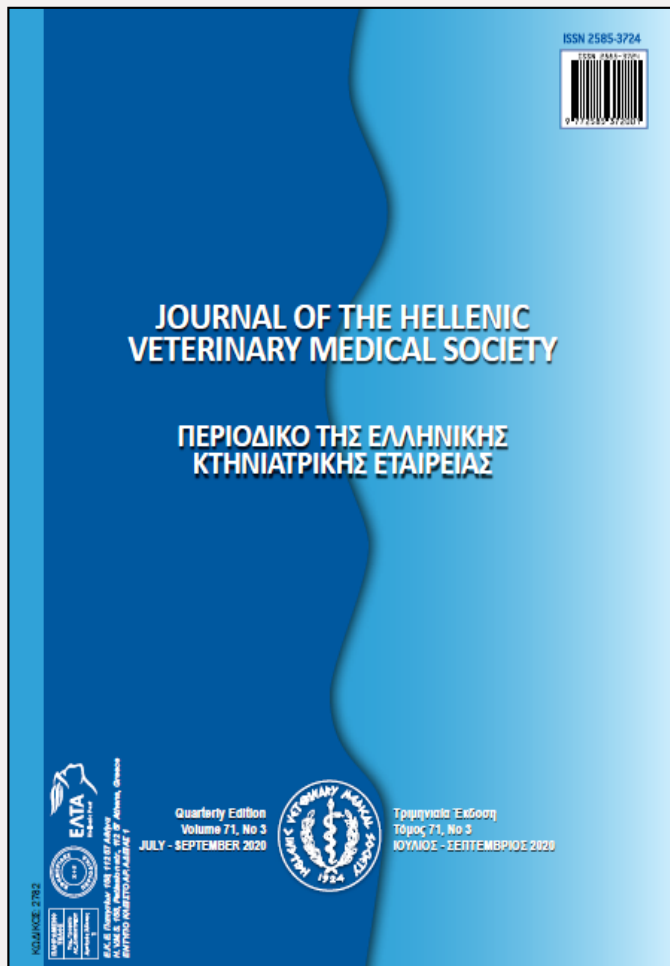


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First occurrences of *Nerocila bivittata* on Dusky Grouper (*Ephinephelus marginatus*) and Mottled Grouper (*Mycteroperca rubra*)

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ABSTRACT: The parasitic Isopod *Nerocila bivittata* was collected from caudal fins and body surface of dusky grouper (*Ephinephelus marginatus*) and mottled grouper (*Mycteroperca rubra*) captured by commercial trawl vessels as non-target species from Antalya Bay which is located in the eastern Mediterranean coast of Turkey. The parasites caused typically hemorrhages on caudal fins of both hosts. The parasitic isopod was identified as *Nerocila bivittata* which has not been reported from groupers in the worldwide. The study represents new hosts and geographical records.

Keywords: *Nerocilia bivittata*, Isopoda, *Ephinephelus marginatus*, *Mycteroperca rubra*

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INTRODUCTION

The dusky grouper (*Epinephelus marginatus*) and mottled grouper (*Mycteroperca rubra*) which is the most important littoral fish species (Maggio et al., 2006) are greatly distributed worldwide from the eastern Atlantic Ocean to the Mediterranean Sea (Bouchereau et al., 1999). Groupers, members of the genus *Epinephelus*, are mostly tropical fish species. Distributions of them in subtropical and temperate waters are limited (Dulcic et al., 2006). *E. marginatus* is one of the seven species of groupers which were recorded in the Mediterranean Sea (Harmelin and Vivien-Harmelin, 1999). The mottled grouper, *M. rubra* prefers the shallow rocky habitats and occurs at depths less than 40 metres in the eastern Mediterranean Sea (Aranov and Goren, 2008). The members of Epinephelinae subfamily are more popular than the other fish species in the worldwide due to their commercial importance (Genç et al., 2005). Also, groupers play an important role in the ecological stability of marine ecosystems (La Mesa et al., 2006). For these reasons, many researches carried out studies on ecology (Hackradt, 2012), distribution (Mahé et al., 2012), growth (Bouchereau et al., 1999) reproduction (Andrade et al., 2003, Glamuzina et al., 1998), genetic (Maggio et al., 2006), larval evolution (Cunha et al., 2009), breeding (Marino et al., 2001) and diseases included bacterial, viral and parasitic infections (Eissa et al., 2011; Moravec and Justine, 2008; Katharios et al., 2004) of them.

Parasitic diseases are among the major problems in the aquaculture and hunting of food fish species. About 25% of parasitic agents include crustaceans such as copepod, brachiura and isopod species. The Isopoda are the second largest order and contain terrestrial and aquatic species (Kirkim et al., 2008). Marine species of this order are divided into 12 suborders which include Cymothoidae and this suborder possess Cymothoidae family presented by 43 genera and 358 species (Worms, 2018). *Nerocila bivittata* is a parasite species belong to the family Cymothoidae. It shows a wide distribution including the British waters, French coasts, Black Sea, Marmara and Aegean Seas (Fig. 1: Kayış and Er, 2012; Akmirza 2014; Kirkim et al., 2008). Although *N. bivittata* acts specifically in choice of host and has been usually reported on the members of the family Labridae, e.g. *Symphodus mediterraneus*, *S. tinca*, *S. melops* (Bariche and Trilles, 2005), there are many reports about different host species such as *Boops boops*, *Gobius geniporus*, *Mugil cephalus*, *Sciaena umbra*, *Labrus merula* for *N. bivittata* (Trilles 1994; Charfi-Cheikhrouha et al, 2000; Oğuz and Öktener 2007;

Kirkim et al, 2008; Akmirza 2014).

The main objective of the present study was to inform as new hosts dusky grouper, *Epinephelus marginatus* (Lowe, 1834) and mottled grouper, *Mycteroperca rubra* (Bloch, 1793) for *Nerocila bivittata*. This is also the first record of *N. bivittata* from the Gulf of Antalya, coastal waters of Mediterranean Sea in Turkey.

MATERIALS AND METHODS

Nerocila bivittata was found on dusky grouper (*Epinephelus marginatus*) and mottled grouper (*Mycteroperca rubra*) in the Mediterranean Sea coastal waters of Turkey. These fish species were captured by commercial trawl vessels as non-target, from Antalya Bay, which is located in the eastern Mediterranean coast of Turkey, on November 2014. The capture depth and coordinate of the specimens was 70 meters and 36° 46' 515'' N, 031° 12' 660'' E and 36° 46' 783'' N, 031° 08' 850'' E, respectively (Fig. 1). The parasites were removed from the body and fin surfaces of hosts and immediately preserved in 70% ethanol until brought to our faculty research laboratory. Subsequently, the fixed parasites were examined under a stereomicroscope. The total lengths of the isopods were measured and recorded in millimeters. Morphological characteristics of the parasites and these characters were used for the descriptions of the parasites (Risso, 1816; Brusca, 1978; Brusca, 1981).

RESULTS

A hemorrhagic lesion on caudal fin rays of *E. marginatus* where *Nerocila bivittata* was attached was observed (Fig.2). But, another external clinical finding except this lesion was not detected. The parasite was also detected on the caudal fin and body surface of *Mycteroperca rubra* (Fig. 3).

N. bivittata has dark brown body colour and there are two white strips along the dorsal part of body. The body is oval-shaped, the shell is cambered and bright. The head of the *N. bivittata* is small, rounded and flattened. There are seven large sections in the body followed by five smaller segments. The first three of its external antennas are swollen. Tail of the parasite is wide and almost square in shape. Extremities of *N. bivittata* are lanceolate and have small points at the ends. Uropod is twice the length of the endopod. Distal margin of endopod deeply intended. Totally, 3 parasites were detected on fishes and the average body length and width of them were measured as 17.2 mm and 8.3 mm, respectively. The species was identified as *Nerocila bivittata*.

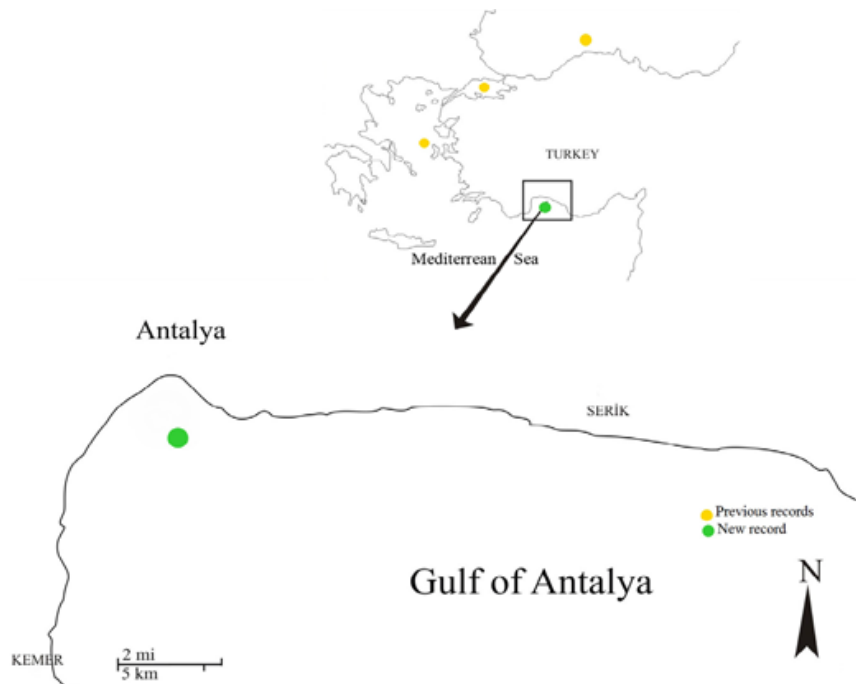


Figure 1. The map showing the previously records (yellow dots; Kayış and Er 2012; Akmirza 2014; Kirkim et al 2008) and new record (green dot) for *Nerocila bivittata* in Turkey.



Figure 2. *Nerocila bivittata* on the caudal fin of *Ephinephelus marginatus* and hemorrhagic lesion.



Figure 3. *Nerocila bivittata* on caudal fin and body surface of *Mycteroperca rubra*.

DISCUSSION

The Order Isopoda are widely distributed in all habitat types including terrestrial, marine, fresh and ground water. Some species are known as parasites and infested to the marine, freshwater and brackish water fish species (Bariche and Trilles, 2005). Parasitic isopods as crustacean ectoparasites are the most commonly reported group in marine fish species (Kabata, 1984). They are attached on the body surface, the fins, in the gill chambers, buccal cavity and nostrils or they make a pouch in the muscle of many wild tropical and cultured fish having economic value (Williams and Williams, 1994; Brusca, 1981). Isopods are haematophagous species and produce an anticoagulant substance from their latero-oesophagus glands (Bariche and Trilles, 2005). They feed on their host's blood and haemolymph and cause lesions on the body surfaces of their hosts so these parasites bring about a decrease in the economic value of the fish (Printrakoon and Purivirojkul, 2011).

N. bivittata has been described in 1816 for the first time by Risso (Risso, 1816). In 1818, the parasite was considered as a new species and described it as *Nerocila blainvillii* and Risso reported that *N. blainvillii* as the single species found in the genus. The author's specimen has been preserved in the British Museum (BMNH 1979: 400:2) but has never been fully described. Subsequently, this material as *Nerocila bivit-*

tata was identified and recorded as conspecific with *N. blainvillii* (Trilles, 1975).

N. bivittata was generally reported from the Mediterranean countries such as Greece, Egypt, Lebanon, Libya and Algerian (Trilles 1994; Ramdane et al. 2007; Shakman et al 2009; Kolygas M 2014; Elgendy et al., 2018). This parasitic species has been isolated from many fish species such as *Siganus luridus*, *Mullus surmuletus*, *Mugil cephalus*, *Serranus scriba*, *Pagellus erythrinus*, *Meluccius merluccius*, *Belone belone*, *Uranoscopus scaber*, *Dentex macrophthalmus* from the Black, Marmara and Aegean Seas in Turkey (Oktener and Trilles, 2004; Kirkim et al., 2008; Oguz and Oktener, 2007; Alas et al. 2008; Oktener et al., 2010; Er and Kayis, 2015).

CONCLUSION

As results of the present study, the parasitic isopod *Nerocila bivittata* (Crustacea, Isopoda, Cymothoidae) on dusky grouper (*Ephinephelus marginatus*) and mottled grouper (*Mycteroperca rubra*) is the first record in the worldwide and also the first notification of *Nerocila bivittata* from the coastal waters of Mediterranean Sea, Gulf of Antalya in Turkey.

CONFLICT OF INTEREST

None declared by the authors.

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