

SHORT COMMUNICATION

First record of *Pachygrapsus maurus* (Lucas, 1846) in the Northern Tunisian coast

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Abstract

The cryptogenic grapsid crab *Pachygrapsus maurus* (Lucas, 1846), is a native species in the Mediterranean Sea that has been reported since the 1990s in several parts of the central basin such as the Maltese islands and Italian coast. However, the species presence in the areas such as eastern Algeria, Tunisia and Libya has not been documented previously. In September 2016, a preliminary survey was carried out to investigate the marine biodiversity in the channel of Bizerte (Northern Tunisia), during which *P. maurus* was observed and documented. Individuals were captured, photographed and identified based on key morphological features. The number of individuals observed indicates the species is well-established within the specialized rock and boulder habitat with strong wave exposure preferred by this species.

Keywords: *Pachygrapsus maurus*, central Mediterranean, North Africa, Grapsidae

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Pachygrapsus maurus (Lucas, 1846) is one of the cryptic species found in the Mediterranean. The first record of this species was made in 1846 in Oran Bay (Algeria) (Lucas 1846) and now reported from other places in the Mediterranean Sea, from the Alboran Sea to the eastern Mediterranean (Crocetta *et al.* 2011). It is considered as a Macaronesian species, with stable populations in all the Macaronesian archipelagos, except for the Cape Verde Islands (D'Udekem D'Acoz 1999; Poupin *et al.* 2005).

This distinctive decapod crab (Poupin *et al.* 2005) seems to have a narrow ecological niche as it seems restricted to complex rocky shores exposed to intense wave hydrodynamic activity, as proposed by D'Udekem D'Acoz (1994 and 1999). In this habitat, the species is capable of very rapid movement and uses this

ability to dart into crevices, making it difficult to catch or observe. Although it has expanded its distribution to other parts of the Mediterranean, the expansion vector(s) of this species and pathways is not identified yet, but it has long been known that certain grapsoid crabs may be transported over long distances by clinging to drifting debris or in the hull fouling, or through ballast waters (Zaouali *et al.* 2008; Crocetta *et al.* 2011; Ounifi-Ben Amor *et al.* 2016).

According to Crocetta *et al.* (2011), only three specimens of *P. maurus* have been recorded from the Mediterranean shores of Africa (two from 1840-42 and one from 1946), all from the Algerian and Moroccan coasts in the western basin. The latest sites where the presence of *P. maurus* was reported were Malta and Lampedusa (Italy) in 2011 (Crocetta *et al.* 2011).

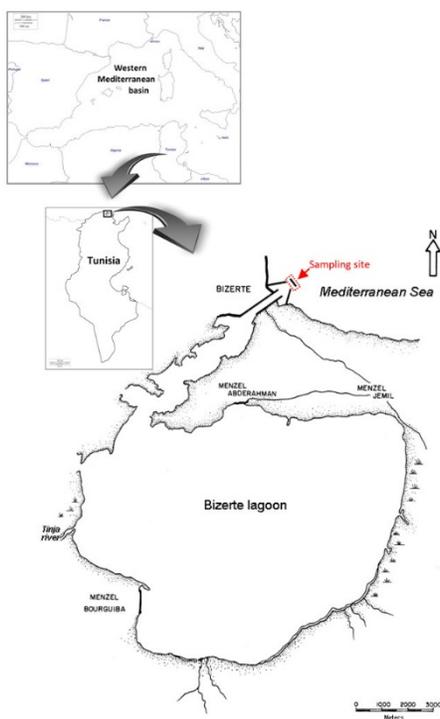


Figure 1. Geographical location of the study area and the sampling site

In September 2016, a preliminary survey was carried out to investigate the marine biodiversity in the Channel of Bizerte, which is located in the northern Tunisian coast (37.248°N, 9.8510°E). It connects the second largest Tunisian lagoon, one of the most degraded coastal ecosystems (Harzallah 2003; Venier 2004), to the Bay of Bizerte (Figure 1). It is an artificial corridor created in the early 20th century to establish a deep-water port and an advanced naval base (Venier 2004).

This channel extends over 7 km in length and 300 m in width. Its maximum depth reaches 12 m in the middle of the channel. This transition area with low amplitude semi-diurnal tidal cycle circulates seawater with current velocities reaching 1 m/s (Harzallah 2003).

A rapid assessment procedure was adapted to assess the presence of invasive species in the lagoon area. The procedure involved snorkeling and scuba-diving in randomly assigned transects while recording and documenting all marine species encountered. An underwater camera was used to photograph the observed species, these photographs were then used to verify and confirm the identification of the species.

During the survey, two specimens of *P. maurus* were collected, one of each sex. We also noted the substantial abundance of *P. maurus* (up to 3-4 individuals/m²) in the splash-zone and in the wave breakers area. Crabs were moving quickly on rocks and between dark rocky recesses (on breakwater structures) making their capture very difficult. Recently and on May 2017, the species was also observed in the Cani Islands (north-eastern to Bizerte harbor, 37°21'20"N, 10°07'24"E). This led us to conclude that this crab is now successfully established in the northern Tunisian coast, especially near Bizerte harbor.

Taxonomical classification

Kingdom: Animalia

Phylum: Arthropoda

Subphylum: Crustacea

Class: Malacostraca

Order: Decapoda

Suborder: Brachyura

Family: Grapsidae

Genus: *Pachygrapsus* (Randall 1840)

Species: *maurus* (Lucas, 1846)

Pachygrapsus maurus (Lucas, 1846)

Grapsus maurus Lucas 1846: 20, vol. 4, pl. 2, fig. 5 [type locality: Oran, Algeria]

Leptograpsus maurus - H. Milne Edwards 1853: 173 (Algeria)

Pachygrapsus simplex - Stimpson 1858: 48 [102] (Madeira); 1907: 116 (Madeira)

Pachygrapsus maurus - Heller 1863: 112 (Algeria) - Kingsley 1880: 199 (Key;

synonymy) - Rathbun 1918: 244 (Azores, Canary Is.; synonymy) - Bouvier 1940:

290, fig. 180 (Algeria, Madeira, Azores) - Zariquiez Álvarez 1948: 291, pl. 24,

fig. 1-2 (Spain); 1968: 425, fig. 140b, 141a (Spain) - Falciai and Minervini, 1992:

234 - D'Udekem D'Acoz 1994: 36 (Greece); 1999: 255, unnumbered fig. p. 52

(references, distribution, ecology); 2005 (photographs, reference, distribution) -

González Pérez 1995: 223, photo 164 (Canary Is.)

Morphological diagnosis

The details of the morpho-anatomical characteristics of *P. maurus* were well described in the key identification of Grapsidae by Poupin *et al.* (2005). Those characteristic concerns the carapace form and length, front width, orbital margin, form, teeth and eye position fingers, parapdi and merus, abdomen, telson and gonopod measurements according to gender.

The color of the crab varied between large round bluish/greyish or pale yellowish spots on a black background (Figure 2). In some specimens, the spots are confluent (D'Udekem D'Acoz 2005, Poupin *et al.* 2005).

Generally, the carapace measurement ranges from 6.5 x 7.7 to 12.7 x 14.3 mm, and in smaller ovigerous females 6.0 x 7.0 mm (Poupin *et al.* 2005). D'Udekem D'Acoz (2005) indicates a carapace width of about 20 mm.



Figure 2. Male specimen (right) and female specimen (left) of *Pachygrapsus maurus* captured in the outer Bizerte harbor, September 2016

Distribution and Habitat

According to Poupin *et al.* (2005), the distribution of *P. maurus* was more important in the West Atlantic (common in the Azores, Madeira, and Canary Islands) and the Mediterranean Sea (more frequently encountered in the western basin than in the eastern basin). This species was recorded in the western Mediterranean from the Alboran to the Tyrrhenian shores, although its presence in the eastern basin seems to be more sporadic, with records in the Ionian, Aegean and northern Levantine seas (Crocetta *et al.* 2011; Schembri 2011). No records of this species from Corsica and Sardinia, the Adriatic, and the entire southern and eastern shores of the Mediterranean from Tunisia to the Turkish-Syrian border (Zaouali *et al.* 2008; Crocetta *et al.* 2011; Schembri 2011).

Its patchy distribution is attributed to the rarity of suitable habitats for this species. These habitats include the intertidal zone on rocks and cliffs with strong wave

exposure (D'Udekem D'Acoz 2005). Indeed, most species of the *Pachygrapsus* are mainly restricted to intertidal rocky shore habitats (Poupin *et al.* 2005).

Occurrence in the Mediterranean Sea

The most recent record of this species is from the Gozo Island in the Maltese waters in 2011 (Crocetta *et al.* 2011; Schembri 2011). However, it is very scarce in the eastern Mediterranean and even rarer with patchy distribution in the central and central-eastern Mediterranean (Poupin *et al.* 2005; Schembri 2011). Morphologically and sympatrically, *P. maurus* is quite similar to the Mediterranean native crab *Pachygrapsus marmoratus* (very common in the Mediterranean and especially in the Tunisia northern coast) (Poupin *et al.* 2005; Crocetta *et al.* 2011; Schembri 2011) with difference in size; *P. maurus* is smaller than *P. marmoratus* (carapace width is about 20mm against 40 mm) (Poupin *et al.* 2005).

In this context, we think that the unusual delay in the expansion of *P. maurus* to the eastern basin since its identification by Lucas (1846) in Oran Bay can be explained by the total difference in hydrodynamic and environmental conditions between the eastern and western Mediterranean basins. Indeed, the northern Tunisian coast is considered as a biogeographic border between both basins (Taupier-Letage and Millot 1987; Manzella *et al.* 1988; Sammari and Gana 1995; Millot and Taupier-Letage 2005). Since the majorities of benthic organisms, particularly decapod crustaceans and especially rocky crabs, are highly influenced on their distribution by these hydrodynamic conditions (Zaouali *et al.* 2008; Ayata 2010). According Zaouali *et al.* (2008), *P. maurus* was less observed and less common in Tunisia than the other Grapsidae species (*P. marmoratus* and *P. transversus*).

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