

# First record of *Charybdis japonica* (Crustacea: Decapoda: Portunidae) in the Mediterranean Sea

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*The swimming crab Charybdis japonica is recorded for the first time in the Mediterranean Sea. A single adult male specimen was caught in 2006 with gill-net at the entrance of Ancona harbour, on the Adriatic coast of Italy. No other specimens have been found despite extensive surveys of the environs of the port. Unintentional transport by a merchant ship seems the most likely vector of introduction.*

**Keywords:** Portunidae, *Charybdis japonica*, alien species, Mediterranean Sea, shipping, first record

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## INTRODUCTION

The possibility of introduction of marine organisms outside their original distribution range by shipping has been long recognized (Catta, 1876; Chilton, 1910). This phenomenon has increased dramatically worldwide in recent decades due to the increase of maritime traffic, speed of vessels and the practice of loading/discharge of ballast waters (Minchin & Gollasch, 2002).

Some swimming-crabs of the Indo-Pacific genus *Charybdis* De Haan, 1833 have proved highly invasive, spreading outside their original range of distribution transported by shipping.

Two species, *Charybdis hellerii* (A. Milne-Edwards, 1867) and *Charybdis longicollis* (Leene, 1938), have reached the eastern Mediterranean, via the Suez Canal (Holthuis & Gottlieb, 1958), and are common throughout the Levant Basin (Galil *et al.*, 2002). *Charybdis hellerii* has also reached, most probably with ballast waters, the Caribbean Sea (Campos & Türkay, 1989) and the US Atlantic coast (Lemaitre, 1995), and has subsequently spread to southern Brazil (Mantellato & Biagi Garcia, 2001).

Single adult specimens of two other species were recently collected in the Mediterranean Sea: *Charybdis feriata* (Linnaeus, 1758) and *Charybdis lucifera* (Fabricius, 1798) near the harbour of Barcelona, Spain (Abelló & Hispano, 2006) and off Venice (Mizzan & Vianello, 2009), respectively.

The unintentional introduction in New Zealand of *Charybdis japonica* (A. Milne-Edwards, 1861) was also mediated by vessels (Smith *et al.*, 2003) and today the species is common in the Auckland Bay (Gust & Inglis, 2006). The capture of *C. japonica* on the Adriatic coast of Italy, Mediterranean Sea, is herein discussed.

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## MATERIALS AND METHODS

A large swimming crab was caught with gill-net near the entrance of the harbour of Ancona (43°37'31"N 13°29'35"E), Italy, Adriatic Sea, on 10 December 2006 by the fisherman Claudio Bernardini. He noticed it was different from the other swimming crabs, usually found entangled in his nets and brought it to me.

The specimen has been identified as an adult male of *Charybdis japonica*, following Sakai (1976) and Wee & Ng (1995). It is now preserved in ethanol in the author's collection (D-1998) and will be deposited in the Museo civico di Storia naturale, Verona, Italy.

### SYSTEMATICS

Order DECAPODA Latreille, 1802

Infraorder Brachyura Linnaeus, 1758

Family Portunidae Rafinesque, 1815

Genus *Charybdis* De Haan, 1833

Species *Charybdis japonica* (A. Milne-Edwards, 1861)  
(Figure 1)

*Charybdis japonica* is easily distinguished from the autochthonous Mediterranean portunid crabs in bearing 6 antero-lateral teeth and 6 frontal teeth on its carapace. It may be separated from the other alien species of the genus *Charybdis* previously recorded in the Mediterranean Sea on the following combination of characters: frontal teeth acute, versus rounded in *C. hellerii* and *C. feriata*; outer margin of cheliped merus unarmed versus with distal spine, and lower surface of chela smooth, versus covered with squamiform granules in *C. longicollis*; propodus of fifth pereopod with posterior margin smooth, versus posterior margin serrated in *C. lucifera* and *C. hellerii*.

In the present specimen, the inner margin of merus has 4 spines + 2 tubercles; and 3 spines + 4 tubercles, respectively on right and left cheliped. The dorsal surface of carapace and chelipeds is glabrous, like the larger male examined by

Leene (1938), and not pilose as described by Wee & Ng (1995). Colour in life as in Figure 1, from a photograph taken a few hours after capture.

Morphometric measures taken on the crab, with a quadrant calliper, are as follows: carapace length 70.0 mm, carapace width (between tip of posterior antero-lateral teeth) 102.7 mm; right cheliped (cutter): dactylus length 44.2 mm, palm length 34.4 mm; left cheliped (crasher): dactylus length 42.3 mm, palm length 40.0 mm; merus of 5th pereopod: length 20.5 mm, height 11.1 mm; sixth abdominal segment length 12.2 mm, height 9.2 mm.

## DISCUSSION

*Charybdis japonica* is distributed from Korea and Japan to Indonesia (Sakai, 1976). It is unknown in the western Indian Ocean (Crosnier, 1962; Apel & Spiridonov, 1998), whereas it was recorded once in the Red Sea (Leene, 1938), on two specimens present in the dry collection of the National Natuurhistorisch Museum Leiden, possibly collected by Rüppell in his 1822–1827 voyage to the Red Sea (Fransen *et al.*, 1997).

Leene's (1938) record is puzzling because the large size of *C. japonica* and its habitat (shallow soft level substrates) make unlikely its presence could go undetected by all the authors who subsequently studied the Red Sea and western Indian Ocean decapods. Leene's record may be a consequence of a mixing of labels that occurred in the past, or it may result from an early accidental introduction of the species outside its native range, not followed by the establishment of a self-maintained population. Unfortunately both hypotheses are not testable.

The known species distribution lets us surmise that shipping is the most likely vector of its introduction in the Adriatic Sea.

Checking the register of arrivals kept in the Ancona port office (Capitaneria di porto) it was found that in the years 2004–2006, container-ships connecting harbours of the Far East (China, Singapore, Indonesia, etc.) arrived monthly to Ancona and other Adriatic harbours, and bulk carriers from Indonesia (Bontang and Balikpapan) loaded with coal, and

from China (Shanxi) loaded with chalk were registered as well. As these vessels arrived in Ancona fully loaded from their Asiatic ports of call, the discharge of ballast water, with consequent release of crab larvae, before entering the harbour is unlikely. But in such large ships the area of the sea-chests can harbour biologically significant accumulations of macrofouling biota, including portunid crabs (see: Coutts *et al.*, 2003, p. 1511), and the crab may have reached the Ancona harbour waters in a juvenile stage passing through the meshes of the grid that protects the sea-chest.

No other specimen of this species has been obtained from the environs of Ancona, despite repeated samplings and examination of the catches and discards of the local fishers working with set nets, bottom trawls and hydraulic dredges for clams.

*Charybdis japonica* proved to be invasive in New Zealand (Gust & Iglis, 2006), whereas a specimen was captured in South Australia (Port River, Adelaide) and it appears the species is not established there (Ahyong & Wilkens, 2011). Therefore we may speculate that one or few specimens arrived to the Ancona harbour, possibly hidden in the sea-chests of a ship, and the 'propagule pressure' (Lockwood *et al.*, 2005) has been too low to establish a population, even if the local environmental conditions (shallow soft level substrates with annual temperature range 8–24°C and salinities between 30 and 36 psu) are suitable for its settlement. As *C. japonica* proved able to arrive in the Adriatic Sea, we may expect to see it in the future in this or in other Mediterranean sectors.

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Fig. 1. *Charybdis japonica* (A. Milne Edwards, 1861): male (carapace length 70 mm, carapace width 103 mm) collected at the entrance of Ancona harbour, Adriatic Sea.

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