

# Cymothoid (Crustacea, Isopoda) Records on Marine Fishes (Teleostei and Chondrichthyes) from Turkey

A. Öktener<sup>1\*</sup>, J.P. Trilles<sup>2</sup>, A. Alaş<sup>3</sup> and K. Solak<sup>4</sup>

<sup>1</sup> Istanbul Provincial Directorate of Agriculture, Directorate of Control, Kumkapı Fish Auction Hall, Aquaculture Office, TR-34130, Kumkapı, İstanbul, Turkey; <sup>2</sup> UMR 5119 (CNRS-UM2-IFREMER), Équipe Adaptation écophysiological et ontogénèse, Université de Montpellier 2, CC. 092, Place E. Bataillon, 34095 Montpellier cedex 05, France; <sup>3</sup> Department of Science, Education Faculty, Aksaray University, TR-68100 Aksaray, Turkey; <sup>4</sup> Department of Biology, Education Faculty, Gazi University, TR-06100 Ankara, Turkey.

## Abstract

Nine teleostean and one chondrichthyan species are identified as new hosts for six cymothoid isopods, *Nerocila bivittata* (Risso, 1816), *Ceratothoa steindachneri* Koelbel, 1878, *Ceratothoa oestroides* (Risso, 1826), *Livoneca sinuata* Koelbel, 1878, *Anilocra physodes* L., 1758 and *Mothocya taurica* (Czerniavsky, 1868). Six of these hosts are reported for the first time. They are: *Helicolenus dactylopterus dactylopterus*, *Argentina sphyraena*, *Belone belone*, *Chromis chromis*, *Conger conger*, *Trisopterus minutus*. Others are new hosts in Turkey.

## Introduction

Crustacean ectoparasites on marine fish are diverse. Many species of fish are parasitized by cymothoids (Crustacea, Isopoda, Cymothoidae). These parasitic isopods are blood feeding; several species settle in the buccal cavity of fish, others live in the gill chamber or on the body surface including the fins. Their life cycle involves only one host (Holoxenic cycle) (Ramdane et al. 2007). Studies concerning cymothoids on marine fishes, cephalopods and decapods from the Turkish coasts are scanty. Previously, 16 species in the family Cymothoidae have been recorded parasitizing cephalopod, decapod, fishes of several families in Turkey from Aegean Sea, the Mediterranean Sea, the Sea of Marmara and the Black Sea (Öktener & Trilles 2004; Trilles

& Öktener 2004; Ateş et al. 2006; Kirkim et al. 2008). Those are *Anilocra physodes* (L., 1758), *Anilocra frontalis* Milne Edwards, 1840, *Nerocila bivittata* (Risso, 1816), *Nerocila maculata* (Milne Edwards, 1840), *Nerocila orbigny* (Guérin-Meneville, 1828-1832), *Ceratothoa oestroides* (Risso, 1826), *Ceratothoa parallela* (Otto, 1828), *Ceratothoa italica* Schioedte & Meinert, 1883, *Ceratothoa capri* (Trilles, 1964), *Ceratothoa steindachneri* Koelbel, 1878, *Emetha audouini* (Milne Edwards, 1840), *Mothocya epimerica* Costa, 1851, *Mothocya belonae* Bruce, 1986, *Mothocya taurica* (Czerniavsky, 1868), *Livoneca pomatomi* (Gaillat Airoldi, 1940) and *Livoneca sinuata* Koelbel, 1878. In this study, 10 new hosts are reported for six cymothoid species.

\* Corresponding author's E-mail: ahmetoktener@yahoo.com

## Material and methods

Three hundred ninety-one fishes belonging to 10 species were examined from July 2007 to August 2008 (Table 1). The fish were preserved on ice for approximately 6 hr. Parasites were fixed in 70% ethanol and later examined using a stereomicroscope (American Optical). Identifications of parasites were performed according to Horton (2000) and Trilles (1968, 1972, 1975 and 1976). Classification and fish names were updated according to Akşiray (1987) and Froese and Pauly ([www.fishbase.org](http://www.fishbase.org) 2008). Prevalence (P) and the mean intensity were calculated according to Margolis et al. (1982) and Bush et al. (1997). All the parasite specimens are preserved in the collection of A. Öktener.

## Results and discussion

The parasites collected belong to the species *Anilocra physodes*, *Nerocila bivittata*, *Ceratothoa steindachneri*, *Ceratothoa oestroides*, *Mothocya taurica*, *Livoneca sinuata*.

### Order Isopoda

#### Family Cymothoidae Leach, 1814

#### Genus *Anilocra* Leach, 1818

#### *Anilocra physodes* L., 1758

One female of *Anilocra physodes* was found at the base of the pectoral fin of *Belone belone* (P= 1.89%). One female and one male were found on the body surface of *Chromis chromis* (P= 8.33%). Three female were collected from the body surface of *Serranus scriba* (P= 12.5 %). One female occurred on the body surface of *Conger conger* (P= 100%). *Anilocra physodes* is widely distributed in the Mediterranean, the Adriatic Sea and the Atlantic Ocean (Trilles 1994). This euryxenic species can be found infesting diverse fish species, including *Atherina boyeri*,

*Boops boops*, *Chrysophris* sp., *Dentex vulgaris*, *Diplodus annularis*, *Diplodus fasciatus*, *Diplodus vulgaris*, *Gadus capelenus*, *Lichia* sp., *Lithognathus mormyrus*, *Lophius piscatorius*, *Merluccius merluccius*, *Mugil cephalus*, *Mullus barbatus*, *Naucrates ductor*, *Oblada melanura*, *Pagellus acarne*, *Pagellus erythrinus*, *Pagrus auriga*, *Pagrus coeruleostictus*, *Pomatomus saltator*, *Raja clavata*, *Sardina pilchardus*, *Sciaena umbra*, *Scorpaena porcus*, *Serranus hepatus*, *S. scriba*, *Smaris alcedo*, *Spicara maena*, *Squatina angelus*, *Spondylisoma cantharus*, *Torpedo* sp., *Trachinus draco*, *Trigla* sp., *Trisopterus minutus*, *Uranoscopus scaber* and *Zeus faber* (Papoutsoglou 1976; Trilles 1994; Charfi-Cheikrouha et al. 2000; Öktener & Trilles 2004; Bariche & Trilles 2005; Ramdane et al. 2007). In Turkey, it has been reported from *Boops boops*, *Dicentrarchus labrax*, *Dentex macrophthalmus*, *Diplodus annularis*, *Diplodus vulgaris*, *Diplodus sargus*, *Labrus merula*, *Lithognathus mormyrus*, *Liza aurata*, *Oblada melanura*, *Pagellus* sp., *Pagellus erythrinus*, *Spicara smaridis*, *Spicara maena*, *Serranus scriba*, *Scomber japonicus*, *Sciaena umbra*, *Spondylisoma cantharus*, *Sparus aurata*, *Sphyrnaena chrysotaenia*, *Trachurus trachurus* in the Mediterranean Sea, the Sea of Marmara and the Aegean Sea (Öktener & Trilles 2004; Oğuz & Öktener 2007; İnnal et al. 2007; Kirkim et al. 2008). Two species belonging to the genus *Anilocra* (*Anilocra frontalis* and *A. physodes*) have been reported parasitizing Turkish fishes (Öktener & Trilles, 2004). For the first time, the genus and the species *A. physodes* are reported from *Belone belone*, *Chromis chromis*, *Serranus scriba* and *Conger conger* with respect to the Turkish and the world fauna.

#### Genus *Nerocila* Leach, 1818

#### *Nerocila bivittata* (Risso, 1816)

A teratologic female of *Nerocila bivittata*

Parasites/hosts species	NFE	NFI	P	PC
<b>Anilocra physodes Linnaeus, 1758</b>				
<i>Belone belone</i> Linnaeus, 1761	53	1	1.89	MS
<i>Chromis chromis</i> Linnaeus, 1758	12	1	8.33	AA
<i>Serranus scriba</i> (Linnaeus, 1758)	24	3	12.5	TA
<i>Conger conger</i> (Linnaeus, 1758)	1	1	100.0	SA
<b>Nerocila bivittata (Risso, 1816)</b>				
<i>Scorpaena scrofa</i> Linnaeus, 1758	12	1	8.33	GA
<b>Ceratothoa steindachneri Koelbel, 1878</b>				
<i>Serranus cabrilla</i> (Linnaeus, 1758)	17	1	5.88	GA
<b>Ceratothoa oestroides (Risso, 1826)</b>				
<i>Helicolenus dactylopterus dactylopterus</i> (Delaroche, 1809)	32	1	3.13	GA
<b>Mothocya taurica (Czerniavsky, 1868)</b>				
<i>Helicolenus dactylopterus dactylopterus</i> (Delaroche, 1809)	32	1	3.13	GA
<i>Trisopterus minutus</i> (Linnaeus, 1758)	78	2	2.56	MS
<b>Livoneca sinuata Koelbel, 1878</b>				
<i>Raja clavata</i> Linnaeus, 1758	8	2	25	BS
<i>Argentina sphyraena</i> Linnaeus, 1758	154	1	0.65	AS

NFE = Number of fish examined; NFI = Number of fish infASted; P = Prevalence (%);

PC = Place of collection; GA=Gökçeada(the Aegean Sea); AA=Ayvalık (the Aegean Sea); TA=Torbali Liman (the Aegean Sea); SA= Saros Bay, Bebek Kayalikları(the Aegean Sea); MS=the Sea of Marmara; BS=the Black Sea; AS=the Aegean Sea.

**Table 1.** Parasitological index of the Cymothoidae collected from Turkish seas.

was found on the operculum of one *Scorpaena scrofa* (P= 8.33%). *Nerocila bivittata* is widely distributed in the Mediterranean Sea, the Adriatic Sea and the Atlantic Ocean (Trilles 1994). In the Mediterranean, *Nerocila bivittata* is found primarily on fishes of the family Labridae, including *Crenilabrus pavo*, *Labrus viridis*, *Symphodus melops*, *Symphodus mediterraneus* and *Symphodus tinca*. It has sometimes been collected from hosts of the families, Centracanthidae, Cottidae, Gobiidae, Merlucciidae, Monacanthidae, Mugilidae, Mullidae, Sciaenidae, Scorpaenidae, Serranidae, Sparidae, Triglidae and Platycephalidae. Species from which the isopod have been collected include *Boops boops*, *Chelidonichthys lucernus*, *Cottus sp.*, *Gobius geniporus*, *Gobius niger*, *Lithognathus mormyrus*, *Merluccius merluccius*, *Monacanthus setifer*, *Mugil cephalus*, *Mullus surmuletus*, *Pagellus erythrinus*,

*Platycephalus indicus*, *Sciaena umbra*, *Scorpaena scrofa*, *Scorpaena porcus*, *Serranus scriba*, *Spicara maena*, and *Stephanolepis hispidus* (Trilles 1994; Charfi-Cheikrouha et al. 2000; Öktener & Trilles 2004; Bariche & Trilles, 2005; Ramdane et al. 2007). In Turkey, it has been mentioned from *Pagellus erythrinus*, *Pagellus sp*, *Labrus merula*, *Gobius niger*, *Sciaena umbra*, *Dentex macrophthalmus*, *Symphodus tinca*, *Parablennius sanguinolentus* in the Mediterranean Sea, the Sea of Marmara, the Aegean Sea and the Black Sea (Öktener & Trilles 2004; Oğuz & Öktener 2007; Alaş et al. 2008; Kirkim et al. 2008). Three species belonging to the genus *Nerocila* (*Nerocila bivittata*, *Nerocila maculata*, *Nerocila orbignyi*) have previously been reported parasitizing Turkish fishes (Öktener & Trilles 2004). In this study, *N. bivittata* was recorded for the first time from the largescaled scorpionfish, *Scorpaena scrofa*. That species is

a new host for *N. bivittata* with regard to the world fauna.

Genus *Ceratothoa* Dana, 1852

*Ceratothoa steindachneri* Koelbel, 1878

A male *Ceratothoa steindachneri* was found from gill cavity of one *Serranus cabrilla* (P=5.88%). *Ceratothoa steindachneri* is found in the Atlantic Ocean, the Mediterranean Sea and the Adriatic Sea (Trilles 1994; Horton 2000). The species is reported parasitizing several fishes including *Chlorophthalmus agassizi*, *Diplodus vulgaris*, *Echiichthys vipera*, *Serranus atricauda*, *S. hepatus*, *S. scribe*, *S. cabrilla*, *Raja asterias*, *R. polystigma*, *Rostroraja alba*, (Trilles 1994; Horton 2000; Cuyas et al. 2004; Horton & Okamura 2002; Horton et al. 2004). It has been mentioned only from *Chlorophthalmus agassizi* in the Mediterranean Sea of Turkey (Öktener et al. 2007). Five species: *Ceratothoa oestroides*, *C. parallela*, *C. italica*, *C. capri* and *C. steindachneri* were reported from Turkey (Öktener & Trilles 2004; Öktener et al. 2007). For the first time, *C. steindachneri* was collected on *S. cabrilla* in Turkey.

*Ceratothoa oestroides* (Risso, 1826)

A female *Ceratothoa oestroides* was found in the mouth of one *Helicolenus dactylopterus dactylopterus* (P=3.13%). This species is widely distributed in the Mediterranean and the Adriatic Sea. It has also been recorded from the northeast Atlantic Ocean including the northwest coasts of Africa (Trilles 1994). This ubiquitous species is found on many different host species with the families Centranchidae and Sparidae being the most frequently parasitized groups. *C. oestroides* has been found on *Boops boops*, *Diplodus annularis*, *Diplodus sargus*, *Diplodus vulgaris*,

*Pagellus acarne*, *Spicara sp.*, *Spicara maena*, and *Spicara melanurus*. Also, but rarely collected on *Abudefduf saxatilis*, *Liza aurata*, *Mullus barbatus*, *Phycis phycis*, *Sardina pilchardus*, *Scorpaena porcus*, *Scorpaena notata*, *Spondylisoma cantharus* and *Trachurus trachurus* (Trilles 1994; Charfi-Cheikrouha et al. 2000). It has recently been reported from *Dicentrarchus labrax* and *Sparus auratus* on fish farms in Adriatic Sea and Greece (Papoutsoglou et al. 1996; Sarusic 1999; Horton & Okamura 2003; Mladineo 2002). In Turkey, it has been mentioned from *Boops boops*, *Dicentrarchus labrax*, *Diplodus annularis*, *Diplodus vulgaris*, *Mullus surmuletus*, *Rostroraja alba*, *Sparus aurata*, *Scomber japonicus*, *Spicara flexuosa*, *Spicara smaridis*, *Spicara maena*, *Sardina pilchardus*, *Trachurus mediterraneus*, *Zeus Faber* in the Mediterranean, the Aegean Sea and the Sea of Marmara (Öktener & Trilles 2004; Kirkim et al. 2008). It is reported here for the first time from *Helicolenus dactylopterus dactylopterus* with regard to the Turkish and the world fauna.

Genus *Mothocya* Costa in Hope, 1851

*Mothocya taurica* (Czerniavsky, 1868)

A female *Mothocya taurica* was found in the mouth of one *Helicolenus dactylopterus dactylopterus* (P=3.13%). Two females *Mothocya taurica* were collected from the gill cavity of two *Trisopterus minutus* (P=2.56%). Known locations for this species are the Black Sea, particularly the Crimea, the regions of Kerch in Crimea and Gelendzhik, county of Krasnodar in Russia, and the Agigea region near Constanta, Romania. It has also been reported from Castiglione in the Mediterranean Sea (Trilles 1994). The species was collected from several fishes, particularly Clupeidae and shads. It has been found on *Alosa finta*, *Caspialosa pontica*,

*C. nordmanni*, *Engraulis encrasicolus ponticus*, *Sardina pilchardus*, *Sprattus sprattus phalericus* and *Trachurus mediterraneus ponticus*. In addition, it has been reported from *Atherina hepsetus*, *Gobius sp.*, *Scorpaena porcus*, and *Pomatomus saltator* (Trilles 1994; Öktener & Trilles 2004). It has been mentioned parasitizing *Alosa fallax* on the Black Sea coast of Turkey (Öktener & Trilles 2004). Three species belonging to the genus *Mothocya* (*Mothocya epimerica*, *M. belonae*, *Mothocya taurica*) were previously reported from Turkish fishes (Öktener & Sezgin 2000; Öktener & Trilles 2004). *Helicolenus dactylopterus dactylopterus* and *Trisopterus minutus* are new hosts for *M. taurica* with regard to the world fauna.

Genus *Livoneca* Leach, 1818

*Livoneca sinuata* Koelbel, 1878

Two female *Livoneca sinuata* were found in the gill cavity of *Raja clavata* (25%). A male and a female were found in the gill cavity of *Argentina sphyraena* (0.65%). *Livoneca sinuata* is widely distributed in the Mediterranean (Sicily, Gulf of Naples, Sea of Sciacca and Palerme, Sete, Gulf of the Lion and Marseilles, Tunis Gulf, Zembra, Bou Haroun, Algiers) and Atlantic (northwest coast of Spain, Punta Aguruncho, Isla de Arosa, Ria de Arosa and northwest Africa), Montenegro, Adriatic sea (Trilles 1994; Bello & Mariniello 1998), the Aegean sea coast of Turkey (Trilles & Öktener 2004). The species was reported from *Boops boops*, *Gobius sp.*, *Cepola macrophthalma*, *Raja miraletus*, (Trilles 1994) and more recently from *Brama brama*, *Sepiolo ligulata*, *Lepidopus caudatus* and *Trichiurus lepturus* (Bello & Mariniello 1998). It has been mentioned only parasitizing the cephalopod *Loligo vulgaris* from the Aegean Sea coast of Turkey (Trilles & Öktener 2004).

Two species (*Livoneca sinuata*, *L. pomatomi*) belonging to the genus were reported in Turkey from a decapod (*Nephrops norvegicus*) (Trilles & Öktener 2004; Ateş et al. 2006). *Raja clavata* is a new host for *L. sinuata* in Turkey and *Argentina sphyraena* with regard to the world fauna.

### Acknowledgements

We would like to thank to Tahsin Ceylan from Ayvalık Township for supplying materials.

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