

## Rapid Communication

## The first record of the brown shrimp *Penaeus aztecus* Ives, 1891 in the central Adriatic coast of Italy

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### Abstract

Seven specimens of the northern brown shrimp *Penaeus aztecus*, a western Atlantic species, were collected in December 2016 and in November 2017 by bottom trawlers off Termoli, on the central Adriatic coast of Italy. The various colonization scenarios put forward as explanations for the species' sudden, near concurrent presence in distance sites within the Mediterranean Sea and nowhere else, are discussed. The species is already established as a valuable fishery resource in southeastern Sicily, and is likely to do well in the Adriatic Sea, once its population increases.

**Key words:** invasive alien species, vector, fishery resource, Ionian Sea, Adriatic Sea, Mediterranean Sea

### Introduction

*Penaeus aztecus* Ives, 1891, native to the Western Atlantic, was first recorded in the Mediterranean Sea in December 2009, off Antalya, Turkey (Deval et al. 2010, as *Farfantepenaeus aztecus*), and shortly thereafter in the Bay of Iskenderun, Turkey (Bilecenoglu et al. 2013). Within an amazingly short period (2009–2018) the species has been recorded from sites across the Mediterranean Sea – off France, Egypt, Greece, Israel, Italy, Montenegro, and Turkey (for recent distribution maps and records see Galil et al. 2016; Scannella et al. 2017; Sadek et al. 2018). The first Italian specimens of *P. aztecus* were collected in 2014 off the Central Tyrrhenian coast (Castiglione della Pescaia, Follonica), while trawling on muddy bottoms for red mullets, pink shrimps and karamote prawns (Cruscanti et al. 2015). In 2015 specimens were reported from the Gulf of Corigliano, at the southern Gulf of Taranto (Mytilineou et al. 2016), and that same year four specimens were collected by commercial trawlers between Gela and Mazara del Vallo, Sicily (Scannella et al. 2017). In the southeastern

Adriatic *P. aztecus* was recorded earlier: in 2013 single specimens were collected off Corfu, Greece (Kapiris et al. 2014), and in Boka Kotorska Bay, Montenegro (Marković et al. 2014).

### Methods

On December 2, 2016, several specimens of *P. aztecus* were caught on a muddy bottom, at depths of 50–60 m, by the M/P *Marpesca*, a 28 m long commercial trawler equipped with 50 mm net, off Termoli (42° 07' 01.22"N 15° 00' 03.90"E), on the central Adriatic coast of Italy; the shrimps were photographed but not preserved. Nearly a year later, on November 13, 2017, seven more specimens were caught by the same vessel at a nearby site (42° 07' 59.69"N 15° 03' 15.81"E), at depth of 50 m. These specimens were photographed and measured (total length, wet weight), preserved in 80% ethanol, and deposited in the Natural History Museum of Comiso, Ragusa, Sicily (MSNC-4560).

The Museo Civico di Storia Naturale of Comiso has engaged fishermen in Sicily and southern Italy in an effort to monitor rare and alien species. Interviews



**Figure 1.** *Penaeus aztecus* Ives, 1891, female, TL 176 mm, fished off Termoli, Italy, 13 November 2017. Photograph by G. Pilla.

with Apulian fishermen confirm that several large sized specimens *P. aztecus* have been captured since 2015 between Mola di Bari and Bari (Apulia) and Ortona and Chieti (Abruzzo), at 40–50 m depth.

## Results

The specimens were identified as *P. aztecus* following Pérez-Farfante (1988: 12, figs 17, 18) and Pérez-Farfante and Kensley (1997: 77, figs 39, 40): Rostrum with three ventral teeth; postrostral carine long, adrostral carina and sulcus, almost reaching posterior margin of carapace, median sulcus long, deep along entire length; cheliped coxae unarmed; telson with deep median sulcus; petasma symmetrical, hooded, with ventral costa arcuate, tapering distally, with closely set small spinules, as fig 18b; thelycum closed, lateral plates meeting along midline, anteriorly with median protuberance, as fig 18c. The 4 male specimens ranged in size from 141–149 mm TL, and weighed 18–22 gr; the 3 females from 132–176 mm, and weighed 14–36 gr. One of the female specimens from the 2017 sample is depicted in Figure 1.

## Discussion

Several colonization scenarios have been put forward as explanations for the sudden, near concurrent records from distant locations within the Mediterranean Sea, and nowhere else (Galil et al. 2016; Scannella et al. 2017). The first, an expansion scenario, posits that *P. aztecus* was introduced with ballast water to Antalya, Turkey (sometime prior to 2009, Deval et al. 2010), and then by current-driven post-establishment spread along the Turkish Mediterranean coast (Gökoğlu and Özvarol 2013), the western Aegean Sea (Nikolopoulou et al. 2013; Kevrekidis 2014; Minos et al. 2015), and up to Montenegro, in the eastern Ionian Sea (Marković et al. 2014; Kapiris et al. 2014; Crocetta et al. 2015) in less than three years

(December 2010–September 2013). This scenario is based simply on the first collection dates, lacking documentation of previous absence at each site, and fails to account for the relatively short planktonic larval stage (less than 15 days) (Cook and Lindner 1970), and mark-recapture experiments that indicated that adults spread parallel to the coastline, with most individuals remaining within 50 km of their release sites (Klima 1963; McCoy 1968). Nikolopoulou et al. (2013: 372) observed that a progressive dispersal from the southern Turkish coast to the northern Aegean Sea “should have required longer period of time than the 2–3 years” and posits multiple introduction events, either additional transfers in ballast waters from the population established in the Turkish Mediterranean or from the native populations in the western Atlantic (Scannella et al. 2017). Yet, it is highly unlikely that ballast introductions are the cause for the burst of records across the Mediterranean Sea. A more plausible explanation for this pattern of spread is that many of the Mediterranean populations issue from direct human introduction (Galil et al. 2016). Mediterranean countries have been notably careless about biosecurity risks due to *intentional* “unofficial” introductions, movement of stock, feed, and equipment that may result in introduction of marine species (CIESM 2007). The bilaterally ablated female banana prawn, *Penaeus merguensis* de Man, 1888, collected in 2006 in the Bay of Iskenderun, Turkey, is certainly an escape or an inadvertent release from a nearby aquaculture facility, since eyestalk ablation is commonly used in aquaculture for inducing maturation of gonads (Özcan et al. 2006). Similarly, *Penaeus indicus* H. Milne Edwards, 1837 was illegally introduced from the United Arab Emirates to Damietta shrimp farms, Egypt, in 2011 (Megahed 2014). The clandestine importation of *P. pulchricaudatus* Stebbing, 1914 (misidentified as *P. japonicus* Bate, 1888) and *P. semisulcatus* De Haan, 1844 from Turkey into Italy was revealed only



**Figure 2.** A crate of *Penaeus aztecus* Ives, 1891, offered for sale in February 2018, in the fish market of Scoglitti, Sicily, Italy. Photograph by B. Zava.

when specimens infected with White Spot Syndrome (WSD) Virus were submitted to the Office International des Epizooties (OIE) Reference Laboratory for WSD at the University of Arizona, USA, by industry representatives in 1997 (Stentiford and Lightner 2011). None of these introductions were reported to the competent authorities of the respective countries. Thus, the absence of official records of importation of *P. aztecus* into the Mediterranean Sea does not rule out direct human introduction, particularly as several of the recorded specimens were collected in the vicinity of fish and shellfish farms, including the Italian Tyrrhenian and Adriatic records (Sanna 2010, fig. 1). Progressive dispersal with the prevailing current of larvae and adults may be responsible for some adjacent records (e.g. SE Levant, S Turkey, SE Adriatic Sea). In time, population genetic analyses may clarify the colonization history of *P. aztecus* in the Mediterranean Sea (Darling et al. 2017).

Invasive Erythraean prawns, chiefly *P. pulchricaudatus* (misidentified as *P. japonicus* Spence Bate, 1888) and its relatives – *P. semisulcatus* De Haan, 1844, *Metapenaeus monoceros* (Fabricius, 1798), *M. stebbingi* Nobili, 1904 – are highly prized and are considered a boon to the Levantine fisheries (Kumlu et al. 1999; Can et al. 2004; Duruer et al. 2008). It seems that *P. aztecus* is likely to join them as a valuable fishery resource. Along the southern coast of Turkey, large numbers of commercial-sized individuals were collected by trawling and trammel netting within three years of the initial record (Bilecenoglu et al. 2013). Along the Egyptian coast, where it was first noted in the Damietta branch of

the Nile delta in 2012, it has since appeared annually between February and mid-June and the plentiful wild fry is welcomed by fishers (Sadek et al. 2018). Along the Ionian coast of Calabria, Italy, it is commonly trawled at 90–100 m depth and marketed locally (Mytilineou et al. 2016). Off the central Adriatic coast of Italy it is fished in small quantities and offered for sale mixed with other penaeid species. Off southeastern Sicily in past years it fetched 10–12 euros/kg, but its value rose recently, and present prices in the fish markets of Catania and Scoglitti (Figure 2) rose to 15–20 euros/kg as compared to 30–40 euros/kg for the native prawn *P. kerathurus* (Forskål, 1775).

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