

Occurrence of Two Parasitic Copepod Crustaceans, *Caligus cossackii* Bassett-Smith, 1898 and *Lernanthropus sarbae* Kensley & Grindley, 1973 from the Sparid Fish *Acanthopagrus bifasciatus* from Marine Waters of Iraq

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Abstract: Two parasitic copepods are recorded from gill filaments of two-bar seabream *Acanthopagrus bifasciatus* (Forsskål, 1775) (Pisces: Perciformes: Sparidae), which included, male and female of *Caligus cossackii* Bassett-Smith, 1898 (Siphonostomatoida: Caligidae) and *Lernanthropus sarbae* Kensley & Grindley, 1973. *C. cossackii* is recorded here for the first time from Iraqi territorial waters. This brings the total number of *Caligus* species in Iraq to five species. *A. bifasciatus* is considered in the present study as a new host for *L. sarbae* in Iraq and hence eight *Lernanthropus* species are so far known in marine fishes of Iraq. With the present records, *A. bifasciatus* is considered as host in Iraq for three monogeneans, one nematode and two crustaceans.

Keywords: *Caligus cossackii*, *Lernanthropus sarbae*, Copepoda, *Acanthopagrus bifasciatus*, Marine waters, Iraq.

Introduction

The copepod family Caligidae has a higher number of species and among which the genus *Caligus* includes 255 valid species (WoRMS, 2017). *Caligus cossackii* was described by Bassett-Smith (1898). Lernanthropidae is a large family of siphonostomatoid copepods comprising 46 valid species (WoRMS, 2017). They are exclusively parasitic on gill filaments of marine teleosts. Lernanthropids are largely parasites of warm-water fishes. Thus, while 44 species are known from India (Pillai 1985), only nine species are known from Japan (Ho & Do, 1985). This family Caligidae is represented in fishes of Basrah province with 10 species of the genera *Anuretes*, *Caligus* and *Hermilius* as well as two unidentified species of the genera *Abasia* and

Caligus, while the family Lernanthropidae in the same province includes nine specified species of the genus *Lernanthropus* as well as one unspecified species of the same genus (Khamees et al., 2015).

Few *Caligus* species were collected from marine waters of Iraq. These included *Caligus cordyla* Pillai, 1963 from gills of *Megalaspis cordyla* by Al-Ataby (2012) and Al-Azizz et al. (2014), adults and larvae of *Caligus epinepheli* Yamaguti, 1936 from gills of *Nemipterus japonicus* by Adday (2013), Khamees & Adday (2013 and Venmathi Maran et al. (2014), *Caligus longicaudus* Bassett-Smith, 1898 from gills of *Chirocentrus nudus* by Adday (2013), *Caligus orientalis* Gusev, 1951 from gills of *Planiliza macrolepis* (reported as *Liza macrolepis* by Al-Daraji (1995 and unidentified *Caligus* species was reported from gills of *Netuma bilineata* (reported as *Arius bilineatus*) by Jori & Mohamad (2008). *Lernanthropus* species from marine waters of Iraq included those of Bannai (2002) who recorded *Lernanthropus* sp. from two species of fishes: *Planiliza subviridis* and *Otolithes* (misspelled as *Otolithus*) *ruber*, Al-Ataby et al. (2012) recorded *Lernanthropus indicus* Pillal, 1967 from two carangids: *Megalaspis cordyla* and *Carangoides malabricus* and Jassim (2013) reported *Lernanthropus* sp. from *Acanthopterus arabicus* (misidentified as *A. latus*).

Caligids and lernanthropids can often cause pathological effects like desquamation, erosion and necrosis of the host's gill filaments (Manera & Dezfuli, 2003) and, in cases of heavy infection, this may lead to asphyxiation, anemia, and secondary bacterial infections (Tokşen et al., 2006). The aims of the present study are to detect and identify the parasitic crustaceans from some perciform fishes from northwest of the Arab Gulf.

The sparid two-bar seabream *Acanthopagrus bifasciatus* (Forsskål, 1775) is distributed in the Red Sea, Arab Gulf, off southern Oman (not Gulf of Oman), presumably along the whole southern coast of the Arabian Peninsula and also Iran to Pakistan (Froese & Pauly, 2017). This fish received very limited attention from the Iraqi fish parasitologists. Therefore, the present article is devoted to through the light on two crustacean parasites of this fish.

Materials and Methods

A total of 55 specimens of *A. bifasciatus*, (23.5-42.7 cm total length and 147-251 gm total weight) were examined for ectoparasites during the period from October 2013 till July 2014. They were captured by trawl net from the Iraqi marine waters, northwest of the 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 in 70% ethanol. Before dissection, the copepods were cleared in lactophenol by using the wooden slide method (Humes & Gooding, 1964). Measurements (in mm.) were made by using an ocular micrometer. Drawings were made using a

camera Lucida. Copepods were identified on the basis of their morphological features. Some specimens were sent to Prof. Dr. Geoffrey A. Boxshall, Department of Zoology, Natural History Museum, London for confirmation of the identification.

Results

1- *Caligus cossackii* Bassett-Smith, 1898:

Host: *A. bifasciatus*

Site of infection: Gills

Prevalence of infection: 31%

Mean intensity: 5

Locality: Northwest Arab Gulf within the Iraqi territorial waters.

Material deposition: Two voucher specimens were deposited in the Natural History Museum, London (accessions NHMUK 2014.52-53).

Description and measurements (based on two males and one female):

Male (Figure 1-A): Body 4.18-4.63 (4.45) long, carapace 2.12 x 2, free thoracic segment 0.33-0.38 (0.35) long, swollen at the sides which bear the fourth pair of leg, genital segment 1.06 x 0.94 carrying vestiges of the fifth pair of legs behind the ventral corner. Abdomen two segmented, 0.83 long, 0.42 wide and the shorter terminal segment carrying caudal rami, each ramus 0.2 long, tipped by six setae.

Female (Figure 1-B): Body 4.93 long, carapace nearly orbicular, 2.1 long by 1.9 in its maximum width. Frontal plate's stout, with two setae, one on either side of the median incision close to the lunules; latter deep, well protruding. Transverse dorsal rib convex, its lateral arms divergent; lateral ribs of ventral areas bifurcate; sub median ribs slender, curved outwards at the tips. Eyes at 0.5 mm behind frontal plates. Lateral lobes of carapace curved inwards, much in front of the posterior margin of the median lobe, leaving the posterior sinuses narrow and deep. Free thoracic segment 0.31 x 0.40 with the fourth pair of legs projecting out from its lateral margins. Genital segment 1.4 x 1.39; sides nearly parallel, rounded at two ends. Abdomen two segmented, basal segment longer than terminal 0.92 long by 0.47 wide near anterior end. Caudal rami 0.2 long, each ramus with six spiniform setae of unequal lengths. Egg cords 2.1 long, each containing 11 eggs. Appendages (Figure 2): antennules short, segments equal; basal segment with 26-28 plumose seta along the anterior and ventral sides; terminal segment with about 12 spiniform setae at the tip, besides a similar one at the distal end of posterior margin. Second antenna with its terminal segment in the form of sharply curved claw provided with two accessory spines, one near the base and another in middle, basal segment short with a straight stout posterior spine as long as the segments itself.

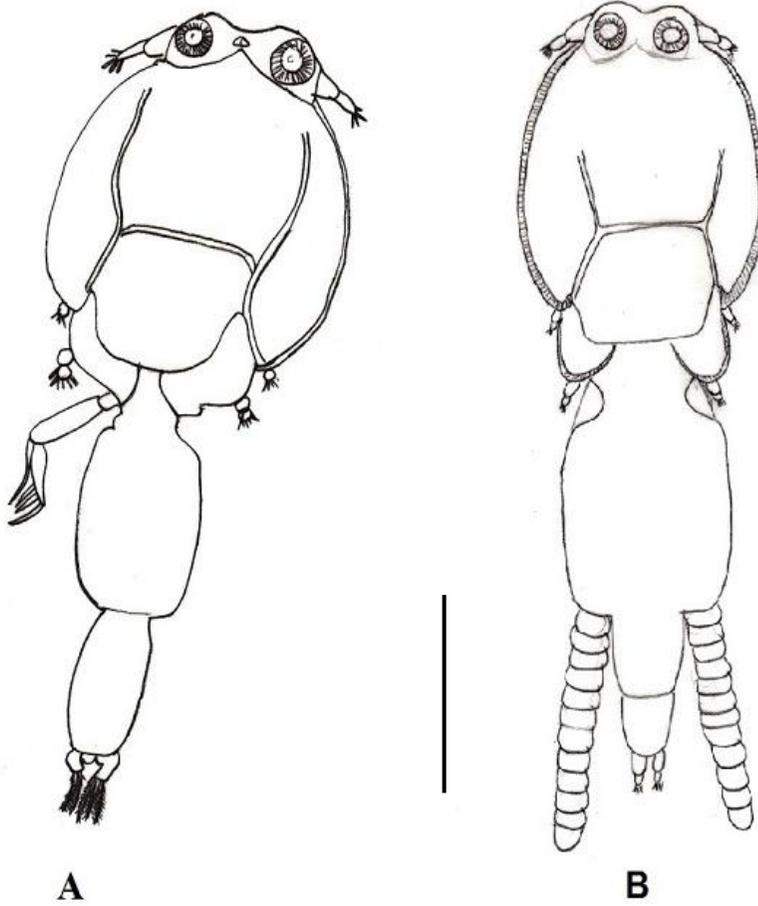


Figure 1: *Caligus cossackii*, A: Male; B: Female. (Scale bar= 1.3 mm.).

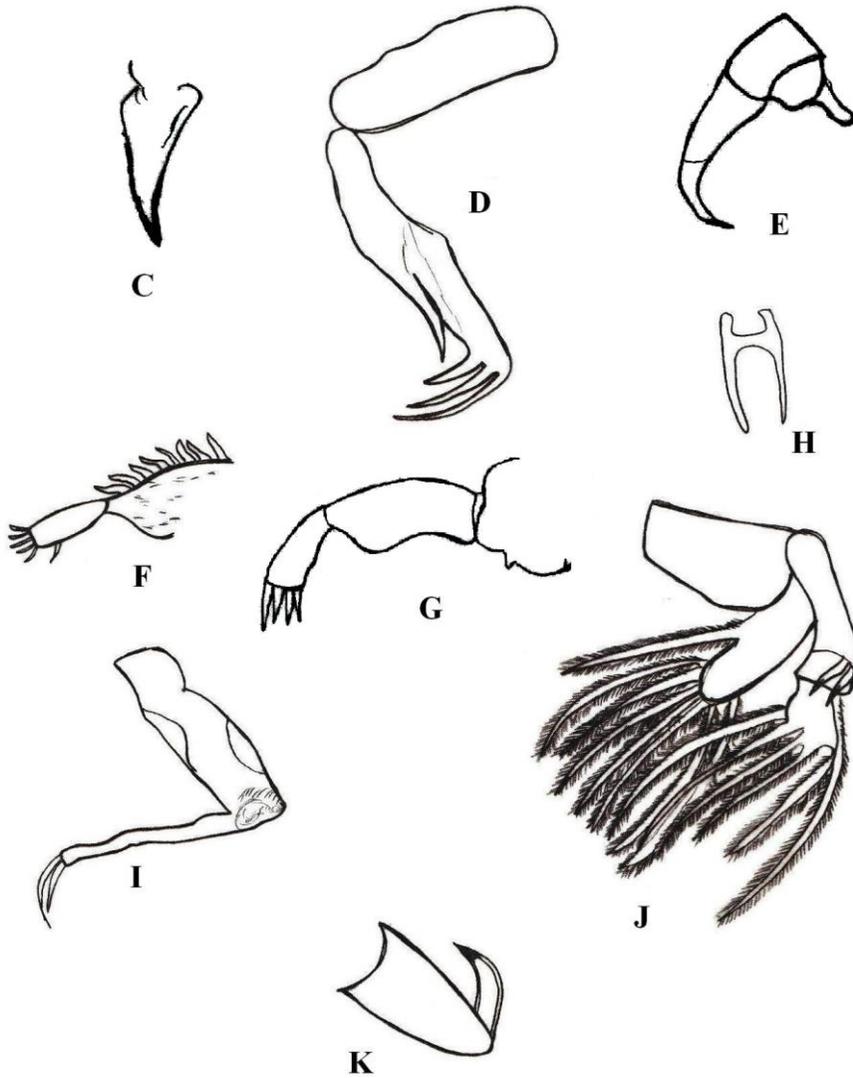


Figure 2: *Caligus cossackii*, C: 2nd Maxilla; D: Fourth leg; E: 2nd Antenna; F: 1st Antenna; G: 1st leg; H: Forca; I: 1st Maxilliped; J: 2nd Leg; K: 2nd Maxilliped. (Scale bar= 0.1 mm).

2- *Lernanthropus sarbae* Kensley & Grindley, 1973:

Host: *Acanthopagrus bifasciatus*

Site of infection: Gills

Prevalence of infection: 9%

Mean intensity: 5

Locality: Northwest Arab Gulf within the Iraqi territorial waters.

Material deposition: Four voucher specimens were deposited in the Natural History Museum, London (accessions NHMUK 2014.48-51).

Discussion

1- *Caligus cossackii* Bassett-Smith, 1898:

The genus *Caligus* can be easily distinguished by having a pair of sucker-like holdfast "lunules" on the frontal plates (Kabata, 1979). Bassett-Smith (1898) described *C. cossackii* from *Chrysophrys sarba* (= *Rhabdosargus sarba*) off Iranian marine waters and Ceylon. Heegaard (1943) recorded it from *Sparus berda* (= *Acanthopagrus berda*) off Madagascar. Pillai (1985) used the description of Heegaard (1943) in his monograph.

According to Khamees et al. (2015) and Mhaisen (2017), four *Caligus* species were recorded from marine fishes of Iraq. These included *Caligus cordyla* Pillai, 1963 from gills of *Megalaspis cordyla* by Al-Ataby (2012 and Al-Azizz et al. (2014), *Caligus epinepheli* Yamaguti, 1936 as adults and larvae from gills of *N. japonicus* by Adday (2013) and Khamees & Adday (2013) and Venmathi Maran et al. (2014), *Caligus longicaudus* Bassett-Smith, 1898 from gills of *Chirocentrus nudus* by Adday (2013) and *Caligus orientalis* Gusev, 1951 from gills of *Planiliza macrolepis*, reported as *Liza macrolepis* by Al-Daraji (1995). In addition, unidentified *Caligus* species was reported from gills of *Netuma bilineata*, reported as *Arius bilineatus* by Jori & Mohamad (2008). Hence, *C. cossackii* of the present article is considered as the first record in Iraq which brings the total number of *Caligus* species in marine fishes of Iraq to five species. Also, *A. bifasciatus* is considered here as a new host record in Iraq.

2- *Lernanthropus sarbae* Kensley & Grindley, 1973:

According to Khamees et al. (2015) and Mhaisen (2017), eight species of *Lernanthropus* were reported from gills of marine fishes of Iraq. These included *Lernanthropus corniger* Yamaguti, 1954 from gills of both *C. malbaricus* and *M. cordyla* (Al-Ataby, 2012; Al-Niaem et al., 2013), *Lernanthropus cornutus* Kirtisinghe, 1937 from gills of *Tylosurus crocodilus* by Adday (2013), *Lernanthropus ilishae* Chin, 1948 from gills of *Ilisha compressa* by Adday (2013), *Lernanthropus indicus* Pillai, 1967 from gills of both *C. malbaricus* and *M. cordyla* (Al-Ataby, 2012; Al-Ataby et al., 2012), *L. nemipteri* Jayasree & Pillai, 1976 was reported from gills of *N. japonicus* by Adday (2013), *Lernanthropus polynemi* Richiardi, 1881 which was misidentified as *L. trifoliatus* Bassett-Smith, 1898 from gills of *Otolithes ruber* by Bannai (2002) *Lernanthropus sarbae* Kensley & Grindley, 1973 from gills of *A. arabicus* by Adday (2013) and *Lernanthropus sillaginis*

Pillai, 1963 from gills of both *Sillago arabica* and *S. sihama* by Adday (2013). Also, unidentified *Lernanthropus* species were reported from gill filaments of *C. nudus* by Piasecki et al. (1993), *Scomberomorus guttatus* by Al-Daraji (1995) and from *A. arabicus* (deliberately misidentified as *A. latus*) by Jassim (2013). The present record of *L. sabrae* is identical with *L. sarbae* from *A. arabicus* of Adday (2013), and hence, *A. bifasciatus* is considered as a second host for *L. sabrae* in Iraq.

Finally, in accordance with Mhaisen (2017), the parasitic fauna of *A. bifasciata* in Iraq now includes three monogeneans (dactylogyrid sp., *Lamellodiscus* sp. and mazocraeid sp.), one nematode (*Huffmanella* sp.) in addition to the two copepods of the present results (*C. cossackii* and *L. sabrae*).

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