall & Gurney (1980)**. In 2003, **Ho and Lin** listed 16 valid species of this group then **Boxshall and El-Rashidy (2009)** were given additional characters help in identification of this group. *Caligus lagocephali* considered one of this group, recorded from *Takifugu rubripes* **(Temminck and Schlgel, 1850)**, *Takifugu niiphobles* **(Jordan and Snyder, 1901)**. All the reported hosts of *C.lagocephali* are tetraodontids **(Yamaguti and Yamasu, 1959; Pilai, 1961; Ozak et al., 2012)**. In Egypt their were several authors recorded different *Caligus* species from different fish species; **Paperna (1980)** (*Caligus minimus* from *Dicentrachus labrax* in Bardawil lagoon), **Badawy (1994)** (*Caligus carangis*, sp.nov. from *Caranx sem* from Red Sea), **Mohey and Abu EL-Wafa (1995)** *(Caligus curtus* from captive *Mugil* and *Sparus*), **Argun et al. (2010)** *(Caligus temnodontis* from the bluefish *Pomatomus saltatrix* in Alexandria city), **Eissa et al. (2012)** (*Caligus carangis* from *Morone labrax*), **Bayoumy et al. (2013)** *(Caligus kuwaitensis* from *Acanthopagrus bifasciatus)*, **Noor El-Din et al. (2013)** *(Caligus minmus* from *Dicentrachus labrax* and *Caligus elongates* from Mullet), **Youssef (2014)** (*Caligus epidemicus* from *Mugil cephalus* and *Oreochromus niloticus* at Suez Canal area), **Youssef et al. (2014)** (*Caligus longipedis* from *Morone labrax* at Suez Canal area) and **Mahdy and Abu El Ezz (2015)** *(Caligus kuwaitnesis* from *Pagrus pagrus* from Cairo). *Caligus productus* group having low data in Egypt. The aim of the present study are to throw the light on the *Caligus* infestation among *Morone labrax,* incidence and seasonal variations with special references to *Caligus lagocephali* as a new record from *Morone labrax*.

Materials and Methods

Two hundred marine fish samples, *Morone labrax* were collected a live from Suez Canal area, in the period from January 2014 to December 2014. the collected parasites were preserved in 70% ethyl alcohol, subsequently cleared in lactic acid for one hour, the preservation, dehydration and mounting of the parasites occur according to Pritchard and Kruse, 1982. Measurements were made using an ocular micro meter, Morphological terminology follows **Boxshall (1990)** and **Huys & Boxshall (1991)**. Host and fish names were identified according to fish base **(Frose & Pauly, 2009)**.

RESULTS

Studying the Caligids infestation among marine fish, *Morone labrax* , it showed that 80 (40%) out of 200 of the examined fish were infested with a different *Caligus* species which identified as *C. minimus* **(Otto, 1821; Paperna, 1980)***; C. longipedis* **(Bassatte-Smith, 1898; Ganamuth, 1950)** and *C. lagocephali* **(Yamaguti and Yamasu, 1959; Pilai, 1961)**. *C. lagocephali* only represent 1% infestation from the total examined fish (2 out of 200).

Caligus species present all-over the year, high incidence were recorded in spring while winter was the Season of low incidence. The present study showed that *Morone labrax* represents a new host for *Caligus lagocephali.* The obtained *C. lagocephali* specimens were only females.

Order: Siphonostomatoida
Family: Caligidae Burmeister, 1835
Genus: *Caligus* Muller, 1785
Caligus lagocephali, Pillai, 1961

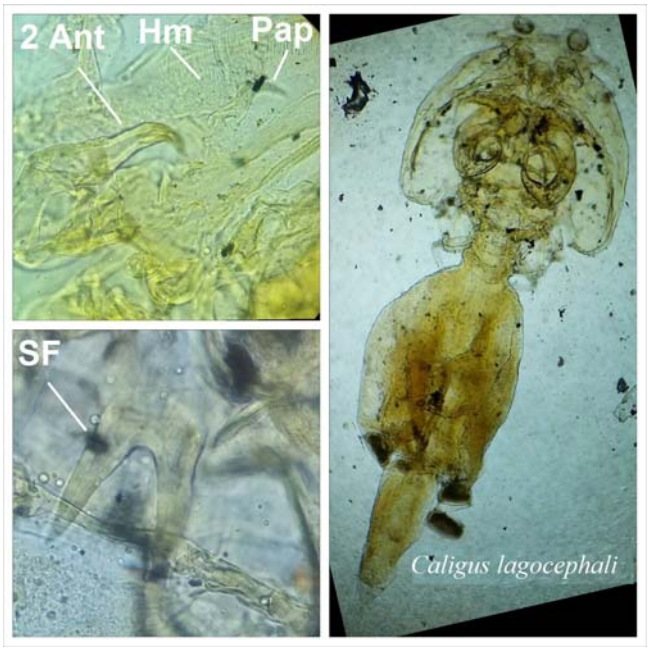

Figure 1: *Caligus lagocephali* female
2 ant: second antenna, Hm: hyaline membrane, Pap: post-antennal process, SF: Sternal furca.

Morphology of *Caligus lagocephali* females (Fig. 1, 4): The parasite was found in the mouth cavities and skin of *Morone labrax,* it is creamy in color. The body dorsoventrally flattened, it measured 3.4 mm in average. Having a wide angle between frontal plate, cephalothorax measured 1.2x1.1 mm in average and provided with conspicuous marginal membrane laterally and well defined striated border located ventrally internal to lateral margins of dorsal cephalothoracic shield, frontal plate carrying large lunules. Genital complex longer than wide, measured 1.25x0.82 mm in average, it is 1.5 times longer than abdomen and has no distinct poster-lateral lobes. Abdomen longer than wide, measured 0.85x 0.32 mm in average, two segment, the first is the largest, the combined length of genital complex and abdomen approximately twice as long as cephalothorax. caudal rami longer than wide, 0.87x0.065 mm with 6 pinnate setae, Maxilliped (Fig. 2b) with large, well developed, tapering

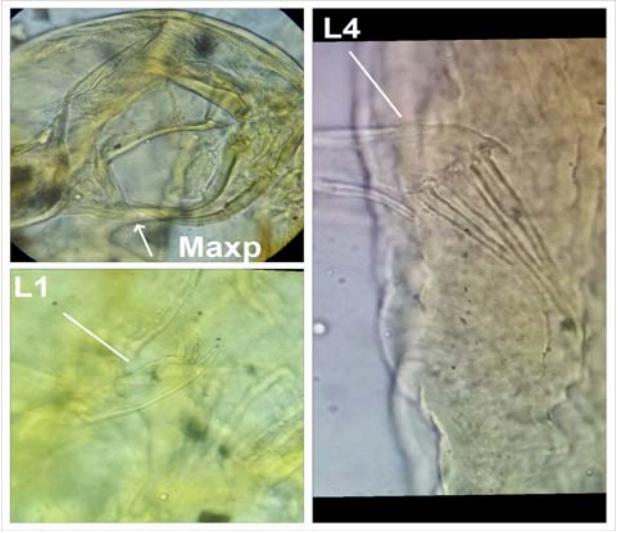

Figure 2A: Caligus lagocephali female:
L1: First leg shown no spine in its distal exopodal seg.
L4: fourth leg (shown formula spine 1-1V).
Maxp: maxilliped with large, well developed, tapring process proximally on medial margin.

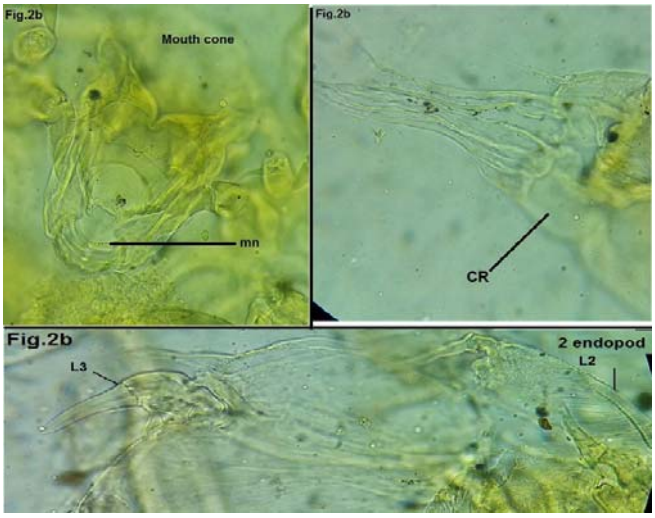

Figure 2B: Caligus lagocephali female:
CR: caudal ramus.
2 endopod, L2: outer margin of second endopodal segment of leg 2 densely ornamented with fine spinules.
-L3: process of third leg.
-Mn: serrated mandible.

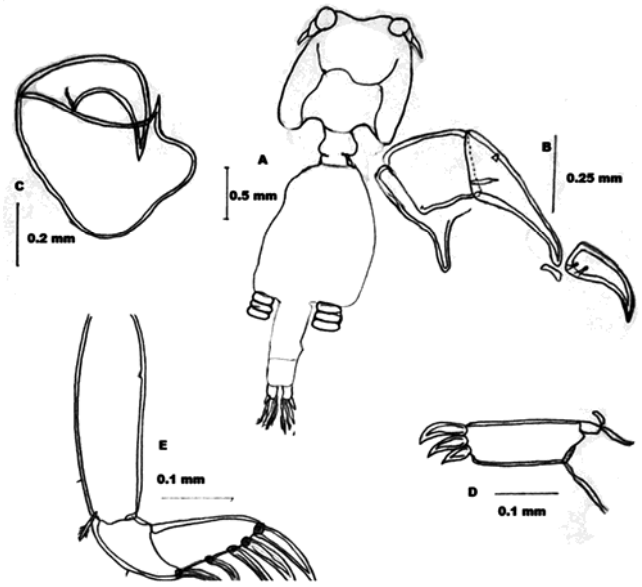

Figure 4: Caligus lagocephali: (A: whole parasite, B: second antenne, C: maxilliped, D: first leg, E: forth leg)

process proximally on medial margin. Sternal furca (Fig. 2a) with tapering tines. Leg 1 (Fig. 2b) with 2-segmented exopod and unsegmented vestigial endopod, distal exopodal segment without setae on posterior margin. Outer margin of the second endopodal segment of second leg densely ornamented with fine spinules. Second exopodal segment of fourth leg (Fig. 2b) with short outer margin spine and 3 long distal spines, increasing in length towards terminal spine. The male not recorded from the fish in this study.

Discussion

Caligus is considered important pathogen infesting marine fish, it cause severe damage upon the external surface of the fish. The prevalence of *Caligus* species infested the examined fish species, *Morone labrax* was 40%, the result agreed with that given by **Eissa et al. (2012)**. The seasonal variation showed that Spring Season was the Season of high record, in agreement with **Paperna (1980), Eissa et al. (2012)** and **Noor El-Deen et al. (2013)**. *Morone labrax* infested with different species of *Caligus,* in this study *Caligus lagocephali* is one of this Caligids. It is one of the *productus* group created by **Boxshall and Gurney (1980)**, characterized by loss of two and reduction or loss of the third plumose setae which carried on the posterior margin of the distal exopodal segment of the first leg. **Boxshall and El-Rashidy (2009)** were given additional characters help in identification of Productus group to include other typical character states such as: two-segmented abdomen of male, large lunules and two segmented exopod of fourth leg armed with 1, 1V spines and rare (1, 111), also give a key to the species of the *Caligus productus*-group (female only). *Caligus lagocephali* was recorded from *Takifugu rubripes* **(Temminck and Schlgel, 1850)**, *Takifugu niiphobles* **(Jordan and Snyder, 1901)**. All the reported hosts of *C. lagocephali* are tetraodontids **(Yamaguti and Yamasu, 1959; Pilai, 1961; Ozak et al., 2012)** so this record from *Morone labrax* consider first record. The striated ventral border extending around the lateral margins of the dorsal cephalothorcic shield internal to the margin membrane may enhance attachment to the surface of the hosts. The most distinguishing character of *C.lagocephali* is the well developed process located proximally on the inner margin of the female maxilliped which differentiate it from *Caligus ariicolus* which have the same ratio of abdomen and genital complex but maxilliped without proximal process on medial margin **(Boxshall and El-Rashidy, 2009)**. The morphological features of our adult female revealed similarities both in shape and morphometrics to *C. lagocephali* as described by **Yamaguti and Yamasu (1959)**. The body proportions are also in the range given by Boxshall and **El-Rashidy (2009)** and **Ozak et al. (2012)**.

Conclusion

From this study it was concluded that *Morone labrax* was infested with different *Caligus* species with a percent of 40% and recorded as a new host for *Caligus lagocephali* with a percent of 1% infestation. *C.lagocephali* females only were obtained in this study and characterized by its creamy color, wide angle between frontal plates and Maxilliped with large, well developed, tapering process proximally on medial margin. Seasonal variation revealed that spring was the Season of high incidence.

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