

## SHORT NOTE

# Has the portunid crab *Charybdis feriata* already established a population in the Mediterranean Sea?

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**Abstract:** The crucifix crab *Charybdis feriata* (Linnaeus, 1758) is reported for the third time in the Mediterranean Sea. An adult male was captured on 6<sup>th</sup> November 2017 with a trammel net in the fishing grounds off Tarragona at 22 m depth on sandy-muddy bottoms. The record from this study confirms the spreading of *C. feriata* throughout the northwestern Mediterranean Sea, and allows inferring the occurrence of an established population in the area, although so far at a low settlement level.

**Résumé :** *Le crabe portunidé Charybdis feriata a-t-il déjà établi une population en Méditerranée ?* Le crabe crucifix *Charybdis feriata* (Linnaeus, 1758) est signalé pour la troisième fois en Méditerranée. Un mâle adulte a été capturé le 6 novembre 2017 avec un trémail dans les zones de pêche au large de Tarragone à 22 m de profondeur sur des fonds sablo-vaseux. Le bilan de cette étude confirme la dissémination de *C. feriata* dans le nord-ouest de la Méditerranée et permet d'en déduire l'existence d'une population établie dans la zone, même si, à ce jour, le niveau de peuplement est bas.

**Keywords:** *Charybdis feriata* • Portunid swimming crab • Invasive species • Range extension • Mediterranean Sea

## Introduction

The crucifix crab, *Charybdis feriata* (Linnaeus, 1758) is a portunid crab widely distributed in the Indo-Pacific region (Stephenson et al., 1957; Stephenson, 1972; Apel & Spiridonov, 1998; Ng, 1998). It usually occurs sublittorally at depths of approximately 10-60 m on muddy and sandy bottoms (Ng, 1998; Yan et al., 2004). Juvenile crabs inhabit sandy coastal and intertidal habitats, while adults are

preferentially found in deeper muddy areas (Baylon & Suzuki, 2007). In its native distribution area it is extensively exploited by directed fisheries and trawl bycatch (Chatterji et al., 1994; Dineshbabu, 2011; Dash et al., 2014). Fisheries catches show a strong seasonality, with peak densities taking place mainly during full moon and new moon (Chatterji et al., 1994). It has a high commercial value being caught mainly by bottom trawls, sometimes by traps and fixed nets, and it is often sold frozen. However with the recent expansion of live fish markets, this species is now maintained in aquaria and hold tanks, and exported throughout eastern Asia (Ng, 1998).

The first report of this Indo-Pacific portunid crab in the Mediterranean Sea took place off Barcelona (Catalan coast) in December 2004 (Abelló & Hispano, 2006). The second Mediterranean sighting was reported in the Ligurian Sea off Livorno (Italy) in December 2015 (Karachle et al., 2016). The current record constitutes the third observation for the Mediterranean Sea and the second for the Catalan coast.

The present study aims to report the range extension of the swimming crab *C. feriata* in the northwestern Mediterranean Sea, not just geographically, but also along the time axis, which may confirm the establishment of the species in the study area.

### Material examined and morphological characteristics

On 6<sup>th</sup> November 2017, a large portunid crab was captured with a trammel net in the northwestern Mediterranean Sea in the fishing grounds off Tarragona (approximate position: 41°04'N-1°12'E) at 22 m depth on sandy-muddy bottoms (Fig. 1). According to the morphological and colour descriptions provided by Ng (1998) and Apel & Spiridonov (1998), the specimen was identified as an adult male of *Charybdis feriata*. This portunid crab has a distinctive colour pattern of longitudinal bands of maroon and white with a cross-shaped pattern on the gastric region (Fig. 2).

The following morphometric measurements were taken on the crab with a digital calliper with a 0.1 mm precision

level: long carapace length (LCL) 82.6 mm (from tip of the frontal teeth to the posterior end of the carapace), short carapace length (SCL) 82.0 mm (from rostral notch to the posterior end of the carapace), carapace width (CW) 133.7 mm (from tip to tip of the last anterolateral teeth), right propodus cheliped length (RCL) 115.2 mm (from tip of the propodus to the posterior ventral end of the propodus), and right propodus cheliped height (RCH) 33.8 mm (from dorsal anterior end; excluding dorsal spine, perpendicularly to ventral propodus side). The specimen weighed 394 g. It was also visually examined for the possible occurrence of macroepibionts. Serpulid polychaetes were found on the anterior dorsal carapace (1 individual), posterior dorsal carapace (1 individual), right cheliped propodus (1 individual), left cheliped propodus (1 individual), right cheliped carpus (1 individual), left cheliped carpus (4 individuals), right cheliped merus (1 individual). One small bryozoan colony was also found on the left cheliped carpus.

The specimen was deposited in the Biological Reference Collections of the Institut de Ciències del Mar (ICM-CSIC) in Barcelona under the catalogue number ICMD002149.

### Discussion

Most allochthonous decapod species present in the Mediterranean Sea have lessepsian origin with a native range from the Indo-Pacific Ocean (40%), the Indian Ocean (17%), the Red Sea (11%); some have a pantropical distribution (9%); and some have an Atlantic origin (23%)

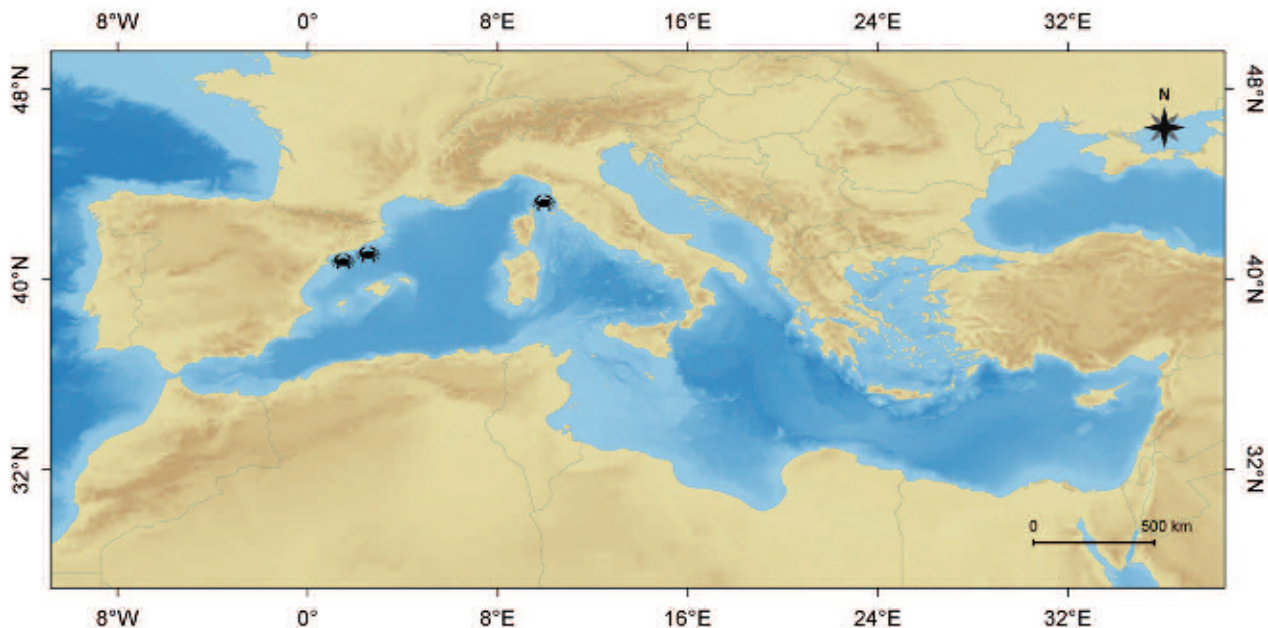
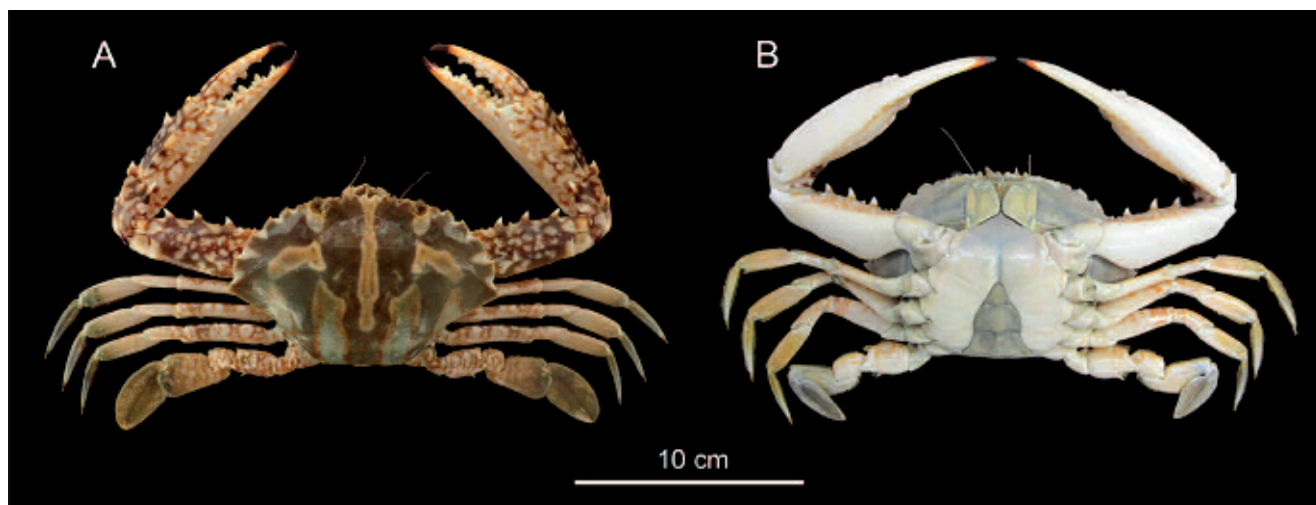


Figure 1. *Charybdis feriata*. Distribution in the Mediterranean Sea.



**Figure 2.** *Charybdis feriata*. Adult male captured near Tarragona, northwestern Mediterranean Sea. **A.** Dorsal view. **B.** Ventral view.

(Klaoudatos & Kaporis, 2014). In the western Mediterranean Sea it has been estimated that over 50% of the invasive species have been introduced by shipping, around 30% used corridors as a primary pathway (Suez Canal and inland canals), and 15% can be linked to aquaculture activities (Klaoudatos & Kaporis, 2014). The increase of maritime traffic makes this pathway more important for the introduction and dispersal of alien decapod species, since larvae can survive long periods in ballast water (Occhipinti-Ambrogi, 2000), and adult crabs have been found in bottom sediments in ballast tanks and in sea chests and other areas not routinely affected by ballast water management (Grosholz, 2011). The presence of non-indigenous species populations in some Mediterranean areas can also be related to their trade since many decapods are frequently found alive in the markets. Once introduced to a new region, crabs may rapidly expand their range along the coastline given adequate environmental conditions.

The ecological impact of invasive alien species on the native Mediterranean biota is poorly known although a significant decline of native species, including local population extirpations has been observed such as *Mullus barbatus* in the Levantine fisheries or *Spondylus gaederopus* off the Israeli coast (Galil et al., 2015). The impacts of invasive alien crustaceans often imply changes in the trophic structure of native communities and, in turn, on energy flows through the ecosystem (Hänfling et al., 2011).

Concerning *C. feriata*, the species is known to predate on bivalves, other decapod crustaceans, fish, algae, gastropods and detritus (Wu & Shin, 1998). Therefore, it is an omnivore whose ecological impact in a new marine environment may be important, especially given its fast growth rates within its 3-year life span (Dash et al., 2014).

The recent record of *C. feriata* in the northwestern

Mediterranean Sea indicates that the current range of the species may be slightly expanding along the Catalan coast. The dynamics of the northwestern Mediterranean which is characterized by a main surface current called the Northern Current that follows the edge of the continental shelf, from the eastern Ligurian Sea to the Gulf of Valencia (Salat, 1996), could be used as larval dispersal since Abelló & Guerao (1999) found a strong coupling between the distribution of the larval stage of brachyuran crabs and the coastal hydrography, with larvae being restricted to the coastal and shelf water mass. Although the total number of records is scarce, they strongly suggest a limited establishment of a viable population in the northwestern Mediterranean Sea.

An increase in the number of species reported from different areas due to human-induced introductions, voluntarily or involuntarily, is usually reported in biogeographical and faunistical recent studies (González, 2016). According to Marco-Herrero et al. (2015), up to a minimum of ten allochthonous brachyuran crab species have been reported from the Iberian Peninsula waters (including both Atlantic and Mediterranean shores) since the work by Zariquiey Alvarez (1968) on Iberian decapod crustaceans was published. *C. feriata* is one of the at least ten allochthonous crab species introduced in the area.

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