

New records of caridean shrimps (Decapoda: Caridea) from shallow water along the northern Yucatan peninsula coasts of México

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ABSTRACT - The northern coast of the Mexican state of Yucatán has only been cursorily sampled in the past, with most of this effort concentrated on the largest coral reef in the Gulf of México, Arrecife Alacranes. The present study reports on recent collections (June 2008 - September 2013) of caridean shrimp in Yucatán, including Arrecife Alacranes and other reefs, as well as coastal lagoons and beaches. Additionally, a number of species are reported based on older, unidentified museum material. Six species represent new records for the Gulf of México [*Janicea antiguensis* (Chace, 1972), *Gnathophyllum modestum* Hay, 1917, *Lysmata jundalini* Rhyne, Calado and dos Santos, 2012, *Periclimenes sandyi* De Grave, 2009, *Rapipontonia platalea* (Holthuis, 1951a), *Typton tortugae*, McClendon, 1911], and 11 species are confirmed new records for México [*Lysmata ankeri* Rhyne and Lin, 2006, *L. pedersenii* Rhyne and Lin, 2006, *L. rafa* Rhyne and Anker, 2007, *Ascidonia miserabilis* (Holthuis, 1951b), *A. quasipusilla* (Chace, 1972), *Neopontonides chacei* Heard, 1986, *Periclimenaeus maxillulidens* (Schmitt, 1936), *P. pearsei* (Schmitt, 1932), *P. schmitti* Holthuis, 1951b, *Typton prionurus* Holthuis, 1951b, *Processa manningi* De Grave and Felder, 2012], adding up to a total of 17 newly reported species for the East coast of México. Further, the colour pattern of several species is documented for the first time.

Key words: Barbouriidae, biodiversity, Hippolytidae, Palaemonidae, Processidae

INTRODUCTION

The known fauna of caridean shrimps from the Gulf of México currently comprises 252 species belonging to 73 genera and 22 families (Anker, 2010, 2012; Anker and De Grave, 2010; Felder *et al.*, 2009). Of these, only 103 shallow water species have been reported so far from the eastern coasts of México (Álvarez *et al.*, 1999; Barba *et al.*, 2005; Barba *et al.*, 2010; Escobar-Briones and Jiménez-Guadarrama, 2010; Escobar-Briones and Villalobos-Hiriart, 2003; Felder *et al.*, 2009; García-Madriral *et*

al., 2002; Goy, 2005; Gracia and Hernández-Aguilera, 2005; Hermoso-Salazar and Arvizu-Coyotzi, 2007; Hernández-Aguilera *et al.*, 2010; Hernández-Aguilera *et al.*, 1996; Hernández *et al.*, 2010; Markham *et al.*, 1990; Martínez-Guzmán and Hernández-Aguilera, 1993; Martínez-Mayén and Román-Contreras, 2006; McClure, 2005; Mejía-Ortiz, 2008; Raz-Guzmán, 2010; Rodríguez-Almaraz *et al.*, 2000; Román-Contreras, 1988; Román-Contreras and Martínez-Mayén, 2007, 2009, 2010a,b,c; Román-Contreras and Romero-Rodríguez, 2005; Soto, 1980; Wicksten,

2005b; Wicksten, 2005c). Although the knowledge of caridean species in the Mexican part of the Gulf of México is quite considerable, it does not appear exhaustive compared to the effort in the United States region of the Gulf, as the herein included additional records demonstrate.

In order to contribute to the knowledge of carideans along the Mexican coastline of the Gulf of México, a number of sampling campaigns have been carried out since 2008 along the Yucatán peninsula by the BioDiversidad Marina de Yucatán team (BDMY) at Unidad Multidisciplinaria de Docencia e Investigación de Sisal (UMDI-Sisal), concentrating on the largest offshore reef system of the Gulf of Mexico (Arrecife Alacranes) and two of the Sisal banks reef system (Zarco-Perelló *et al.*, 2013) (Serpientes and Madagascar reefs), northeast off the Yucatán peninsula, but supplemented by fieldwork in the marshes, estuaries, and coastal wetlands of north-western Yucatán peninsula, from Celestún to Ría Lagartos (Fig. 1). Some points along the Caribbean coast of México were also sampled (Fig.1).

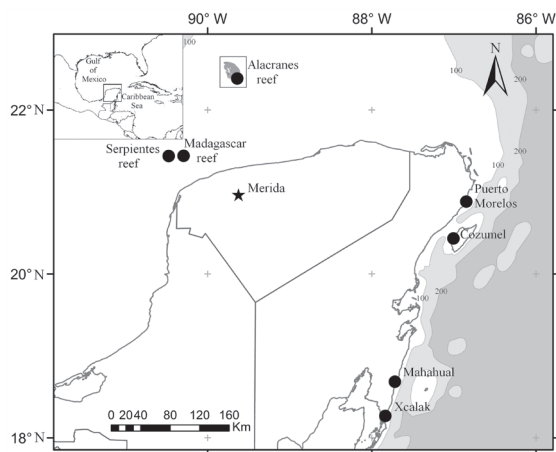


Figure 1. Location of the collecting sites at Yucatan peninsula, México.

MATERIAL AND METHODS

Sampling was conducted in a focused manner, targeting potentially shrimp rich habitats, such as coral reefs, seagrass beds, tidal flats, coral rubble, and focusing on known host species such as sponges and echinoderms. In general manual collecting was carried out, both by SCUBA and snorkelling as well as by push-

net over suitable habitat. Sampling effort was concentrated in the Yucatán Peninsula region (Fig. 1). The studied material is deposited in the Colección de Crustáceos, UMDI-Sisal (YUC-CC); the Colección Nacional de Crustáceos, UNAM, Ciudad de México (CNCR) and in the Zoological Collection of the Oxford University Museum of Natural History, Oxford, United Kingdom (OUMNH-ZC). Abbreviations used are “pocl” for post-orbital carapace length, in mm, and “fcn” for field collection number (prefix DSM for the first author, NS for third author). Species reported without fcn numbers are based on re-identifications of material by the first author in the CNCR collection. Species were considered to be new records for the Gulf of México, if within the geographical boundaries outlined for the Gulf by Felder *et al.* (2009) and not previously reported. The classification adopted here follows De Grave and Fransen (2011).

RESULTS

Systematics

Family Barbouriidae Christoffersen, 1987

Janicea antiquensis (Chace, 1972)

(Fig. 2A)

Material examined: 1 female (pocl 7.6), Arrecife Alacranes, 10 Aug. 2009, 22°23'8.88"N 89°42'1.65"W, on reef wall, below 17 m depth, nocturnal dive, fcn NS-178 (OUMNH.ZC.2012.11.001); 1 male (pocl 5.6), Arrecife Alacranes, 10 Aug. 2009, 22°23'28.89"N 89°42'13.79"W, nocturnal dive, on reef wall, at 19m depth, fcn NS-215 (OUMNH.ZC.2012.11.002).

Remarks: The material presents no special features, and corresponds closely with the descriptions of Chace (1972), Manning and Hart (1984) and d'Udekem d'Acoz (2000). The colour pattern of the present specimens (Fig. 2A) matches the material reported from Brazil (Giraldes *et al.*, 2012).

Distribution: *Janicea antiquensis* has been reported previously from Bermuda, the Bahamas, and Antigua (Kensley, 1988), as well as Fernando de Noronha (Ramos-Porto



Figure 2: Colour pattern in life of caridean shrimp from the Yucatan Peninsula, Mexico. Specimens (E), (H) and (K) were already dead when photographed and are presented for documentation only. (A) - *Janicea antiguensis*; (B) - *Gnathophyllum modestum*; (C) - *Lysmata jundalini*; (D) - *Lysmata pedersenii*; (E) - *Ascidonia quasipusila*; (F) - *Neopontonides chacei*; (G) - *Periclimenaeus maxillulidens*; (H) - *Periclimenaeus pearsei*; (I) - *Periclimenaeus schmitti*; (J) - *Periclimenes sandyi*; (K) - *Rapipontonia platalea*; (L) - *Typton prionurus*; (M) - *Procesa manningi*

and Coelho, 1991), Pernambuco and Espírito Santo, Brazil (Giraldes *et al.*, 2012), in the western Atlantic. It is also known from the Cape Verde Islands, São Tomé and the Canary Islands in the eastern Atlantic (d'Udekem d'Acoz, 2000; Wirtz, 2004). Within Mexican waters, the species has been reported from a single anchialine cave system, Cueva Quebrada in Cozumel (Kensley, 1988). Some of Kensley's (1988) material was re-examined by d'Udekem d'Acoz (2000) who erroneously placed this locality inside the Gulf of México. The species has also been recorded from 350 m deep on the Banco Chinchorro escarpment in Quintana Roo (Escobar-Briones and Villalobos-Hiriart, 2003). Although Giraldes *et al.* (2012) state that the species also occurs in Yucatán, no earlier records substantiating this could be traced. Thus, the present specimens constitute the first confirmed record of the species for the Gulf of México coast of México and by extension the entire Gulf.

Family Gnathophyllidae Dana, 1852
Gnathophyllum modestum Hay, 1917
 (Fig. 2B)

Material examined: 1 male (pocl 2.7), North Madagascar Reef, Yucatan, 4 Sept. 2013, 21°28'37.38"N 90°17'14.76"W, 24m depth, hand collected under calcareous slate rock in sand bottom, fcn DSM-225te (YUC-CC-255-11-000365); one unsexed specimen observed and photographed in Veracruz, Veracruz, 27 Mar. 2012, 19°11'34.85"N 96°7'24.05"W, 2m depth, hand collected at the fisherman pier in sand-rock bottom by José Francisco Rendón Hernández; observation of one male and an ovigerous female, North Madagascar Reef, Yucatan, 3 Sept. 2013, 21°27'16.74"N 90°19'03.96"W, 24m depth, under a calcareous slate rock on sand bottom.

Remarks: The present specimen only has five dorsal teeth and one minute distal ventral tooth, corresponding to Manning's (1963) description. According to Manning (1963), the color pattern of living material is a diagnostic feature in this genus and the present specimen matches the colour notes in Manning (1963) (Fig. 2B) with a deep brown background

carapace and abdomen, many scattered small yellow spots throughout the somites and a few larger orange spots towards the frontal part of the body. This specimen has an anterior series of 2 antero-dorso-lateral orange spots on each side of the carapace and a series of 3 larger orange spots ventrally, on the base of each first maxilliped.

Distribution: Although this species is considered to have a wide distribution in the western Atlantic, there are in reality few published records of it (Dardeau *et al.*, 1980; Hay, 1917; Hay and Shore, 1918; Manning, 1963). Within Mexican waters, this is the first record of the species in Veracruz and north Madagascar Reef in Yucatan.

Family Hippolytidae Spence Bate, 1888
Lysmata ankeri Rhyne and Lin, 2006

Material examined: 2 ovigerous hermaphrodites (pocl 6.4, 7.0), 1 non-ovigerous hermaphrodite (pocl 4.2), Quintana Roo, Playa María Irene, aprox. 4 km al N de la Estación de Ciencias de Mar y Limnología, UNAM, Puerto Morelos, Municipio de Benito Juárez, 27 Jun. 1988, leg. J.L. Villalobos, J.C. Nates, A. Cantú, P. Schmidsdorf and P. Flores [CNCR4925, original identification *L. wurdemanni* (Gibbes, 1850)]; 2 ovigerous hermaphrodites (pocl 8.4, 10.6), Punta Estrella (20°49'56.12"N 86°53'22.15"W), Puerto Morelos, Municipio de Benito Juárez, Quintana Roo, 27 Jun. 1988, leg. J.L. Villalobos, J.C. Nates, A. Cantú, P. Schmidsdorf and P. Flores [CNCR9871, original identification *L. moorei* (Rathbun, 1901)]; 3 non-ovigerous hermaphrodites (pocl 5.3, 5.9, 6.5), Punta Estrella (20°49'56.12"N 86°53'22.15"W), Puerto Morelos, Municipio de Benito Juárez, Quintana Roo, 27 Jun. 1988, leg. J.L. Villalobos, J.C. Nates, A. Cantú, P. Schmidsdorf and P. Flores [CNCR9865, original identification *L. moorei* (Rathbun, 1901)]; 4 non-ovigerous hermaphrodites (pocl 2.9, 3.9, 6.4, 8.8), Playa María Irene, aprox. 4 km al N de la Estación de Ciencias de Mar y Limnología, UNAM, Puerto Morelos, Municipio de Benito Juárez, Quintana Roo, 27 Jun. 1988, leg. J.L. Villalobos, J.C.

Nates, A. Cantú, P. Schmiddorf and P. Flores [CNCR9734, original identification *L. moorei* (Rathbun, 1901)].

Remarks: This material close corresponds to the type description (Rhyne and Lin, 2006), with the more than 34 carpal segments of the second pereopod and the rostrum not over-reaching the antennular peduncle being characteristic for the species.

Distribution: The species appears to be widespread, ranging from Florida southwards to Brazil (Rhyne and Lin, 2006; Wirtz *et al.*, 2009). Although the species was known to occur in the northern Gulf of México (Rhyne and Lin, 2006), it had not been previously recorded in Mexican waters.

Lysmata jundalini Rhyne, Calado and dos Santos, 2012
(Fig. 2C)

Material examined: 2 ovigerous hermaphrodites (pocl 4.6, 6.0), 1 non-ovigerous hermaphrodite (pocl 3.5), Arrecife Alacranes, 09 Aug. 2009, 22°23'5.57"N 89°38'22.70"W, 2 m depth, on large dead *Montipora sp.*, fcn NS-159 (YUC-CC-255-11-428); 2 ovigerous hermaphrodites (pocl 4.7, 4.8), Arrecife Alacranes, 09 Aug. 2009, 22°23'5.57"N 89°38'22.70"W, 2 m depth inside dead conch, *Strombus gigas* (Linnaeus, 1758), fcn NS-171 (OUMNH.ZC.2012.11.003); 8 ovigerous hermaphrodites (pocl 4.8-5.8), 8 non-ovigerous hermaphrodites (pocl 2.3-5.5), Arrecife Alacranes, 09 Aug. 2009, 22°23'5.57"N 89°38'22.70"W, 2 m depth, on large dead *Montipora sp.*, fcn NS-186 (OUMNH.ZC.2012.11.004).

Remarks: The majority of the material corresponds close to the type description (Rhyne *et al.*, 2012) in having 22-24 fused segment on the lateral antennular flagellum, as well as three accessory spines on the dactyl of the ambulatory pereopods. However, two ovigerous females harboured four accessory spines on the dactyl on all ambulatory pereopods, but with 22 and 24 fused antennular segments respectively. The colour pattern of the present material clearly shows the blue spot on the coxa of the fourth

pereopod, considered characteristic for the species (Rhyne *et al.*, 2012).

Distribution: The species was previously only known from Cayo Enrique, La Parguera, Puerto Rico (Rhyne *et al.*, 2012), but is known to be more widespread in the southern Caribbean (De Grave and Anker, pers. obs.). The present specimens extends its distribution considerably north-westwards to Arrecife Alacranes and constitute the first record for the Gulf of México, as well as México.

Lysmata pedersenii Rhyne and Lin, 2006
(Fig. 2D)

Material examined: 1 non-ovigerous hermaphrodite (pocl 9.2), Arrecife Alacranes, 13 Jun. 2008, 22°34'36.12"N 89°42'42.60"W, fcn ALA-073 (YUC-CC-255-11-366); 2 ovigerous hermaphrodite (pocl 10.2, 10.4), Arrecife Alacranes, 13 Jun. 2008, 22°34'36.12"N 89°42'42.60"W, fcn ALA-076 (YUC-CC-255-11-367); 1 non-ovigerous hermaphrodite (pocl 6.6), 1 ovigerous hermaphrodite (pocl 8.1), Arrecife Alacranes, 13 Aug. 2009, 22°27'9.72"N 89°45'44.90"W, fcn NS-210 (YUC-CC-255-11-455); 1 ovigerous hermaphrodite (pocl 7.8), Arrecife Alacranes, 07 Aug. 2009, 22°33'17.28"N 89°47'18.60"W, fcn NS-145 (YUC-CC-255-11-421); 1 non-ovigerous hermaphrodite (pocl 6.5), Arrecife Alacranes, 08 Aug. 2009, 22°30'42.84"N 89°47'53.40"W, fcn NS-151 (YUC-CC-255-11-425); 1 ovigerous hermaphrodite (pocl 12.6), Arrecife Alacranes, 08 Aug. 2009, 22°30'42.84"N 89°47'53.40"W, fcn NS-161 (OUMNH.ZC.2012.11.005); 1 non-ovigerous hermaphrodite (pocl 7.1), Arrecife Alacranes, 10 Aug. 2009, 22°23'8.88"N 89°42'1.70"W, night diving, 14 m depth, fcn NS-179 (YUC-CC-255-11-442); 1 non-ovigerous hermaphrodite (pocl 6.7), Arrecife Alacranes, 11 Aug. 2009, 22°35'12.84"N 89°44'41.10"W, fcn NS-190 (YUC-CC-255-11-449); 1 non-ovigerous hermaphrodite (pocl 7.5), 1 ovigerous hermaphrodite (pocl 8.9), Arrecife Alacranes, 27 Febr. 2011, 22°31'6.60"N 89°46'6.70"W, 12 m depth, fcn DSM-033 (YUC-CC-255-11-160); 2 ovigerous

hermaphrodite (pocl 9.5, 12.5), 1 non-ovigerous hermaphrodite (pocl 7.8), Arrecife Alacranes, 19 Febr. 2012, 22°23'12.89"N 89°40'44.72"W, 9 m depth, fcn DSM-177 (YUC-CC-255-11-319); 1 non-ovigerous hermaphrodite (pocl 9), Arrecife Alacranes, 24 Feb. 2011, 22°31'11.60"N 89°45'34.20"W, 2 m depth, fcn DSM-185 (YUC-CC-255-11-327); 1 non-ovigerous hermaphrodite (pocl 3.2), Arrecife Alacranes, 24 Feb. 2011, 22°31'11.60"N 89°45'34.20"W, 5 m depth, fcn DSM-190 (YUC-CC-255-11-332); 1 non-ovigerous hermaphrodite (pocl 3.8), Arrecife Madagascar, 12 Aug. 2008, 21°26'17.33"N 90°16'39.27"W, 14 m depth, fcn DS-13 (YUC-CC-255-11-385); 2 non-ovigerous hermaphrodites (pocl 5.7, 10.9), Arrecife Madagascar, 10 Jun. 2011, 21°26'28.30"N 90°17'34.01"W, 8 m depth, fcn DSM-108 (YUC-CC-255-11-237); 1 ovigerous hermaphrodite (pocl 6.4), Quintana Roo, no further details, 21 Aug. 1990, leg. L. Soto, E. Escobar and J.L. Villalobos [CNCR10788, original identification *L. rathbunae* (Chace, 1970)].

Remarks: The material corresponds closely to the type description (Rhyne and Lin, 2006) and presents no special features. All material collected during the present study from Arrecifes Madagascar and Alacranes was collected from inside the osculum or on the outside of *Callyspongia vaginalis* (Lamarck, 1814), which is one of the main host species (Rhyne and Lin, 2006). The colour pattern of the present material closely matches the type material (Rhyne and Lin, 2006).

Distribution: The species ranges from Florida southwards to Venezuela (Rhyne and Lin, 2006). Although widespread including the northern Gulf of México, the present specimens constitute the first record of the species from Mexican waters.

Lysmata rafa Rhyne and Anker, 2007

Material examined: 1 non-ovigerous hermaphrodite (pocl 4.6), Arrecife Alacranes, 04 Aug. 2009, 22°23'7.85"N 89°40'2.48"W, fcn NS-122 (YUC-CC-255-11-411).

Remarks: The single specimen is typical for the species with a long, upwardly curved rostrum with seven dorsal and eight ventral teeth, elongated third maxillipeds as well as elongated ambulatory pereopods (Rhyne and Anker, 2007).

Distribution: The species was previously only known from Biscayne Bay and Key West Lakes, Florida (Rhyne and Anker, 2007). The present specimen extends its distribution considerably southwards and constitutes the first record for México.

Family Palaemonidae Rafinesque, 1815
Ascidonia miserabilis (Holthuis, 1951b)

Material examined: 1 male (pocl 1.55), Isla Cozumel, 1 km south of Playa Corona, shallow near-shore rubble flat with seagrass, algae, and fan corals, abundant algae-overgrown rubble, depth 0.5-1 m, in *Ascidia* sp. attached under rocks [host preserved], 9 Jul. 2010, collected by A. Anker, J Duarte-Gutierrez. fcn COZ3-014 (OUMNH.ZC.2013.05.017).

Remarks: The single specimen corresponds closely to the redescription of the species by Fransen (2002), as well as the additional material reported in Pachelles *et al.* (2012). The white dotted colour pattern, however, differs from the Honduras, Panama and Brazil specimens therein, which have marked yellow dots.

Distribution: The species is widespread, ranging from the northern part of the Gulf of México (Wicksten, 2005a), Caribbean (Fransen, 2002, 2006; Holthuis, 1951b), to Atol das Rocas (Brazil) (Pachelles *et al.*, 2012). Although recorded in the northern part of the Gulf of México, the present specimen represents the first record of the genus in Mexican waters.

Ascidonia quasipusilla (Chace, 1972)
(Fig. 2E)

Material examined: 1 ovigerous female (pocl 2.2), Arrecife Alacranes, 18 Feb. 2012, 22°23'12.89"N 89°40'44.72"W, inside unidentified ascidian, 7m depth, fcn DSM-164 (OUMNH.ZC.2012.11.006).

Remarks: The present specimen corresponds closely to the re-description of the species (Fransen, 2002), although it is the smallest ovigerous female known to date. The specimen has 15 large eggs (0.4-0.5 mm) (Fig. 2E), contrasting to the Mauritanian material examined by Fransen (2002) which had 100-200 eggs (0.6-0.7 mm). The number of eggs of the female holotype from Antigua (Chace, 1972) is not known, which is the only other known ovigerous specimen from the West Atlantic. This difference between West and East Atlantic specimens assigned to this species warrants closer scrutiny.

Distribution: The species was previously recorded from Antigua and Martinique (Chace, 1972) as well as Guadeloupe (Fransen, 2002) in the western Atlantic, and Mauritania in the eastern Atlantic (Fransen, 2002). The present specimen constitutes the first record of the species for the Gulf of México, and thus by extension México.

Neopontonides chacei Heard, 1986
(Fig. 2F)

Material examined: 1 ovigerous female (pocl 1.1), 6 males (pocl 0.6-1.0), Arrecife Alacranes, 11 Aug. 2009, 22°35'12.70"N 89°44'41.10"W, 27 m depth, on the octocoral *Pseudopterogorgia americana* (Gmelin, 1791), fcn NS-197-1 (OUMNH.ZC.2012.11-007); 1 male (pocl 1.7), Arrecife Madagascar, 07 Jun. 2011, 21°26'17"N 90°16'38.2"W, 7 m depth, on *P. americana*, fcn DSM-066-1 (YUC-CC-255-11-194); 1 ovigerous female (pocl 1.2), Punta Norte, Isla Pérez, Arrecife Alacranes, 20 Feb. 2011, 22°23'08.90"N, 89°40'53.40"W, 4 m depth, on *P. americana*, fcn DSM-004.

Remarks: The present specimens correspond closely to the type description (Heard, 1986) in harbouring equal and similar second pereopods, slender ambulatory pereopods with a poorly developed or absent tubercle on the distal flexor margin of the merus. The colour pattern (Fig. 2F) shows the species to be largely transparent, with some scattered red dots on the carapace and the lateral sides of the pleura.

Distribution: Previously reported from Marigot Bay, St. Lucia Island, Falmouth, Antigua, Carrie Bow Cay, Belize, Looe Key and Bahia Honda Key, Florida (Heard, 1986), Honduras associated with *P. americana* (De Grave, 2009) and the northern Gulf of México associated with *Leptogorgia* spp. (Wicksten and Cox, 2011). The present records from Arrecifes Alacranes and Madagascar constitute the first record for Mexican waters.

Periclimenaeus maxillulidens (Schmitt, 1936)
(Fig. 2G)

Material examined: 2 females (pocl 1.4, 1.4), Arrecife Alacranes, 05 Aug. 2009, 22°23'17.90"N 89°42'8.78"W, inside dead conch on sandy flats, fcn NS-158 (OUMNH.ZC.2012.11.008).

Remarks: The material is damaged, with one specimen missing the telson, both second pereopods as well as the left third and fourth pereopod, whilst the other specimen lacks the major second pereopod as well as both fifth pereopods. The rostrum in both specimens is short, barely reaching the distal margin of the eye, harbouring one and two dorsal teeth, respectively. The short, poorly armed rostrum, combined with a simple dactylus on the ambulatory pereopods as well as a short distolateral tooth on the scaphocerite and the lack of the anterolateral tooth on the basal segment of the antennular peduncle, confidently secures the identity of these specimens. The colour pattern (Fig. 2G) shows the species to be largely transparent, but with a dense covering of small, white dots all over the body, pereopods, uropods, telson and uropods.

Distribution: The species was previously only known from a single specimen from Bonaire, with the habitat described as sandy debris behind the reef (Schmitt, 1936) and a further non-ovigerous female from off Cape San Blas, Florida, collected on coarse grey sand, broken shells, gravel, sand, coral (Holthuis, 1951b). As the present specimens were collected inside a dead conch shell, it remains unknown whether the species associates with sponges or ascidians. The present specimens constitute the first record of the species for México.

Periclimenaeus pearsei (Schmitt, 1932)
(Fig. 2H)

Material examined: 1 ovigerous female (pocl 5.5), 1 male (pocl 4.3), Arrecife Serpientes 15 Jun. 2011, 21°26'22.3"N 90°28'25.4"W, 11 m depth, inside sponge *Ircinia strobilina* (Lamarck, 1816), fcn DSM-123 (OUMNH.ZC.2012.11.009).

Remarks: The specimens corresponds closely to the re-description of the species in Holthuis (1951b), with the globose carapace, the rostral dentition (4/0) as well as the shape of the minor second pereopod being characteristic of the species. The colour pattern of the species is not known (Fig. 2H).

Distribution: The species was previously only known from the Dry Tortugas, Florida (Holthuis, 1951b) from *Spongia officinalis* Linnaeus 1758 and Maranhão, Brazil (Ramos-Porto and Coelho, 1990), between 46-52 m depth. The present specimens present the first record of the species for México, a different host record, as well as being much shallower than previously recorded.

Periclimenaeus schmitti Holthuis, 1951b
(Fig. 2I)

Material examined: 1 ovigerous female (pocl 2.5), 1 male (pocl 2.2), Arrecife Madagascar, 07 Jun. 2011, 21°26'17"N 90°16'38.2"W, 12 m depth, inside sponge *Aplysina fistularis* (Pallas, 1766), fcn DSM-068 (OUMNH.ZC.2012.11.010); 1 ovigerous female (pocl 2.3) Arrecife Madagascar, 10 Jun. 2011, 21°26'28.3"N 90°17'34.0"W, 8 m depth inside *A. fistularis*, fcn DSM-097 (OUMNH.ZC.2012.11.011); 3 ovigerous females (pocl 2.0, 2.3, 2.5), 4 females (pocl 1.7-2.0), 4 males (pocl 1.3-1.9), Arrecife Alacranes, 24 Feb. 2012, 22°31'11.60"N 89°45'34.20"W, 4.5 m depth, inside *Monanchora arbuscula* (Duchassaing and Michelotti, 1864), fcn DSM-191 (YUC-CC-255-11-333); 1 ovigerous female (pocl 2.6), Arrecife Madagascar, 29 May 2012 21°26'30.10"N 90°17'25.90"W, 20 m depth, inside *Mycale laxissima* (Duchassaing and Michelotti, 1864), fcn DSM-212 (OUMNH.ZC.2012.11.012).

Remarks: The specimens are typical for the species (Holthuis, 1951b) and present no noteworthy features. The lack of a distolateral tooth on the scaphocerite, combined with biunguiculated dactyls on the ambulatory pereopods characterizes this species. The present record confirms the species to be associated with sponges, occurring in *Lissodendoryx colombiensis* Zea and van Soest, 1986, *Aplysina fistularis* (Pallas, 1766), *Monanchora arbuscula* (Duchassaing De Fonbressin and Michelotti, 1864) and *Mycale laxissima* (Duchassaing De Fonbressin and Michelotti, 1864). The colour pattern of the present material closely matches that in De Grave and Fransen (2011), based on material from Bocas del Toro (Panama) (Fig. 2I).

Distribution: The species was previously known from Bogue Sound, North Carolina and the Dry Tortugas, Florida (Chace, 1972; Williams, 1965). Garcia-Madrigal et al. (2002) also recorded the species from an unspecified location in Quintana Roo in a regional checklist. The present record is the first for the southern Gulf of México.

Periclimenes sandyi De Grave, 2009
(Fig. 2J)

Material examined: 2 ovigerous females (pocl 2.7, 3.0), 1 male (pocl 2.7), Desterrada Island on Arrecife Alacranes, 27 Feb. 2011, 22°31'06.6"N 89°46'06.7"W, 12 m depth, fcn DSM-034 (OUMNH.ZC.2012.11.013); 2 ovigerous females (pocl 2.3, 2.7), Pérez Island channel on Arrecife Alacranes, 18 Feb. 2012, 22°23'12.89"N 89°40'44.72"W, 7 m depth, fcn DSM-165 (OUMNH.ZC.2012.11.014); 8 females (pocl 2.1-2.8), Desterrada Island on Arrecife Alacranes, 24 Feb. 2012, 22°31'11.60"N 89°45'34.20"W, 5 m depth, fcn DSM-189 (OUMNH.ZC.2012.11.015); 3 ovigerous females (pocl 2.0, 2.0, 2.2), 1 male (pocl 1.9), Arrecife Alacranes, 07 Aug. 2009, 22°33'17.28"N 89°47'18.60"W, fcn NS-146 (OUMNH.ZC.2012.11.016); 1 ovigerous female (pocl 2.6), Arrecife Alacranes, 11 Aug.

2009, 22°35'12.84"N 89°44'41.10"W, fcn NS-188 (OUMNH.ZC.2012.11.017); 2 ovigerous females (pocl 2.0, 2.5) 3 males (pocl 1.3, 1.5, 1.8), Arrecife Alacranes, 11 Aug. 2009, 22°35'12.84"N 89°44'41.10"W, fcn NS-189 (OUMNH.ZC.2012.11.018).

Remarks: The specimens correspond closely to the type description (De Grave, 2009), harbouring asymmetrical second pereiopods, with two teeth on the cutting edges of the major chelae. The present records confirm that the host species is *Callyspongia vaginalis*, with all specimens collected from the osculum. In general, females are larger than males, eggs in ovigerous females measure 0.4-0.5 mm diameter. The colour pattern of the species is now illustrated for the first time (Fig. 2K), and the species is largely transparent, but with a dense scattering of red dots on the carapace and the ventral side of the pleura, as well as the second pereiopods.

Distribution: Previously only known from the type locality, Crawl Cay, Bocas del Toro, Panama (De Grave, 2009). The present record constitutes a significant northwardly extension, as well as the first record for the Gulf of México and by extension, Mexican waters.

Rapipontonia platalea (Holthuis, 1951a)
(Fig. 2K)

Material examined: 1 ovigerous female (pocl 2.3), 1 male (pocl 1.6), Arrecife Madagascar, 12 Aug. 2008, 21°26'22.15"N 90°17'9.07"W, 14 m depth, fcn DS-06 (OUMNH.ZC.2012.11.019).

Remarks: The present specimens correspond closely to the descriptions in Holthuis (1951a) and Marin (2009) in their general features but harbour fewer dorsal rostral teeth (6 in the male and 5 in the female, respectively), corresponding to some of the specimens illustrated by Marin (2009).

Distribution: The species has been recorded from Senegal, Cape Verde, São Tomé and off Guinea in the eastern Atlantic (Holthuis, 1951a; Marin, 2009; Wirtz and d'Udekem d'Acoz, 2001; Wirtz and De Grave, 2010). Within the western Atlantic, the species

was previously only known from Tobago (Hale and De Grave, 2007), the present specimens thus represent the first record of the species for México and the Gulf of México. In contrast to the other species in the genus, which only associate with hydroids (Marin, 2009), *R. platalea* has been found on hydroids (Hale and De Grave, 2007), black coral (Wirtz and d'Udekem d'Acoz, 2001) and gorgonians (Wirtz and d'Udekem d'Acoz, 2001; Wirtz and De Grave, 2010), although the host of the current specimens is not known.

Typton prionurus Holthuis, 1951b
(Fig. 2L)

Material examined: 1 ovigerous female (pocl 3.7), Arrecife Serpientes, 13 Jun. 2011, 21°26'22.3"N 90°28'25.4"W, 17 m depth, from *Tedania ignis* (Duchassaing and Michelotti, 1864) sponge, fcn DSM-116 (OUMNH.ZC.2012.11.020).

Remarks: The specimen corresponds closely to the re-description of the type material in Holthuis (1951b) and presents no noteworthy features. The specimen has a pocl of 3.7 mm, harbouring 15-20 eggs with 0.4-0.6 mm in diameter. The colour pattern of the species is now illustrated for the first time and shown to be largely transparent, with an orange-red hue (Fig. 2L).

Distribution: The species was previously only known with certainty from the type material from the Dry Tortugas, Florida (Holthuis, 1951b), although a questionable record exists from off Pará, Brazil (Bullis and Thompson, 1965). The present record is the first for México.

Typton tortugae McClendon, 1911

Material examined: 2 males, Puerto Morelos, Municipio de Benito Juárez, Quintana Roo. Aug. 1984. leg. E. Escobar, from the sponge *Ircinia strobilina* (Duchassaing De Fonbressin and Michelotti, 1864) (CNCR4693).

Remarks: The specimens correspond closely to the re-description of the species by Holthuis (1951b) and present no noteworthy features.

Distribution: The species is known from Bermuda, the Dry Tortugas, Virgin Islands, the Brazilian states of Pará and Maranhão as well as Fernando de Noronha (Vieira *et al.*, 2012). Additionally, the species has been recorded in the Gulf of California (East Pacific) by Wicksten (1983). The present specimen represents the first record for the Gulf of México.

Family Processidae Ortmann, 1890

Processa manningi De Grave and Felder, 2012
(Fig. 2M)

Material examined: 1 ovigerous female (pocl 4.0), 1 male (pocl 3.7) Xcalak, Quintana Roo, 19 Apr. 2011, 18°16'3.11"N 87°50'7.35"W, on muddy and fine shells bottom burrows, fcn DSM-054 (OUMNH.ZC.2012.11.021); 1 male (pocl 4.0), Mahahual, Quintana Roo, 05 Apr. 2012, 18°41'6.69"N 87°43'8.16"W, on muddy and fine shells bottom burrows, fcn DSM-220 (OUMNH.ZC.2012.11.022).

Remarks: All specimens are damaged with many pereopods missing, although the ovigerous female has both second pereopods, which are strongly asymmetrical. The material is assigned to *P. manningi* on account of the unarmed stylocerite, the presence of a small posteromedian tooth on the lobe on the sixth pleonite, the presence of an anteromedial row of setae on the telson and the strongly developed antennal spine. In comparison with the type material (De Grave and Felder, 2012), the longitudinal, lateral row of setae on the telson is poorly developed in two specimens, although this could be due to abrasion during sampling. The colour pattern (Fig. 2M) of the present specimens matches the type material in De Grave and Felder (2012). The specimens were obtained by yabby pump on very shallow, muddy and fine shell bottoms in burrows, likely made by callianassids. Although no callianassids were collected in the same burrows as *P. manningi*, *Neocallichirus grandimana* (Gibbes, 1850), the host species in Belize (De Grave and Felder, 2012), was common in the same habitat.

Distribution: The species was previously only known from Belize (De Grave and Felder, 2012), the present record extends its distribution into the south Caribbean coast of México.

DISCUSSION

The present contribution details six new records for the Gulf of México, as well as 11 new records for Mexican waters. This raises the known caridean shrimp fauna of the Gulf of México to 258 species, of which 114 are currently known from shallow, coastal waters in México. As an estimated 35-40 caridean species in the Gulf of México are exclusively known from continental slopes and deeper, it thus appears that the known shallow water Mexican fauna approximates only half the total caridean biodiversity in the Gulf. Certain areas along the Mexican part of the Gulf appear well sampled, for instance Tamaulipas and Campeche, due to local shrimp fisheries and oil industry, however these are primarily sedimentary environments, which hold relatively little caridean biodiversity compared to reefs. The more complex inshore and offshore reef systems and associated environments in Veracruz and Yucatán remain relatively poorly sampled to date, and are likely to hold considerably higher numbers of species, as the current records amply demonstrate.

Despite the perceived lower sampling effort in reefal environments along the southern coastline of the Gulf of México, an examination of available species lists, does show that both Veracruz and Yucatán, already have a rich caridean biodiversity, with 69 and 104 species known, respectively. In contrast, the known species fauna of Campeche is lower at 56 species. Of all the Mexican states along the Gulf of México coast, Tamaulipas and Tabasco appear to hold lower diversity, at 10 and 3 species respectively. As already discussed, this is likely linked to sedimentary environments predominating in those area. Although the small number of species known from Tabasco does suggest a lack of sampling effort.

The total number of species known from Yucatán (104) compares favourably with the 83

known species from Quintana Roo along the Caribbean coast, which historically has seen more sampling effort. To further document the expected rich biodiversity of these areas, concerted sampling as well as deploying novel collecting techniques, such as yabby pumping, bait and light trapping would be beneficial.

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