

FIRST RECORD OF *CERATOTHOA OXYRRHYNCHAENA* (ISOPODA:
CYMOTHOIDAE) FROM TURKISH MARINE WATERS*Ahmet ÖKTENER*Department of Fisheries, Sheep Research Institute, Çanakale Street 7km., Bandırma, 10200, Balıkesir, Turkey
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ABSTRACT

Ceratothoa oxyrrhynchaena Koelbel, 1878, an ectoparasitic isopod (Cymothoidae), has been recorded for the first time in Turkish waters. The samples of *Lithognathus mormyrus* that hosted the isopod were collected with local fishing gears in the port of Babakale in the Turkish part of the Aegean Sea in 2014. The paper aims to present the morphological characters of *C. oxyrrhynchaena* with photos and drawings of the Turkish samples. These parasites are also frequently reported in aquaculture, where they can cause serious damage. Although the occurrence of *C. oxyrrhynchaena* in the Mediterranean Sea is well known, it had not been reported from Turkey previously. The present paper aims to inspire more detailed taxonomic studies about and comparisons with the cymothoid faunas of the neighbouring Mediterranean countries.

Key words: Turkey, *Ceratothoa oxyrrhynchaena*, Isopoda, Cymothoidae

PRIMA SEGNALEZIONE DI *CERATOTHOA OXYRRHYNCHAENA* (ISOPODA:
CYMOTHOIDAE) IN ACQUE MARINE DELLA TURCHIA

SINTESI

Ceratothoa oxyrrhynchaena Koelbel, 1878, un isopode ectoparassitico (Cymothoidae), è stato trovato per la prima volta nelle acque marine della Turchia. Gli esemplari di *Lithognathus mormyrus* infestati dall'isopode sono stati raccolti con attrezzi da pesca locali nel porto di Babakale, nella parte turca del mar Egeo, nel 2014. L'articolo si propone di presentare i caratteri morfologici di *C. oxyrrhynchaena* con foto e disegni dei campioni turchi. Questi parassiti sono frequentemente riportati anche in acquacoltura, dove possono causare gravi danni. Sebbene l'occorrenza di *C. oxyrrhynchaena* nel mare Mediterraneo sia ben nota, la specie non era stata segnalata in precedenza per la Turchia. Il lavoro si propone di ispirare studi tassonomici più dettagliati e confronti con le faune di Cimotoidi dei paesi mediterranei confinanti.

Parole chiave: Turchia, *Ceratothoa oxyrrhynchaena*, Isopoda, Cymothoidae

INTRODUCTION

Cymothoids are a family of ectoparasitic isopods found on the body, fins, or inside the buccal or branchial cavities of numerous freshwater and marine fish. They are protandrous hermaphrodites (Bariche & Trilles, 2005).

Several studies have been carried out to determine the effects of cymothoids on host fish (Fogelman *et al.*, 2009; Rameshkumar & Ravichandran, 2013; Elgendy *et al.*, 2018). Fogelman *et al.* (2009) investigated the effects of *Anilocra apogonae* on the five-lined cardinalfish, *Cheilodipterus quinquelineatus*. They found that the gonads of fish infested with cymothoids were smaller than those of non-infested fish, and that infested fish were inferior in weight and length to non-infested fish of the same age. Elgendy *et al.* (2018) examined the haematological and histopathological effects of *Nerocila bivittata* on *Tilapia zillii*. They determined that infested fish had lower erythrocyte, haemoglobin and haematocrit values than non-infested fish, and recorded serious histopathological damage in different sites of the body. Rameshkumar & Ravichandran (2013) discovered small pinholes in the tongues of *Carangoides malabaricus* infested by *Catoessa boscii*, and established that the increase in growth in non-infested fish was higher than in infested fish.

The World Register of Marine Species (WoRMS Editorial Board., 2018) lists thirty species within the genus *Ceratothoa*. Five of them (*Ceratothoa oestroides*, *Ceratothoa parallela*, *Ceratothoa italica*, *Ceratothoa steindachneri*, *Ceratothoa capri*) have also been reported from Turkish waters, but these studies include limited descriptions (Öktener & Trilles, 2004).

The present paper is the first report of *Ceratothoa oxyrrhynchaena* in Turkish waters with a description of the species' morphological characters. With the new record, the number of *Ceratothoa* species known in Turkey increases to six.

MATERIAL AND METHODS

Twelve samples of *Lithognathus mormyrus* (Linnaeus, 1758) (Sparidae) were collected using local fishing gears in the Turkish part of the Aegean Sea in 2014. The identification of parasites was performed mainly following Schioedte & Meinert (1883), Montalenti (1948), Trilles (1972), Horton (2000), Yamauchi (2009), Martin *et al.* (2013), and Hadfield *et al.* (2016). The parasites collected were fixed in 70% ethanol. The mouthparts and pleopods were dissected using Wild M5 stereo microscope. The dissected parts were mounted on slides in glycerine-gelatine mounting medium. The pleopods of the isopods were stained with methylene blue. The drawings of the appendages were carried out with the aid of a camera lucida (Olympus BH-DA). The photographs were taken with a Canon EOS 1100D camera

attached to a microscope. The measurements were taken in millimetres (mm), using a micrometric programme (Pro-way). The scientific names of the different host species were checked with the WoRMS Editorial Board (2018). The information on the feeding habits of the specific hosts were provided according to Froese & Pauly (2017).

RESULTS AND DISCUSSIONS

This parasitological study identifies the *Ceratothoa oxyrrhynchaena* from Turkish waters.

Ceratothoa oxyrrhynchaena Koelbel, 1878 (Isopoda; Cymothoidae) (Figs. 1–5)

Host: *Lithognathus mormyrus*; Infestation site: mouth cavity; Locality: Babakale Port; Prevalence: 16.6% on *L. mormyrus*; Total parasites: 2; Dissected material: 2.



Fig. 1: *Ceratothoa oxyrrhynchaena* (♀) (Scale: 12.5 mm).
Sl. 1: *Ceratothoa oxyrrhynchaena* (♀) (Merilo: 12,5 mm).

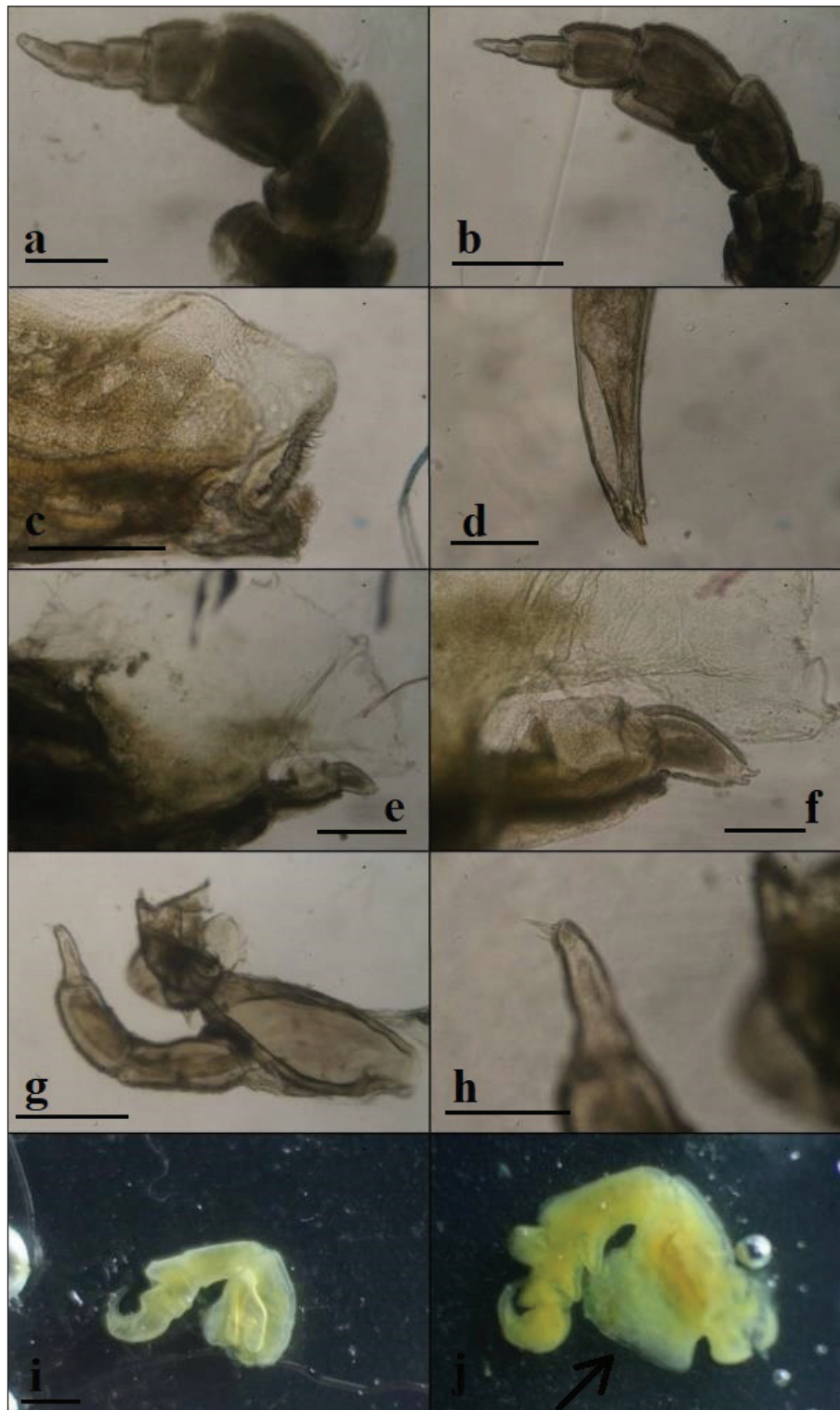


Fig. 2: *Ceratothoa oxyrrhynchaena* (♀): (a) antennule (0.38 mm); (b) antenna (0.48 mm); (c) maxilla (0.25 mm); (d) maxillula (0.14 mm); (e) maxilliped (0.34 mm); (f) distal of maxilliped (0.19 mm); (g) mandible (0.44 mm); (h) distal of mandible (0.30 mm); (i) 1. pereopod (1.21 mm); (j) 7. pereopod.

Sl. 2: *Ceratothoa oxyrrhynchaena* (♀): (a) antenula (0,38 mm); (b) antena (0,48 mm); (c) maksila (0,25 mm); (d) maksilula (0,14 mm); (e) maksiliped (0,34 mm); (f) distalni del maksilipeda (0,19 mm); (g) mandibula (0,44 mm); (h) distalni del mandibule (0,30 mm); (i) 1. pereopod (1,21 mm); (j) 7. pereopod.

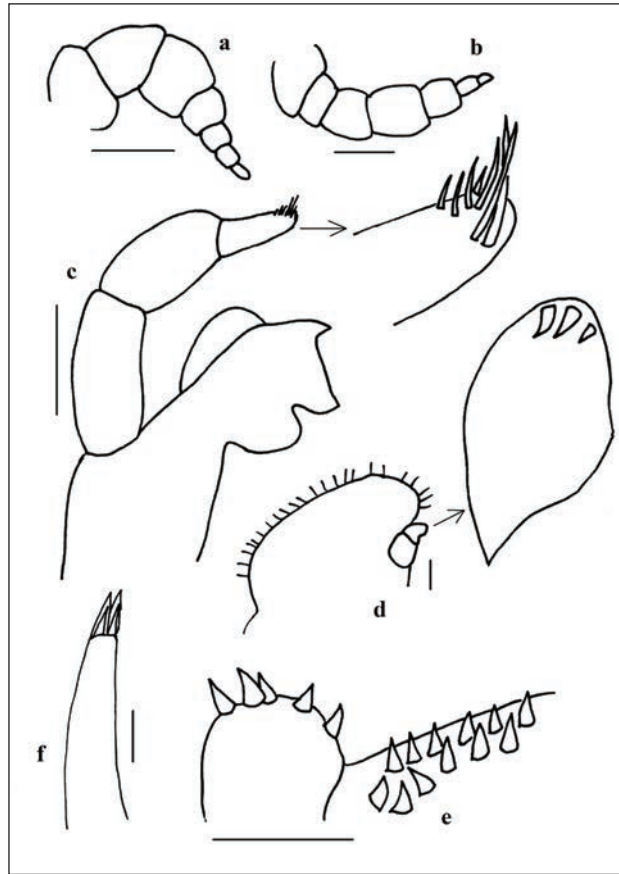


Fig. 3: *Ceratothoa oxyrrhynchaena* (♀); (a) **antennule** (0.77 mm); (b) **antenna** (0.48 mm); (c) **mandible** (0.44 mm); (d) **maxilliped** (0.53 mm); (e) **maxilla** (0.20 mm); (f) **maxillula** (0.15 mm).

Sl. 3: *Ceratothoa oxyrrhynchaena* (♀); (a) **antenula** (0,77 mm); (b) **antena** (0,48 mm); (c) **mandibula** (0,44 mm); (d) **maksiliped** (0,53 mm); (e) **maksila** (0,20 mm); (f) **maksilula** (0,15 mm).

Female: Body length from 22 to 25 mm. Body stout, gradual anterior-to-posterior expansion. Body about 3.5–4 times as long as wide. Eyes distinct but often hidden by antennules and antennae. Coxal plates of pereonites 1–3 inconspicuous, those of 4–7 visible in dorsal view. Pereonites 5–7 shortest, pereonites 1–4 subequal in length. Pereons 1–5 gradually increasing in width, widest at pereonite 5, narrowest at pereonite 1. All pleonites visible, first pleonite distinctly narrow, pleonites 3–5 slightly wider. Seventh pereonite curved medially, especially at its distal edge, and almost entirely covering pleonite 1 and a large part of pleonite 2, whereas the last three pleonites are completely visible. Pleotelson wider than longer, posterior margin slightly concave, its width about 2.8–3 times the length.

Antennule (Figs. 2a, 3a) composed of seven articles. Antenna (Figs. 2b, 3b) composed of eight articles, distal

article very small. Antennule and antenna extending to posterior margin of eye. Mandibular palp (2g, h, 3c) with the third article distinctly shorter than others and setae on apex. Maxillula (Figs. 2d, 3f) with four terminal spines, one long and three short ones. Maxilla (Figs. 2c, 3e) with two rows of spines. Maxilla medial lobe with 4–6 spines, lateral lobe with 10–12 spines. Maxilliped (Figs. 2e, f, 3d) of ovigerous female with oostegial lobe and distal palp with 3 apically recurved spines on article 3.

Pereopods (Figs. 4a–g) gradually increasing in length, all without spines; pereopods 1–4 slightly smaller than 5–7. Expansion of merus and basis on the upper edges of the seventh pereopod distinct from that of 1–6. Pleopods gradually decreasing in length. Peduncles of pleopods 1–4 (Figs. 5a–e) bear a number of hooks ranging from 2 to 4.

Uropods extending to the margin of pleotelson. Exopod (Fig. 4h) slightly longer than endopod.

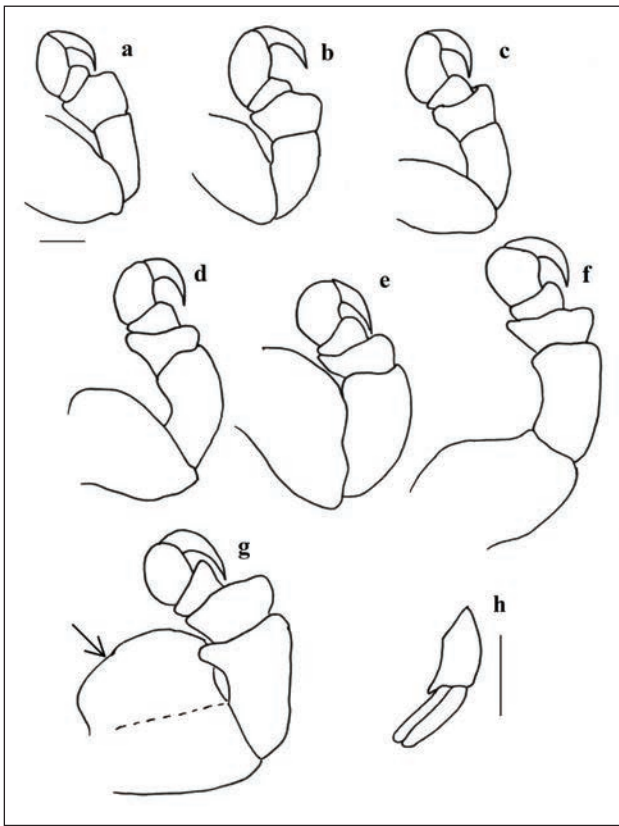


Fig. 4: *Ceratothoa oxyrrhynchaena* (♀): (a–g) Pereopod I–VII (0.78 mm); (h) uropod (1.66 mm).
Sl. 4: *Ceratothoa oxyrrhynchaena* (♀): (a–g) Pereopodi I–VII (0,78 mm); (h) uropod (1,66 mm).

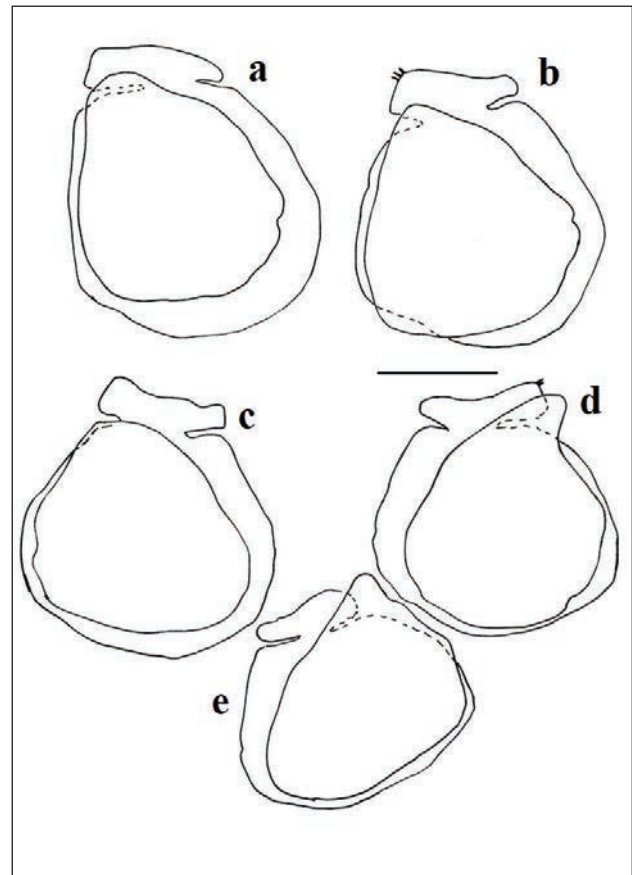


Fig. 5: *Ceratothoa oxyrrhynchaena* (♀): (a–e) Pleopod I–V (1.69 mm).
Sl. 5: *Ceratothoa oxyrrhynchaena* (♀): (a–e) Pleopodi I–V (1,69 mm).

Distribution: Pacific Ocean, Atlantic Ocean, Mediterranean (Trilles et al. (1989); Yamauchi (2009); Hadfield et al. (2016); Martin et al. (2013, 2015).

Hosts: *Boops boops* (Montalenti, 1948; Euzet & Trilles, 1961; Ramdane et al., 2007; Ramdane & Trilles, 2008); *Spicara maena* (Quintard-Dorques, 1966); *Spicara smaris* (Ramdane et al., 2007; Ramdane & Trilles, 2008); *Spicara* sp (Montalenti, 1948), *Raja asterias*, *Raja clavata*, *Scylliorhinus stellaris*, *Torpedo marmorata* (Capape & Pantoustier, 1976); *Zeus faber*, *Dentex macrophthalmus* (Trilles, 1972; Rokicki, 1985); *Dentex spariformis* (Martin et al., 2013); *Doederleinia berycoides* (Yamauchi, 2009; Yamauchi & Nunomura, 2010); *Lithognathus mormyrus* (Bariche & Trilles, 2005).

The hosts parasitized by *Ceratothoa oxyrrhynchaena* were classified by family characteristics: 31% of the 13 host species belonged to Sparidae; 23% to Centrarchidae; 15% to Rajidae; 31% to other families.

The hosts parasitized by *Ceratothoa oxyrrhynchaena* were classified by type of habitat: 39% of the 13 host fish species were demersal; 15% were reef-associated; 23% benthopelagic; 23% pelagic-neritic.

The hosts parasitized by *Ceratothoa oxyrrhynchaena* were classified by feeding habits: 69% of the 13 host fish species were carnivorous, 31% omnivorous.

Remarks: This species is recorded for the first time in Turkish waters. An antennule with 7 articles and an antenna with 9 articles were found in this study, as opposed to an antennule with 7 articles and an antenna with 7 articles found by Montalenti (1948), Trilles (1972), Yamauchi (2009); and an antennule with 7 articles and an antenna with 9 articles by Schioedte & Meinert (1883), Martin et al. (2013). The maxillula with four terminals found in this study is compatible with Trilles (1972), Montalenti (1948), Yamauchi (2009), Martin et al. (2013). This study shows a maxilla medial lobe with 4–6 spines and lateral lobe with 10–12 spines, as opposed to the maxilla medial lobe with 6 spines and lateral lobe with 15 spines in Montalenti, (1948); the maxilla medial lobe with 1 spine and lateral lobe with 9 spines in Trilles, (1972); the maxilla medial lobe with 8 spines and lateral lobe with 15 spines in

Yamauchi (2009); the maxilla medial lobe with 3 spines and lateral lobe with 10 spines in Martin *et al.* (2013). The third article with setae on the lateral margin of the mandible palp found in this study is compatible with Trilles (1972) and Montalenti (1948), but different from the mandible palp without spines found by Montalenti (1948), Yamauchi (2009), Martin *et al.* (2013). Three spines on article 3 of the maxilliped were found in an ovigerous female in this study, as opposed to article 3 of the maxilliped with 2 spines in a non-ovigerous female and 3 spines found in an ovigerous female by Montalenti (1948); 8 spines on article 3 of the maxilliped of a female found by Trilles (1972); 9 spines on article 3 of maxilliped of a female found by Yamauchi (2009); and 5 spines on article 3 of maxilliped in a female found by Martin *et al.* (2013). The morphological characters of *Ceratothoa oxyrrhynchaena* followed the key to the *Ceratothoa* as prepared by Horton (2000): "Cephalon not curved towards rostrum. Prominent merus expansion on all pereopods, most noted on pereopod VII.

Very prominent expansions of the basis on pereopod VII reaching the level of propodus. Pleotelson not wider than pereonite VII, body almost triangular in shape. Cephalon deeply immersed, shoulders of pereonite I level with anterior margin of eyes." The morphological characters are compatible with Horton (2000) and other literature. Hooks were discovered on the medial part of the pleopod peduncle. This important finding distinguishes this study from other research papers.

Therefore, the *Ceratothoa oxyrrhynchaena* presented herein, together with the previously reported five species, brings the total number of species of *Ceratothoa* in Turkey to six.

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