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## FIRST RECORD OF TIGER SHRIMP (*PENAEUS MONODON* FABRICIUS, 1798), IN THE SOUTH-CENTRAL COAST OF VERACRUZ, GULF OF MEXICO

### PRIMER REGISTRO DEL CAMARÓN TIGRE (*PENAEUS MONODON* FABRICIUS, 1798), EN LA COSTA CENTRO-SUR DE VERACRUZ

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#### ABSTRACT

The first exotic specimen of *Penaeus monodon* (tiger shrimp) was recorded in the most important shrimp fishing ground of Veracruz, Mexico. In February 2014, one individual of 29 cm LT was collected at 90 m depth off South-central coast of Veracruz at 22 Km northwest of Coatzacoalcos port and 150 Km southeast from Alvarado. The tiger shrimp was introduced in Cuba in 1986 for cultivation. In 2013 the presence of nine individuals in the Campeche coast was reported. This recording evidence the movement of *P. monodon* into the Gulf of Mexico which is a concern because of their possible impact on local shrimp populations and their ecosystem.

**Key words:** allochthonous, shrimp, Gulf of Mexico, invasive species, *Penaeus*.

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## RESUMEN

El primer espécimen de la especie exótica *Penaeus monodon* (camarón tigre) se registró en la zona de pesca de camarón más importante de Veracruz, México. En febrero de 2014, un individuo de 29 cm se recogió a 90 m de profundidad, en la costa sur-central de Veracruz a 22 km al noroeste de Coatzacoalcos y 150 km al sureste de Alvarado. El camarón tigre fue introducido en Cuba en 1986 para cultivo. En 2013 se registró la presencia de *P. monodon* en la costa de Campeche. La evidencia consiste en filmaciones del movimiento de *P. monodon* en el golfo de México, lo que es preocupante por su impacto sobre el ecosistema y las poblaciones de camarón presentes.

**Palabras clave:** alóctono, camarón, golfo de México, especie invasiva, *Penaeus*.

## INTRODUCTION

The giant tiger shrimp, *Penaeus monodon*, is a decapod crustacean that is native to the Indo-West Pacific (Pérez-Farfante and Kensley, 1997; Benzei, 2000). Within its natural environment, this species is eurytherm and euryhaline, hence it can inhabit coastal systems with a wide range of salinities (1-35 PSU) (Panikkar and Menon, 1956). These features give to *P. monodon* the ability to invade coastal systems with highly variable salinity.

The Asian tiger shrimp is farmed intensively since the early 1970s by several Asian countries (FAO, 2014), and shortly thereafter was introduced in the Atlantic and Caribbean region for commercial culture. As a result, on the west coast of Africa from Senegal to northern Angola, it is believed that there is a well-established wild population of tiger shrimp (Knott et al., 2014). Likewise, there are other occurrence reports of tiger shrimp in Brazil (Fausto-Filho, 1987; Coelho et al., 2001), Venezuela (Aguado and Sayegh, 2007), Colombia (Gomez-Lemos and Campos, 2008) and the Greater Antilles: Cuba, Puerto Rico and Dominican Republic (Giménez-Hurtado et al., 2013; Knott et al., 2014). In the late 80s, as a result of escapements of culture facilities in the US East Coast, about 300 tiger shrimp were caught in the wild along Florida, Georgia and South Carolina (Giménez-Hurtado et al., 2013; Knott et al., 2014). The most recent occurrence record took place in the Mexican Gulf (Wakida-Kusonoki et al., 2013); six specimens were caught in Campeche Bay and three more off Tamaulipas.

This study documents the first record of tiger shrimp in the central region of Mexican Gulf. A commercial trawling vessel in the south-central area of Veracruz, Mexico caught this specimen in February of 2014.

## MATERIAL AND METHODS

The examined specimen was caught accidentally at 90 m depth by a commercial shrimp vessel in the following coordinates: 8° 17' 22.19 "N and 94° 36' 34.45" W. The fishing point is located in front of coastal village of San Juan, 22 km northwest from Coatzacoalcos port in the south-central coast of Veracruz (Fig. 1).

The taxonomic identification was conducted according to Perez-Farfante and Kinsley (1997). Total length (TL) was measured from the base of the rostrum to the end of the telson using an ictiometer ( $\pm 0.1$  cm) and the carapace length (CL) with a caliper ( $\pm 0.1$  mm). Total weight (TW) was determined using a scale (0.1 g accuracy). Finally, the sex of the specimen was determined through verifying the presence or absence of the thelycum.

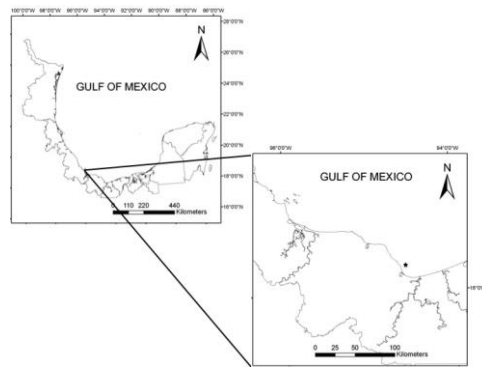


Fig. 1. Location of the recording area of *P. monodon* (\*).

## RESULTS

The specimen presented a dark coloration with transverse black and cream banding on the cephalothorax, abdomen and telson (Fig. 2). The tiger shrimp specimen was a female of 29.0 cm TL, 9.5 cm CL and 310 g TW with no evidence of ovigerous mass.

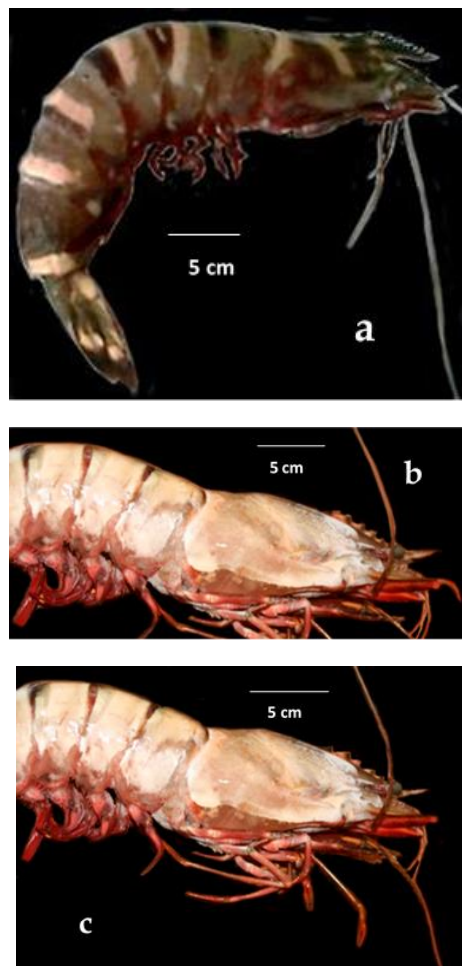


Fig. 2. Tiger shrimp *P. monodon* captured in Veracruz south-central coast in February 2014. a) Lateral view, b) lateral view of body, and c) detail of cephalothorax view.

## DISCUSSION

This is the first verifiable record of tiger shrimp along the south-central coast of Veracruz, which is one of the most important fishing grounds of trawler shrimp fleet in the Mexican waters of the Gulf of Mexico. According to Motoh (1981), the female tiger shrimp reach the sexual maturity at 4.7 cm CL and 67.7 g TW; hence this record corresponds to a sexually mature female. Some captains of shrimp trawlers from Alvarado, Veracruz have caught more specimens of tiger shrimp in the mentioned area, but there is neither photographic evidence nor meristic data about these findings.

The shrimp fishery in the south-central part of Veracruz is based on five native species, in order of commercial importance: northern brown shrimp *Farfantepenaeus aztecus* Ives, 1891 (95% of total catch), southern pink shrimp *Farfantepenaeus duorarum* Burkenroad, 1939, northern white shrimp *Litopenaeus setiferus* Linnaeus, 1767, red spotted shrimp *Farfantepenaeus brasiliensis* Latreille 1817 and rock shrimp *Sicyonia brevirostris* Stimpson, 1871 (INP, 2006). The finding of *P. monodon* which is an exotic species along this area of commercial fishing is a significant and very worrying issue, due to the potential impact on the native shrimp populations and the economic activity that they support.

In the south-central region of the state of Veracruz are located at least five large important estuarine systems in terms of biological and commercial relevance (Contreras, 1993), hence if we consider the great tolerance of the tiger shrimp to highly variable salinity regimes, is very likely that the tiger shrimp can develop their full life cycle using these areas as a nursery grounds. This coincides with Fuller et al. (2014), about the establishment of populations of this species along US East Coast and the northern Gulf of Mexico, in addition to the occurrence patterns described by Aguado and Sayegh (1997) in Venezuela and Giménez-Hurtado et al. (2013), in Cuba, which reported the presence of adult tiger shrimps in the high seas and adjacent to coastal lagoons, and more recently Wakida-Kusunoki et al. (2013), reported its presence in the Campeche Bay and the Laguna de Términos in the southern Gulf of Mexico.

The occurrence report of this study combined with those of the Mexican states of Tamaulipas, Tabasco and Campeche by Wakida-Kusunoki et al. (2013), confirms the presence of *P. monodon* along almost the entire Mexican coast of the Gulf of Mexico. Probably the environmental conditions of the central Gulf contributed to expand the geographic distribution and reproduction of *P. monodon* coming from the northern Gulf and Caribbean Sea.

The allochthonous species constitute an environmental threat and are the second leading cause of extinction of native species. The introduction of an alien species for commercial exploitation, favors their income to the natural environment (Pérez and Klippel, 2006). The introduced tiger shrimp can affect the biodiversity and the survival of native shrimp species (Rodríguez, 2001), through competition for food because it is a large (Dore and Frimodt, 1987) and voracious carnivore species (Solis, 1988), and for space, because like all penaeid shrimp, the spawning of *P. monodon* occurs in the sea, after, they move to the coastal lagoons and estuaries during the early life stages until juvenile and pre-adult just before to migrate to the sea again.

It is important to consider that while a female of *P. monodon* spawning 248,000 to 811,000 eggs (Aquacop, 1979; Motoh, 1981), a female of genus *Farfantepenaeus* spawns 44,000 to 534,000 eggs (Martosubroto, 1974), which can be a competitive advantage for *P. monodon* over the native species of penaeid shrimps of the Gulf of Mexico.

Finally, we must consider the sensitivity of tiger shrimp to the viral diseases because it can become a vector or spreader of highly pathogenic viruses and that may impact local populations. *P. monodon* is affected by three types of *Baculovirus* of the type *Monodon baculovirus*

(MBV), the yellow head virus disease (YHV), the hypodermal and hematopoietic necrosis virus (IHHNV), the hepatopancreatitis virus (HPV), the lymphoid organ parvo-like virus (PVL), and by Reo-like virus disease (RLV) (Lightner, 1996). Is an asymptomatic carrier of Taura syndrome virus (TSV) (Overstreet et al., 1997). All viruses mentioned above have caused significant economic losses to the shrimp farming industry, but with unknown effect on natural populations, however, their spread not necessarily require established and abundant populations.

Although the pathways of propagation of tiger shrimp in the Mexican coast are unclear, it is feasible that its causes are related with escapements of shrimp farms located on the east coast of the United States, beginning the invasion from the northern Gulf of Mexico, given ecological similarities shared between Texas and Tamaulipas, Mexico (Mendoza et al., 2011; Mendoza and Kolef, 2014), via prevailing currents and the presence of suitable habitats for settlement. In this regard, it is important to be aware of the occurrence of this species within estuarine systems and artisanal fisheries in the Mexican coast, because if so, the tiger shrimp develop their life cycle in this important area.

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