

RESEARCH ARTICLE

**Occurrence of the squat lobster *Munida curvimana*
A. Milne Edwards & Bouvier, 1894 and Columbus crab
Planes minutus (Linnaeus, 1758) in Turkey**

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Abstract

The present study reports the first record of *Munida curvimana* and second record of *Planes minutus* in Turkish waters. A male specimen of *M. curvimana* was collected by a commercial set net in Antalya Bay, Turkey in 2007. A male specimen of *P. minutus* was found on the loggerhead sea turtle that was captured by driftnet as a bycatch in Fethiye Bay in 2005. The morphometric characteristics and the updated distribution of squat lobster and Columbus crab in the Mediterranean Sea are presented.

Keywords: Decapoda, *Munida curvimana*, *Planes minutus*, *Caretta caretta*, symbiosis, Eastern Mediterranean

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Introduction

Crustaceans contribute to the marine trophic chain and some species can be considered as important components of fisheries industry due to their economical values (Melo 1996; Boudreau and Worm 2012). Order Decapoda exhibits more than 10,000 species that include shrimps, lobsters, crayfish, hermit crabs and true crabs (Sainte-Marie 2007). Bakır *et al.* (2014) reviewed the marine crustaceans in Turkey and reported that a total of 261 identified decapod species.

Squat lobster *Munida curvimana* Milne Edwards & Bouvier, 1894 is reported from rocky, muddy and silty substratums (Pastore 1972; Koukouras *et al.* 1998). *M. curvimana* shows the distribution in the north-west Africa (Holthuis and Gottlieb 1958), the eastern Atlantic (Araújo and Calado 2003), the western Mediterranean (Zariquiey Alvarez 1968), the central Mediterranean (Pastore 1972), and the eastern Mediterranean (Holthuis and Gottlieb 1958; Koukouras *et al.* 1998; Chartosia *et al.* 2018). In general, this anamuran species has been occasionally documented in the literature.

Planes minutus (Linnaeus, 1758), is a relatively small pelagic species, commonly known as the Columbus crab or oceanic crab. *P. minutus* lives on the drifting kelp (mainly *Sargassum*), seaweed, and the floating objects such as plastic flotsam, jellyfish and sea turtles (Spivak and Bas 1999; Frick *et al.* 2011; Pfaller and Gill 2016). In addition, *P. minutus* individuals are also observed on beaches and under rocks (Chace 1951; Davenport 1992; Dellinger *et al.* 1997). *P. minutus* has been reported in the Indian Ocean, North Atlantic, North Sea, Adriatic Sea, Mediterranean Sea, and along the coasts of Africa (Spivak and Bas 1999; Frick *et al.* 2004; Pons *et al.* 2011; Tutman *et al.* 2017).

Little is known about the distribution and ecology of the Columbus crab in the Mediterranean Sea. Several studies indicated that some biological and ecological characteristics of *P. minutus*, such as fecundity (Frick *et al.* 2004), feeding (Frick *et al.* 2011), swimming mechanism (Davenport 1992), and social monogamy (Pfaller *et al.* 2014; Pfaller and Gill 2016).

M. curvimana is reported for the first time in the present study in Turkish waters, whilst the first record of *P. minutus* in Turkish waters has been given by Enzenross and Enzenross (1987) from Samandağ (South-East part of Turkey). The aforementioned study does not include information about the habitat, depth and the sampling method of *P. minutus*. The present study provides the information related to the first record of *M. curvimana* and the second record of *P. minutus* in Turkish waters.

Materials and Methods

The specimen of *M. curvimana* was obtained by set net as a bycatch at the depth of 55 m in Gazipaşa coast of Antalya Bay (Eastern Mediterranean) (Figure 1) in August 2007 and preserved in 10% formalin. The specimen of *P. minutus* was collected on a loggerhead sea turtle (*Caretta caretta*) captured as bycatch by swordfish driftnets 10 miles off Fethiye Bay in June 2005. Depth contour of the sampling area varied between 1000-2000m. During the field survey, 18 tows were observed and a total of three turtles (*C. caretta*) were bycaught. The crab specimen was removed from the turtle on the board and preserved in 10% formalin.

In the laboratory, the specimens were examined with a stereo microscope Olympus SZ70. The following somatic parts of specimens were measured by caliper: carapace width (CW), and carapace length (CL).

Results

Munida curvimana

This study reports the first record of *M. curvimana* in Turkish waters. The CW and CL of *M. curvimana* specimen were 10.2 and 20.0 mm, respectively.

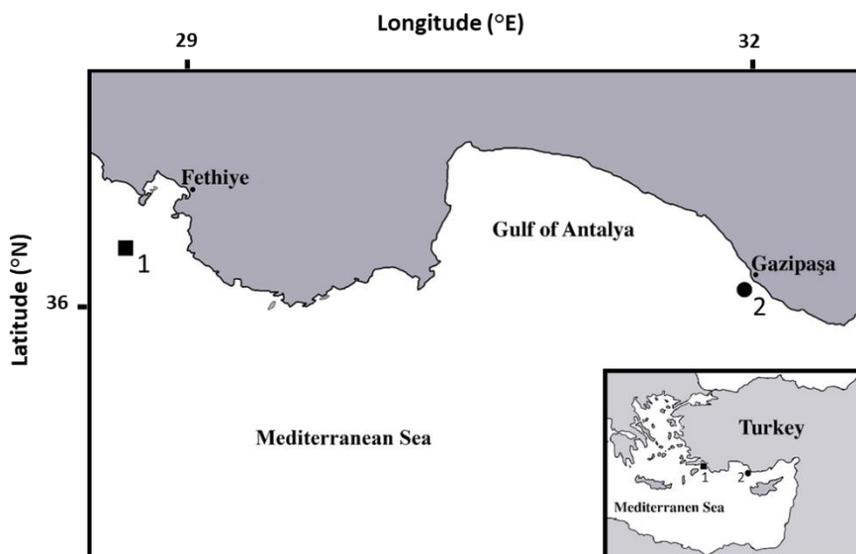


Figure 1. Map of the sampling sites (station 1 for *Planes minutus*: 36° 27' 02"N 28° 46' 45"E, station 2 for *Munida curvimana*: 36° 17' 08"N 32° 13' 27"E)

Taxonomic key to species of the genus Munida from Turkish waters (modified from Rodríguez-Flores *et al.* 2019).

- 1- Characteristic with small eyes, cornea not much broader than the eye-stalks. Maximum corneal diameter about 1/4 length of anterior border of carapace between external orbital spines and abdominal somites 2 and 3 with spines on anterior ridge***M. rugosa***
 -Characteristic with large eyes, cornea dilated. Maximum corneal diameter equal to or greater than 1/4 length of anterior border of carapace between external orbital spines.....**2**
 2- P1 fingers more than 3 times length of palm. Abdominal somites only with spines on anterior ridge of somite 2***M. curvimana***
 -P1 fingers as long as or slightly longer than palm. Abdominal somites at least with spines along anterior ridge of somites 2 and 3.....**3**
 3- Antennal article 1 mesially expanded to epistomic ridge.....***M. speciosa***
 -Antennal article 1 notmesially expanded to epistomic ridge.....**4**
 4- Extensor margin of merus of Mxp3 with distal spine. Abdominal somite 4 with or without spines.....***M. intermedia***
 -A single spinule exist on hepatic region, anterior branchial region unarmed.....**5**

5- Carapace unarmed in cardiac region. 6–7 ridges in cardiac region. Abdominal somites 2–3 each with 2–4 additional transverse ridges on tergite
.....*M. tenuimana*

Description of Munida curvimana

The body of *M. curvimana* includes cream, brown, orange, and red colours. In particular, claws exhibit dark and light coloured areas. Spines on chelipeds are generally white. *M. curvimana* has long claws, which is the reason for its common name “long clawed Galatheid” and with these claws; it is easily separated from other species of this genus. *M. curvimana* also has long antennae. The three rostral spines are squamose dorsally. A strong spine is located behind each of the lateral rostral spines. Furthermore, the upper margin of the dactylus has a strong spine (Figure 2).

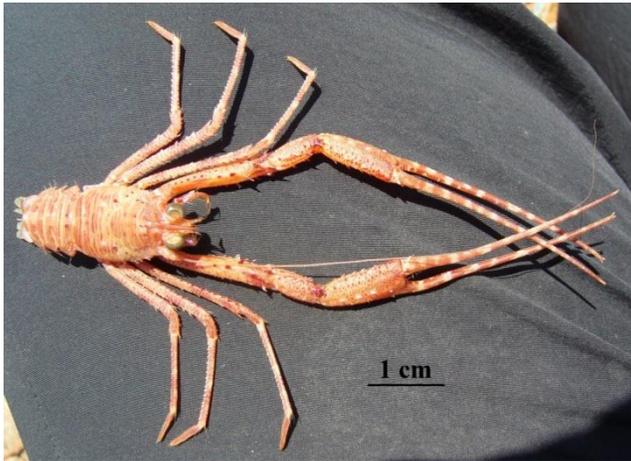


Figure 2. The male specimen of *Munida curvimana* from Antalya, Turkey (Photo was taken at the fishing boat and specimen exhibited the original colour).

Planes minutus

Although three loggerhead turtles (*C. caretta*) were captured as bycatch during the survey, only one of them had a male specimen of *P. minutus* on the hind flipper. CW and CL of *P. minutus* specimen were 18.3 and 19.2 mm, respectively.

Description of Planes minutus

The colour is extremely variable; the Columbus crab is generally brown or olive green, with shades of ranging from yellow to red. Specimens often have whitish patches of varying shades on carapace and limbs (Pollock, 1998). Chelipeds are

robust and exhibit equal size. The pereiopods are very flattened. The last two segments of the second pair are slightly hairy at the level of the hulls (Figure 3).



Figure 3. The male specimen of *Planes minutus* from Fethiye, Turkey (Photo was taken at the fishing boat and specimen exhibited the original colour).

Discussion

M. curvimana shows the distribution in the western, central and eastern Mediterranean (Figure 4A). This anamuran species was recently reported from Cyprus (Chartosia *et al.* 2018). It was considered that this species might be rare in comparison to other *Munida* species. To date, only two records were reported from Levantine (Israel and Cyprus) (Holthuis and Gottlieb 1958; Chartosia *et al.* 2018). Bakır *et al.* (2014) reported four species belonging *Munida* genus including *Munida intermedia* A. Milne Edwards and Bouvier, 1899, *Munida rugosa* (Fabricius, 1775), *Munida rutllanti* Zariquiey Álvarez, 1952 (revised name is *Munida speciose* von Martens, 1878) and *Munida tenuimana* G.O. Sars, 1872 in Turkish waters. With the present study, the genus *Munida* is represented with five species in Turkey.

The dominant habitat type of our sampling areas, where *M. curvimana* was collected, was calcareous algae. Previous studies reported that this species is also found at muddy bottom, rocky and silty substratum (Pastore 1972; Koukouras *et al.* 1998). However, Araújo and Calado (2003) indicated that *M. curvimana* was threatened by habitat degradation and pollution.

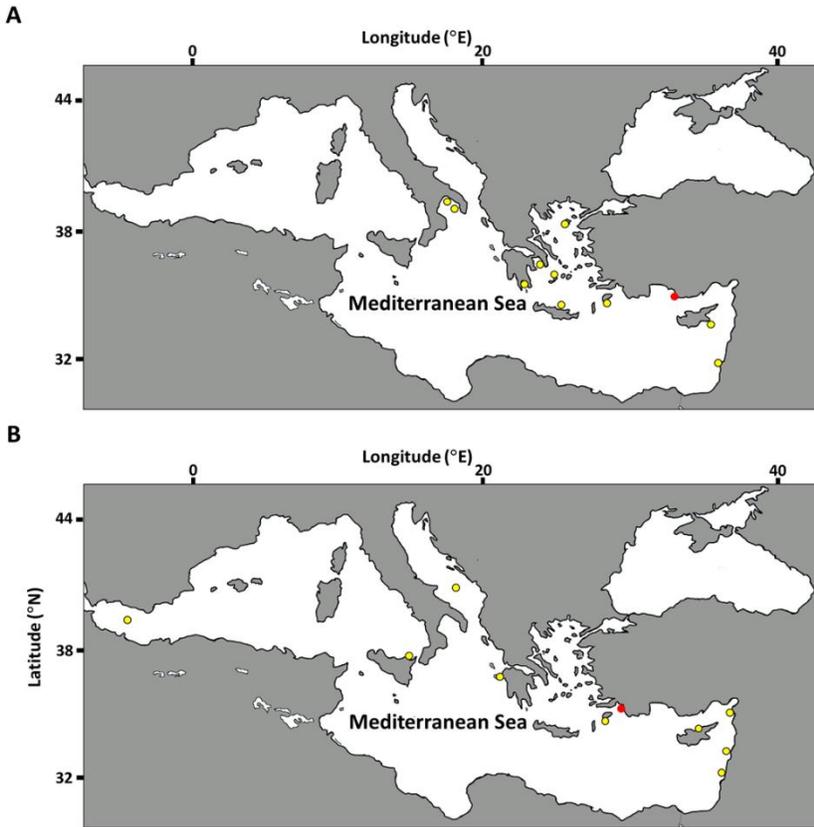


Figure 4. Distribution of A) *Munida curvimana*, and B) *Planes minutus* in the Mediterranean Sea. Yellow dots show localities published previously and red dots show new localities (the present study). The maps were modified from the website of OBIS (2018) and previous studies (Pastore 1972; Koukouras *et al.* 1998; Margaritoulis and Touliaou 2011; Corsini-Foka and Pancucci-Papadopoulou 2012; Maiorano *et al.* 2013; Marco-Herrero *et al.* 2015; Tutman *et al.* 2017; Chartosia *et al.* 2018).

In contrast to *M. curvimana*, *P. minutus* is distributed in larger areas (Figure 4B). Although it is most abundant in the Atlantic Ocean, this crab species has also been reported from the Indian and Pacific Ocean and Mediterranean (Holthuis and Gottlieb 1958). *P. minutus* was reported on the south coast (Samandağ) of Turkey in 1987 (Enzenross and Enzenross 1987). Our study provides an additional information as the second record of *P. minutus* for Turkey.

P. minutus mainly feed on barnacles, amphipods during the daytime whereas its main preys are euphausiids at night (Davenport 1994). *P. minutus* is a small crab species; commonly less than 20 mm in carapace width (Davenport 1992). Our

results show that the carapace width of specimen was 18.3 mm. Similarly, Enzenross and Enzenross (1987) measured the CW of *P. minutus* specimen as 18.0 mm in Samandağ.

P. minutus individuals are known to live on *C. caretta* and they are generally found on turtles' tails, hind flippers, and fore flipper (Davenport 1994). Similarly, the present study shows that *P. minutus* specimen was found on the hind flipper of loggerhead sea turtle. In our study, only one specimen was found in spite of the capture of three sea turtles. Moreover, *P. minutus* has been reported from shallow waters (beaches or floating objects) in previous studies (Davenport 1992; Dellinger *et al.* 1997; Pfaller and Gill 2016).

In conclusion, the present study provides new localities for two crustacean species which are rarely reported in the Mediterranean Sea. The revision of the distribution areas of species contributes to the understanding of biodiversity and decision-making in conservation (Mota-Vargas and Rojas-Soto 2012).

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Keşiş istakozu *Munida curvimana* A. Milne Edwards & Bouvier, 1894 ve Columbus yengeci *Planes minutus* (Linnaeus, 1758)'nin Türkiye'de mevcudiyeti

Öz

Bu çalışma Türkiye denizlerinden *Munida curvimana*'nın ilk kaydını ve *Planes minutus*'un ikinci kaydını rapor etmektedir. *M. curvimana*'nın erkek bireyi 2007 yılında Antalya Körfezi'nde ticari uzatma ağları ile toplanmıştır. *P. minutus*'un erkek bireyi ise 2005 yılında Fethiye Körfezi'nde sürüklenen pelajik uzatma ağları ile hedef dışı tür olarak yakalanmış deniz kaplumbağasının üzerinde bulunmuştur. Çalışmada Akdeniz'de bulunan keşiş istakozu ve Columbus yengecinin morfolojik özellikleri sunulmuştur.

Anahtar kelimeler: Decapoda, *Munida curvimana*, *Planes minutus*, *Caretta caretta*, simbiyosis, Doğu Akdeniz

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