

# FIRST RECORD OF *Caligus diaphanus* NORDMANN, 1832 FROM TURKISH MARINE HABITATS\*

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## Abstract:

*Caligus diaphanus* Nordmann, 1832 (Copepoda; Caligidae) was reported for the first time from the gill chambers and inner faces of opercula of *Chelidonichthys lucerna* (Triglidae) from Aegean Sea Coasts in Turkey. Some morphological characters of this parasitic copepod are given using photograph and drawings.

**Key words:** *Chelidonichthys*, occurrence, Aegean Sea, Turkey

# PRIMEIRO REGISTRO DE *Caligus diaphanus* NORDMANN, 1832 DA COSTA DA TURQUIA

## Resumo

*Caligus diaphanus* Nordmann, 1832 (Copepoda; Caligidae) foi relatado pela primeira vez das câmaras branquiais e faces internas dos opérculos de *Chelidonichthys lucerna* (Triglidae), do Mar Egeu, nas costas da Turquia. Alguns caracteres morfológicos deste copépode parasitário são apresentadas através de fotografia e ilustração.

Palavras-chave: *Chelidonichthys*, Ocorrência, Mar Egeu, Turquia

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## INTRODUCTION

Sea lice (Caligidae) is the largest group of parasitic copepods of fish, comprising more than 450 species (HO and LIN, 2005).

Hitherto, only eleven species of the family Caligidae have been recorded parasitizing fishes in Turkish marine habitats. They are *Caligus apodus*, Brian (1924), *Caligus bonito*, Wilson (1905), *Caligus brevicaudatus*, Scott (1901), *Caligus lagocephali*, Pillai (1961), *Caligus minimus*, Otto (1821), *Caligus pageti*, Russell (1925), *Caligus pelamydis*, Krøyer (1863), *Caligus solea*, Demirkale; Özak; Yanar; Boxshall (2014), *Caligus temnodontis*, Brian (1924), *Lepeophtheirus europaensis*, Zeddarn; Berrebi; Renaud; Raibaut; Gabrion (1988), *Caligus ligusticus*, Brian (1906) (TAREEN, 1982; OĞUZ and ÖKTENER, 2007; BAKIR *et al.*, 2014; DEMİRKALE *et al.*, 2014; DEMİRKALE *et al.*, 2015).

According to BİLECENOĞLU *et al.*, (2014), eight species of searobins are known in the Family Triglididae in Turkey.

This study aims to report geographic distribution and first record of the female of *Caligus diaphanus* with some morphological characters from Turkey.

## MATERIAL AND METHODS

18 of tub gurnard, *Chelidonichthys lucerna* (Linnaeus, 1758) (Pisces, Triglididae) were collected by local gears from Edremit Bay (39°33'40.74"N, 26°44'47.55"E, Aegean Sea Coasts of Turkey, Figure 1) in 2014. The parasitic copepods were preserved in 70% ethanol. They were later cleared in 85% lactic acid for 1 to 2 h before dissection. Dissected parts were mounted on slides in glycerin-gelatine mounting medium. Sides of coverslip were coated with colourless nail polish. The drawings of appendages were carried out with the aid of a camera lucida (Olympus U-DA). The photos were taken using a Canon EOS 1100D camera connected to a microscope. Measurements were taken in millimetres (mm), with a micrometrical programme (Pro-way). Scientific names, synonyms of the parasite and the host were checked through WORMS (2015). The identification, scientific names, their synonyms of parasite were checked with BRIAN (1935), KABATA (1979), CRESSEY and CRESSEY (1980), CUBILLA (1985), WORMS (2015). Parasites (MNHN-IU-2013-18733) were deposited in the collections of the Muséum National d'Histoire Naturelle (MNHN), Paris, France.

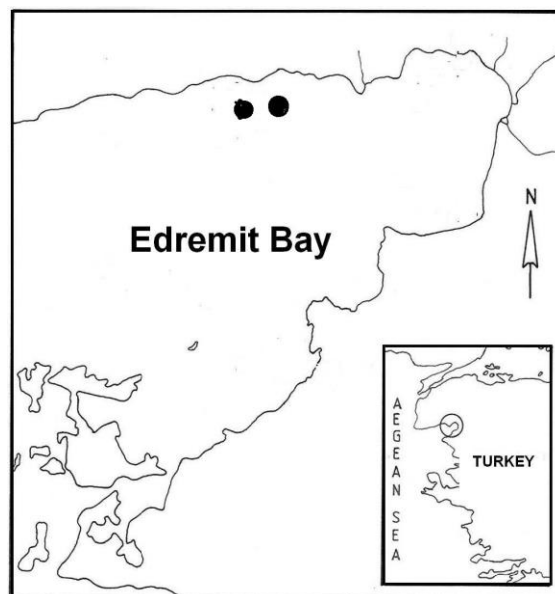


Figure 1. Sampling Area

## RESULTS

### Subclass Copepoda

### Order Siphonostomatoida

### Family Caligidae

*Caligus diaphanus* Nordmann, 1832 (Figure 2)

#### Measurements:

Total length (including egg sac): 5.079-5.123mm

Width: 1.652-1.753mm

Egg sac length: 2.253-2.297mm

Infestation parameters: All parasites were firmly attached to the gill chambers and inner faces of opercula of host. The prevalence, mean intensity and mean abundance of parasite were 16.6%, 3.33 and 1.8, respectively.



Figure 2. *Caligus diaphanus* Nordmann, 1832, female.

#### Description of female.

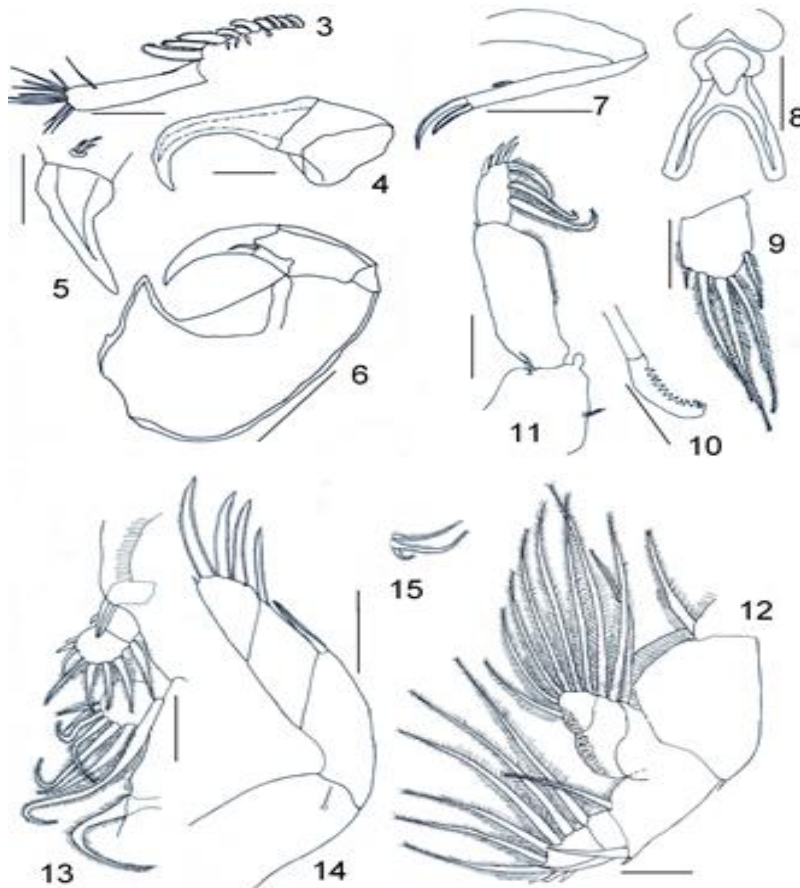
Antennule (Figure 2, Number 3) 2-segmented, with shorter distal segment; proximal segment, with 8 plumose and 3 simple setae on ventral surface;

distal segment with 1 subterminal seta on dorsal margin and 10 setae on distal margin. Antenna (Fig. 2, N° 4) 3-segmented; first segment with small, tapering proximal process; second segment nearly

quadrangular; third segment forming long, distally strongly bent curved claw. Maxillule (Fig. 2 N° 5) consisting of papilla bearing 3 unequal setae. Maxilliped (Fig. 2 N° 6) 3-segmented; proximal segment (corpus) largest, unarmed; distal two segments fused to form a claw and carrying a small seta. Maxilla (Fig. 2 N° 7) 2-segmented and brachiform; proximal segment (lacertus) large and unarmed; slender distal segment (brachium) with a small subterminal hyaline membrane on outer edge and 2 unequal elements (calamus and canna) at terminal end. Sternal furca (Fig. 2 N° 8) with nearly parallel tines, tines rounded at tip. Caudal rami (Fig. 2 N° 9) with 5 plumose setae. Mandible within mouth tube, tip with 12 teeth. (Fig. 2 N° 10).

First leg (Fig. 2 N° 11) basipod with a shorter plumose seta near outer and inner mid-margin; exopod first segment with a short spine on outer distal corner and a row of spinules along inner margin, second segment with 4 outer to terminal spines and 3 inner plumose setae. Second leg (Fig. 2

N° 12) basipod with a short plumose seta on outer distal corner; exopod first and second segments each with a stout spine on outer distal corner and an inner seta, last segment with 3 outer spines and 5 terminal to inner setae; endopod first segment with an inner seta, second segment with a patch of long spinules along outer edge and 2 inner setae, last segment with a patch of long spinules on outer edge and 6 setae. Third leg (Fig. 2 N° 13) exopod first segment with a prominent spine on outer distal corner, second segment with a short spine on outer distal corner and inner seta, last segment with 3 short outer spines and 4 terminal to inner setae; endopod first segment with an inner seta, last segment with 6 terminal setae. Fourth leg (Fig. 2 N° 14) basipod with a small seta on outer distal corner; exopod first segment with a fringed seta on outer distal corner, second segment with fringed seta on outer distal corner, last segment with 3 fringed setae. Fifth leg (Fig. 2 N° 15) represented by 3 short plumose setae.



**Figure 2.** (N° 3) antennule (scale: 0,8), (N° 4) antenna (scale:0,10), (N° 5) maxillule (scale:0,10), (N° 6) maxilliped, (scale:0,17), (N° 7) maxilla (scale:0,18), (N° 8) sternal furca (scale:0,12), (N° 9) caudal rami (scale:0,13), (N° 10) mandible (scale:0,05), (N° 11) first leg (scale:0,10), (N° 12) second leg (scale: 0,10), (N° 13) third leg (scale: 0,20), (N° 14) fourth leg (scale: 0,20), (N° 15) fifth leg.

## DISCUSSION

*Caligus diaphanus* was widely distributed from British Isles, European, Atlantic, Mediterranean, Adriatic, Indian Ocean. The species is reported parasitizing several fishes including Triglidae (*Chelidonichthys cuculus*, *Chelidonichthys lucerna*, *Chelidonichthys capensis*, *Eutrigla gurnardus*, *Trigla lyra*, *Trigloporus lastoviza*, *Lepidotrigla cavillone*), Sparidae (*Pagellus acarne*, *Pagellus bogaraveo*, *Pagellus erythrinus*, *Lithognathus mormyrus*, *Dentex dentex*), Flatfishes (*Scophthalmus maximus*, *Solea solea*, *Platichthys flesus*, *Lepidorhombus whiffiagonis*), Gadoid fishes (*Merluccius merluccius*, *Molva molva*, *Gadus morhua*, *Pollachius virens*), Carangidae (*Caranx hippos*, *Trachurus trachurus*, *Trachinotus botla*), Terapontidae (*Terapon puta*), Belonidae (*Belone belone*), Scombridae (*Scomber scombrus*, *Scomberomorus tritor*), Centropomidae (*Lates calcarifer*) Lutjanidae (*Lutjanus peru*) (BRIAN, 1935; KABATA, 1979; CRESSEY and CRESSEY, 1980; CUBILLA, 1985; RADUJKOVIC and RAIBAUT, 1989; RAIBAUT *et al.*, 1998; GONZALEZ *et al.*, 2004; RAMDANE and TRILLES, 2010; WORMS, 2015). Larvae of the copepod *Caligus diaphanus* infect the gill filaments, but adults prefer the wall of the mouth cavity

(ROHDE, 1993). Also, we found adult of *Caligus diaphanus* on gill chambers and inner faces of opercula of host fish.

The general morphology, second antenna, second maxilla, maxilliped, mandible, maxillule of our female specimens and BRIAN (1935); KABATA (1979); CRESSEY and CRESSEY (1980); CUBILLA (1985); RADUJKOVIC and RAIBAUT (1989) drawings are identical.

However, some discrepancies are found in the fine details of the structure of the appendages. For instance, we found proximal segment of antennule with 11 setae, distal segment bearing 11 setae while proximal segment with 27 setae, distal segment bearing 14 setae by CRESSEY and CRESSEY (1980); proximal segment with 10 setae, distal segment bearing 8 setae by BRIAN (1935);

proximal segment with 24 setae, distal segment bearing 11 setae by CUBILLA (1985).

Morphologic features of all dissected parasites permitted identification of this copepod as *Caligus diaphanus*, Nordmann (1832). This study is so important that it is the first record from Turkey marine habitats according to literature BAKIR *et al.*, (2014).

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