

Four Parasitic Crustacean Species From Marine Fishes of Turkey

Mehmet Cemal OGUZ¹, Ahmet ÖKTENER²

¹Atatürk University, Science-Literature Faculty, Department of Biology, Erzurum;

²Cihannüma Mahallesi Hüsnü Savman Sok No:22/5 Beşiktaş, İstanbul, Turkey

SUMMARY: The aim of this work was to present a preliminary knowledge of the parasitic copepods of marine fish of Turkey. In this study, four parasitic crustaceans were reported from five different fish species found in Turkish seas: *Lepeophtheirus europaensis* (Zeddardam, Berrebi, Renaud, Raibaut & Gabrion, 1988) was found on the gills of the European flounder, *Platichthys flesus* (Linnaeus, 1758) (Pleuronectidae); *Nerocila bivittata* (Risso, 1816) on caudal peduncles of east Atlantic peacock wrasse, *Symphodus tinca* (Linnaeus, 1758) (Labridae); *Ceratothoa oestroides* (Risso, 1826), on the mouth base of European pilchard, *Sardina pilchardus* (Walbaum, 1792) (Clupeidae); *Anilocra physodes* (Linnaeus, 1758), on the body surface of gilthead seabreams, *Sparus aurata* Linnaeus, 1758 (Sparidae) and on horse mackerel, *Trachurus trachurus* (Linnaeus, 1758) (Carangidae). Also, a list of the parasitic copepods previously reported from marine fishes of Turkey since 1931 is given, with a new report of the host species, the localities where they were collected and the corresponding authors. At the present time, 23 parasitic copepods have been recorded from 25 host fish of Turkish coasts. *Lepeophtheirus europaensis* Zeddardam, Berrebi, Renaud, Raibaut & Gabrion, 1988 was reported for the first time in Turkish coastal waters.

Key Words: Copepod, isopod, *Lepeophtheirus*, *Nerocila*, *Ceratothoa*, *Anilocra*.

Türkiye'nin Deniz Balıklarından Dört Parazitik Crustacean Türü

ÖZET: Bu çalışmanın amacı Türkiye Deniz Balıklarının parazitik kopepodları hakkında ön bir bilgi vermektir. Bu çalışmada Türk kıyılarında dört farklı balık türünden dört parazitik crustacean: Avrupa pisi balığının (*Platichthys flesus* Linnaeus, 1758; Pleuronectidae) solungaçlarından *Lepeophtheirus europaensis* Zeddardam, Berrebi, Renaud, Raibaut & Gabrion, 1988; Atlantik lapin balığının (*Symphodus tinca* Linnaeus, 1758; Labridae) kaudal pedunkulundan *Nerocila bivittata* (Risso, 1816); Avrupa sardalya balığının (*Sardina pilchardus* Walbaum, 1792; Clupeidae) ağız tabanından *Ceratothoa oestroides* (Risso, 1826); çipura balığının (*Sparus aurata* Linnaeus, 1758; Sparidae) ve istavrit balığının (*Trachurus trachurus* Linnaeus, 1758; Carangidae) vücut yüzeylerinden *Anilocra physodes* (Linnaeus, 1758) rapor edilmiştir. Daha sonra, 1931'den beri Türkiye deniz balıklarından rapor edilmiş parazitik kopepodlar, toplandıkları konak türleri, toplandıkları mevkiler ve ilgili araştırmacıların isimlerinin listesi bu çalışmadaki yeni kayıtlarla birlikte verilmiştir. Günümüzde Türkiye denizlerinden 25 konak balık türünden 23 parazitik kopepod türü kaydedilmiştir. Türkiye Kıyılarından *Lepeophtheirus europaensis* Zeddardam, Berrebi, Renaud, Raibaut & Gabrion, 1988 ilk kez rapor edilmiştir.

Anahtar Sözcükler: Copepod, isopod, *Lepeophtheirus*, *Nerocila*, *Ceratothoa*, *Anilocra*.

GİRİŞ

The Caligidae Burmeister, 1835 (Siphonostomatoida) is the largest family of parasitic Copepoda comprising more than 450 species. Of the 28 recognised genera of the Caligidae, Caligus Müler, 1785 and *Lepeophtheirus* Nordmann, 1832 are the two largest ones with more than 250 species in the former (13) and 107 species in the latter (14). The members of this family are characteristic in possessing a flattened body, which

is well adapted for life on the blood, mucus, and epithelial cells of their host (15).

Cymothoidae are ectoparasites of marine, fresh-water or brackish-water teleost fishes. Numerous families and species of fishes, including many of commercial importance are infested. They are settled on the skin, in the buccal cavity, the gill chambers or sometimes in a pouch (9, 37). Upon finding a suitable host, they initiate their parasitic life feeding on blood and tissues (18, 32, 33, 37).

Several studies concerned with Caligidae and Cymothoidae have been done marine fishes Turkey (1, 3, 10, 11, 12, 22, 38, 20, 23, 35, 17, 27).

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Yazışma /Corresponding Author: Ahmet Öktener
Tel: - Fax: -
E-mail: ahmetoktener@yahoo.com

Hundred-fourteen parasitic helminths and 14 parasitic isopods from marine fish; 113 parasites (8 belong to copepoda) from freshwater fish were determined in Turkey (24, 27, 28). To date, there has not been a detailed checklist of the parasitic copepods of Turkish marine fish compiled. The goal of this paper is to provide an accurate checklist of the parasitic copepods of Turkish marine fish, and to add to our knowledge of their parasite fauna. Thus, one Caligidae and three Cymothoidae were found from five marine fishes.

MATERIAL AND METHOD

The european flounder, *Platichthys flesus* L., 1758 (Pleuronectiformes; Pleuronectidae) were caught by gill net from the Ekinli Lagoon (the Sea of Marmara), european pilchard, *Sardina pilchardus* (Walbaum, 1792) (Clupeiformes; Clupeidae), the gilthead seabream, *Sparus aurata* L., 1758 (Perciformes; Sparidae) and horse mackerel, *Trachurus trachurus* (L., 1758) (Perciformes; Carangidae) by fishing line from the Çanakkale Strait (the Sea of Marmara). East atlantic peacock wrasse, *Symphodus tinca* (L., 1758) (Perciformes; Labridae) were caught by fishing line from Sinop Coasts (the Black Sea). The parasites collected were fixed in 70% alcohol. Copepods were studied with a dissecting microscope. Specimens were dissected and cleared in lactic acid. All specimens collected are deposited in Atatürk University, Zoological Museum. The identifications and morphometric characteristics for *Lepeophtheirus* were performed according particularly to Zeddäm et al. (41); and for Cymothoidae, Trilles (36), Trilles et al. (39).

RESULTS AND DISCUSSION

The parasites found are as follows: *Lepeophtheirus europaensis* Zeddäm, Berrebi, Renaud, Raibaut & Gabrion, 1988; *Nerocila bivittata* (Risso, 1816); *Ceratohoa oestroides* (Risso, 1826); *Anilocra physodes* (L., 1758).

Order Siphonostomatoida

Family Caligidae Burmeister, 1835

Lepeophtheirus europaensis Zeddäm, Berrebi, Renaud, Raibaut & Gabrion, 1988

Material examined: Removed from the gills of the european flounder, *Platichthys flesus* L., 1758 from Ekinli Lagoon.

Measurements (length in mm): Total length of parasites 3-7 mm.

Distribution: Mediterranean Sea (41).

Hosts: Gill filaments, subopercular surface of *Scophthalmus rhombus*, *Platichthys flesus* (41).

Remarks: This species was recently described from Mediterranean Sea by Zeddäm et al., (41) and our specimens from Turkey agree well their description. The most characteristic of sternal furca of this species has a long base and two parallel line. The thoracic segment has the fourth pair of thoracic legs on ventral surface. Caligids in Turkey were reported from marine fishes. *Caligus* sp., *C. pageti*, *C.*

minimus, *Pseudocaligus apodus* were reported from six marine fishes species in Turkey (1, 11, 35). The finding in this study is the first record of present species in Turkey.

L. salmonis and *C. elongatus* are the two common species of sea lice which cause serious disease problems in salmonid aquaculture (31). *L. longiventris* caused mortality to spotted halibut (*Verasper variegatus*) pen-cultured in Iwate Prefecture, Japan. *L. paralichthydis* caused mortality to olive flounder (*Paralichthys olivaceus*) pen-cultured in Kyoto Prefecture, Japan (16).

Without doubt, the transmission of sea lice occurs from the wild fish to the farmed fish, between farms, and possibly, also from the farmed fish to wild fish (8). It has been begun a growing experiments of flat fish by private fish farmers and institutes in Turkey. Consequently, the sea lice fauna of flatfish in fish farms, institutions and natural habitats of Turkey there should be parasitologically examined to prevent and control any possible infection before outbreaks

Order Isopoda

Family Cymothoidae Leach, 1814

Nerocila bivittata (Risso, 1816)

Material examined: Removed on the caudal peduncle of east Atlantic peacock wrasse, *Symphodus tinca* (L., 1758) from Sinop Coasts (the Black Sea).

Measurements (length in mm): Total length 15-25mm, width 7.5-9.5 mm.

Distribution: Widely distributed in the Mediterranean Sea, Adriatic Sea, Marmara Sea, Atlantic Ocean (40).

Hosts: Labridae, *Crenilabrus pavo*, *C. tinca*, *C. melops*, *Scorpaena scrofa*, *S. porcus*, *Cottus* sp., *Pagellus erythrinus*, *P. mormyrus*, *Mugil cephalus*, *Spicara maena*, *Meluccius merluccius*, *Monacanthus setifer* (40).

Remarks: Three species (*N. bivittata*, *N. maculata*, *N. orbignyi*) belong to *Nerocila* genus were reported in Turkey (27). *N. bivittata* in this study is recorded for the first time in the Black Sea Coasts of Turkey.

Order Isopoda

Family Cymothoidae Leach, 1814

Anilocra physodes (L., 1758)

Material examined: Removed on the body surface of the gilthead seabream, *Sparus aurata* L., 1758 and horse mackerel, *Trachurus trachurus* (L., 1758) from the Çanakkale Strait (the Sea of Marmara).

Measurements (length in mm): Total length 15-25 mm, width 7.5-9.5 mm.

Distribution: Widely distributed in the Mediterranean Sea, Adriatic Sea, Marmara Sea, Atlantic (40).

Hosts: *Diplodus annularis*, *Pagellus erythrinus*, *Meluccius merluccius*, *Pagrus coeruleostictus*, *Serranus hepatus*,

Trachinus draco, *Atherina boyeri*, *Lophius piscatorius*, *Spicara maena*, *Oblada melanura*, *Squatina angelus*, *Lichia* sp, *Chrysophris*, *Torpedo* sp, *Trigla* sp, *Naucrates ductor*, *Sardina pilchardus*, *Gadus capelenus*, *Boops boops*, *Mullus barbatus*, *Spondyllosoma cantharus*, *Dentex vulgaris*, *Smaris alcedo* (40).

Remarks: Two species (*A. physodes*, *A. frontalis*) belong to Anilocra genus were reported in Turkey (27).

Order Isopoda

Family Cymothoidae Leach, 1814

***Ceratothoa oestroides* (Risso, 1826)**

Material examined: Removed on the mouth of european pilchard, *Sardina pilchardus* (Walbaum, 1792) from the Çanakkale Strait (the Sea of Marmara).

Measurements (length in mm): Total length 15-25mm, width 7.5-9.5 mm.

Distribution: Widely distributed in the Mediterranean and the Adriatic Sea. Also recorded from the North-East Atlantic Ocean including the North-west coasts of Africa (40).

Hosts: This species is found on many different host species, the Centracanthidae and Sparidae are the most frequently parasitized groups (*Spicara* sp., *S. chryselis*, *S. maena*, *Smaris melanurus*, *Boops boops*, *Diplodus annularis*, *D. sargus*, *D. vulgaris*) Also, but rarely collected on *Sardina pilchardus sardina*, *Trachurus trachurus*, *Phycis mediterranea*, *Mullus barbatus*, *Abudefduf saxatilis* (40). Recently recorded from *Dicentrarchus labrax* and *S. aurata* on farms of Adriatic Sea and Greece (17, 30, 34).

Remarks: Five species (*C. oestroides*, *C. parallela*, *C. italica*, *C. capri*, *C. steindachneri*) belong to *Ceratothoa* genus were reported in Turkey (21, 27).

The list of the parasitic copepoda of Turkish marine fish was compiled in which the parasite species are arranged by phylum and class, as appropriate. The parasite list includes in the parasites with the parasitized fish, the situation of the collection and the corresponding author(s).

Table 1.

Phylum ARTHROPODA		
Class Copepoda		
<i>Caligus</i> sp. Müller, 1785		
<i>Sardina pilchardus</i>	Marmara Sea	Demirhindi (1961)
<i>Caligus pageti</i> Russel, 1925		
<i>Mugil cephalus</i>	Aegean Sea	Altunel (1983)
<i>Liza saliens</i>	Aegean Sea	Altunel (1983)
<i>Liza ramada</i>	Aegean Sea	Altunel (1983)
<i>Chelon labrosus</i>	Aegean Sea	Altunel (1983)
<i>Caligus minimus</i> Otto, 1821		
<i>Dicentrarchus labrax</i>	Aegean Sea	Tokşen (1999)

***Pseudocaligus apodus* Brian, 1924**

<i>Mugil cephalus</i>	Aegean Sea	Altunel (1983)
<i>Liza saliens</i>	Aegean Sea	Altunel (1983)
<i>Liza ramada</i>	Aegean Sea	Altunel (1983)
<i>Chelon labrosus</i>	Aegean Sea	Altunel (1983)

***Ergasilus nanus* van Beneden, 1870**

<i>Mugil cephalus</i>	Aegean Sea	Altunel (1983)
<i>Liza saliens</i>	Aegean Sea	Altunel (1983)
<i>Liza ramada</i>	Aegean Sea	Altunel (1983)
<i>Chelon labrosus</i>	Aegean Sea	Altunel (1983)
<i>Oedalechilus labeo</i>	Aegean Sea	Altunel (1983)
<i>Mugil soiyu</i>	Black Sea	Öktener & Trilles (2004a)

***Ergasilus gibbus* Nordmann, 1832**

<i>Anguilla anguilla</i>	Ekinli Lagoon	Altunel (1990)
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***Nipergasilus bora* Yamaguti, 1939**

<i>Mugil cephalus</i>	Aegean Sea	Ben Hassine (1983)
<i>Chelon labrosus</i>	Aegean Sea	Ben Hassine (1983)

***Lernanthropus mugilis* Brian, 1898**

<i>Liza aurata</i>	Aegean Sea	Altunel (1983)
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***Lernanthropus kroyeri* vanBeneden, 1851**

<i>Dicentrarchus labrax</i>	Aegean Sea	Tokşen (1999)
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***Lernanthropus trachuri* Brian, 1903**

<i>Trachurus mediterraneus</i>	Sea of Marmara	Öktener & Trilles (2004a)
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***Lerneia* sp Linnaeus, 1758**

<i>Trachurus mediterraneus</i>	Aegean Sea	Akmırza (1998a)
<i>Boops boops</i>	Aegean Sea	Akmırza (1998b)
<i>Mullus surmuletus</i>	Aegean Sea	Akmırza (2000a)
<i>Diplodus annularis</i>	Aegean Sea	Akmırza (2000b)
<i>Pagellus erythrinus</i>	Aegean Sea	Akmırza (2000b)
<i>Oblada melanura</i>	Aegean Sea	Akmırza (2000b)

***Hatschekia mulli* vanBeneden, 1851**

<i>Mullus surmuletus</i>	Aegean Sea	Akmırza (2000a)
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***Hatschekia pagellibogneravi* Hesse, 1879**

<i>Diplodus annularis</i>	Aegean Sea	Akmırza (2000b)
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***Hatschekia* sp Poche,1902**

<i>Pagellus erythrinus</i>	Aegean Sea	Akmırza (2000b)
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***Clavellopsis fallax* Heller, 1868**

<i>Diplodus sargus</i>	Aegean Sea	Akmırza (2000b)
<i>Pagellus erythrinus</i>	Aegean Sea	Akmırza (2000b)
<i>Spondyllosoma cantharus</i>	Aegean Sea	Akmırza (2000b)
<i>Sarpa salpa</i>	Aegean Sea	Akmırza (2000b)

***Lernaeopoda galei* Kroyer, 1837**

<i>Mustelus mustelus</i>	Aegean Sea	Karaytug et al (2004)
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Neobrachiella impudica Nordmann, 1832		
<i>Trigla lucerna</i>	Marmara Sea	Öktener & Trilles (2004a)
Chondracanthus lophii Johnston, 1836		
<i>Lophius piscatorius</i>	Marmara Sea	Öktener & Trilles (2004a)
Lernaeolophus sultanus Nordmann, 1839		
<i>Diplodus vulgaris</i>	Mediterranean	Öktener & Trilles (2004b)
Pennella instructa Wilson, 1917		
<i>Xiphias gladius</i>	Aegean Sea	Öktener & Leonardos (2006)
Eubrachiella exigua Brian, 1906		
<i>Pagellus erythrinus</i>	Mediterranean	Öktener & Trilles (2004b)
Neobrachiella bispinosa Nordmann, 1832		
<i>Trigla lucerna</i>	Mediterranean	Öktener & Trilles (2004b)
Lepeophtheirus europaensis Zeddard, Berrebi, Renaud, Raibaut, Gabrion, 1988		
<i>Platichthys flesus</i>	Ekinli Lagoon	Present study

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