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Short Communication

Presence of giant tiger shrimp *Penaeus monodon* (Fabricius, 1798) in eastern Peninsula of Yucatan coast, Mexico

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ABSTRACT. Giant tiger shrimp *Penaeus monodon* has been declared as an invader in the western coast of Atlantic Ocean. We report the first records of *P. monodon* in the eastern Peninsula of Yucatan, Mexico. On 14 October and 25 November 2014, three giant tiger shrimps were caught in Río Lagartos Lagoon. The total lengths of the shrimp were between 210 and 290 mm and weighed between 111.6 and 200 g. Further sampling and monitoring are required in other coastal lagoons in Yucatan State to assess the invasion area and the origin as well as the probable invasion route of this species.

Keywords: *Penaeus monodon*, giant tiger shrimp, invasive species, Río Lagarto, Mexico.

Presencia del camarón tigre *Penaeus monodon* (Fabricius, 1798) en el oriente de la costa de la Península de Yucatán, México

RESUMEN. El camarón tigre gigante *Penaeus monodon* se ha reportado como una especie invasora en la costa occidental del Océano Atlántico. Se presenta el primer registro de *P. monodon* en la zona oriental de la península de Yucatán, México. El 14 de octubre y 25 de noviembre de 2014, se capturaron tres especímenes de camarón tigre gigantes en laguna de Río Lagartos. La longitud total de los camarones estuvo entre 210 y 290 mm de longitud total y pesaron entre 111,6 y 200 g. Se requiere campañas de muestreo y monitoreo en otras lagunas costeras del estado de Yucatán para evaluar el área de la invasión y el origen, como también la ruta de invasión probable de esta especie.

Palabras clave: *Penaeus monodon*, camarón tigre gigante, especie invasiva, Río Lagartos, México.

The geographic range of giant tiger shrimp *Penaeus monodon* (Fabricius, 1798) is the Indo-West Pacific, ranging from the eastern coast of Africa and the Arabian Peninsula, as far as southeastern Asia, the Sea of Japan and northern Australia (Holthuis, 1980).

The giant tiger shrimp has been reported from the western coast of the Atlantic Ocean. In the USA, it was reported for the coasts of North Carolina, South Carolina, Georgia, Florida, Alabama, Mississippi, Louisiana, and Texas (Fuller *et al.*, 2014), as well as in the Mexican states of Tamaulipas, Tabasco, and Campeche (Wakida-Kusunoki *et al.*, 2013). In the Caribbean, it has been recorded from the Dominican Republic, Puerto Rico and Cuba (Knott *et al.*, 2012;

Ramos, 2012; Giménez-Hurtado *et al.*, 2013); in Central America, in Belize and Costa Rica (Bauman, 2014; Alfaro-Montoya *et al.*, 2015); and in South America from Colombia to Brazil (Fausto-Filho, 1987; Coelho *et al.*, 2001; Santos & Coelho, 2002; Aguado & Sayegh, 2007; Altuve *et al.*, 2008; Gómez-Lemos & Campos, 2008; Cintra *et al.*, 2011).

Introductions of *P. monodon* into the western Atlantic are most likely explained by escapement of specimens from aquaculture facilities, by migration from areas where the tiger shrimp have previously become established in the wild, or via discharge of ballast water (Altuve *et al.*, 2008; Knott *et al.*, 2012).

This paper is the first report of giant tiger shrimp on the Yucatan coast. These shrimps were accidentally caught by artisanal fishermen, one of the shrimp was caught using a gillnet on 14 October 2014 and the other two with a shrimp trawl net on 25 November 2014, all in the areas of the Río Lagartos Lagoon in the Yucatan State (21°35', 29°N, 88°03', 15°S).

These specimens were identified using the identification keys published by Dall *et al.* (1990) and Pérez-Farfante & Kensley (1997). The sex of the specimen was determined by observing the presence of petasma in males and thelycum in females. Total length (TL) and total weight (TW) were measured; TL was assessed with the aid of an ichthyometer (± 0.05 mm) and a caliper, and a precision scale was used to obtain the TW. The specimens were fixed with formaldehyde 10% and alcohol 70% for preservation, and deposited in the Crustacean Collection of Yucatan, UNAM-Sisal (catalog number YUC-CC-255-11-001601).

The total lengths of the captured tiger shrimps were 210 and 290 mm and the total weights 111.6 and 200 g. The two specimens were one male and one female; they showed an overall rusty brown color as well as the distinctive black and white banding across the back and on the tail (Fig. 1).

The presence of giant tiger shrimp in Río Lagartos Lagoon, Yucatan, is the first report in a zone near the Mexican Caribbean Sea. The pathway or pathways of the *P. monodon* introduction in this zone are unclear. Fuller *et al.* (2014) mentioned that introductions into the southeastern USA have three potential sources: 1) the release of larvae in ballast water taken onboard within their native range, 2) migration from areas in the Atlantic or Caribbean Sea where wild populations have become established (most likely as a result of prior aquaculture escape), and 3) escape from active and ongoing aquaculture facilities in the western Atlantic.

Approximately 1,000 tourist cruises arrive every year in the Riviera Maya (SEDETUR, 2014), and this area is around 200 km to the east of the area where the specimens were collected. Other authors hypothesized that ballast water discharge might be the origin of the *P. monodon* introduction in other regions of America (Campos & Türkay, 1989; Severino-Rodrigues *et al.*, 2000).

Two routes of dispersion of giant tiger shrimp in the western Atlantic Ocean can be observed: the first route is from the USA coast, with movement towards the Gulf of Mexico (Knott *et al.*, 2012) and probably to the Caribbean Sea; the second route is from Brazil and Venezuela with dispersion towards the north and the Caribbean Sea (Altuve *et al.*, 2008; Aguirre-Pabón *et al.*, 2015).



Figure 1. Lateral view of the giant tiger shrimp *Penaeus monodon* caught in Río Lagartos Lagoon, Yucatan, Mexico, 14 October 2014 YUC-CC-255-11-001601 (Photograph by D. De Anda-Fuentes).

The geographic origin of the Río Lagartos Lagoon specimens is most probably in Central America or the Caribbean Sea, because there are no reports of *P. monodon* from the western waters of Yucatan State (Humberto-Medina, *pers. comm.*). This hypothesis cannot be corroborated until a genetic analysis can be conducted with the specimens caught in the different invasion areas.

The ecological impacts of the presence of *P. monodon* in areas where it has been introduced remain to be studied; however, the species is a more aggressive predator of soft-bodied invertebrate benthic organisms than other native shrimp species (Marte, 1980), and it could be a potential predator of native shrimp species (Knott *et al.*, 2012). Alfaro-Montoya *et al.* (2015) mentioned that the presence of this species may alter the food web, thereby affecting ecosystem functioning.

Río Lagartos Lagoon is a nursery of two commercially important shrimp, *Farfantepenaeus brasiliensis* and *F. notialis* (May-Kú & Ordóñez-López, 2006). There is concern that *P. monodon* can reduce the abundance of native shrimps by predation (Molnar *et al.*, 2008).

Another negative impact involves the spread of alien pathogens and parasites, and there is concern that shrimp viruses associated with *P. monodon*, such as White Spot Syndrome Virus (WSSV) and Yellow Head Virus (YHV), may infect gulf native shrimp populations (Durand *et al.*, 2000; Chapman *et al.*, 2004).

It was not possible to find evidence of *P. monodon* becoming established in this zone of the Yucatan coast; however, according to local fishermen, this species is constantly appearing in the catches. Additional sampling and long-term monitoring (including reproductive biology parameters) are required to assess the potential

impacts of the presence of *P. monodon* on the native shrimp species.

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