



Palaemonidae (Crustacea: Decapoda: Caridea) from the shallow waters from Quintana Roo, Mexican Caribbean coast

Palaemonidae (Crustacea: Decapoda: Caridea) de las aguas someras de Quintana Roo, Caribe mexicano

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Abstract. Few studies have focused on the palaemonid fauna of the Mexican Caribbean. This study provides a list of shallow water free-living and symbiont shrimps of the family Palaemonidae collected on turtle grass (*Thalassia testudinum*) in Bahía de la Ascensión, Bahía del Espíritu Santo and Mahahual reef lagoon, Quintana Roo, Mexico. Ten species in 8 genera are reported, of which the genus *Periclimenes* is the most diverse with 3 species. An updated geographic distribution along the western Atlantic and other regions is provided for all the species. The greatest affinity of the palaemonid fauna studied, besides that with the Caribbean province, is with the Brazilian, Argentinian, and Texan zoogeographic provinces. Of the 10 species reported in this paper, 8 represent new local records in the studied area.

Key words: Palaemonidae, Decapoda, Caridea, Mexican Caribbean.

Resumen. Los crustáceos de la familia Palaemonidae del Caribe mexicano han sido poco estudiados. En este trabajo se presenta un listado de palemónidos de vida libre y simbioses recolectados en el pasto marino *Thalassia testudinum* de Bahía de la Ascensión, Bahía del Espíritu Santo y la laguna arrecifal de Mahahual, Quintana Roo, México. Se registran 10 especies pertenecientes a 8 géneros, siendo el género *Periclimenes* el más diverso con 3 especies. Para todas las especies se proporciona su distribución geográfica en la costa del Atlántico americano así como en otras regiones. Además de la provincia Caribeña, los palemónidos recolectados también muestran alta afinidad con otras provincias zoogeográficas como la Brasileña, Argentina y Texana; de las 10 especies registradas en este estudio, 8 representan nuevo registro local en el área estudiada.

Palabras clave: Palaemonidae, Decapoda, Caridea, Caribe mexicano.

Introduction

Among decapod crustaceans, shrimp have been extensively studied, both the economically important penaeids (Chace, 1972) as well as the carideans, represented by a considerable number of species in tropical and subtropical waters of the world (Wicksten and Hendrickx, 2003). Caridean shrimps of the family Palaemonidae are common in intertidal and shallow subtidal habitats (Wicksten, 1989) to 1 285 m depth (Chace and Bruce, 1993), and are adapted to different environments including marine, brackish and freshwater habitats. Most species are free-living, although some species are commensals of other invertebrates (Holthuis, 1951; Wicksten, 2005), whereas others are cleaners of marine fish (Limbaugh et

al., 1961). Often, palaemonid shrimps are small, but others of larger size have economic interest as human food, i. e., the genus *Macrobrachium*.

Few studies have presented information on the Palaemonidae of the coast of Quintana Roo, on the Caribbean coast of Mexico. Some are checklists of specific areas and different kinds of marine habitats (Briones-Fourzán and Lozano-Álvarez, 2002). Chace (1972) is one of the important references for this group of crustaceans, since it offers identification keys and descriptions of new species. Other important contributions to the carcinological fauna in the area is that by Markham and Donath-Hernández (1990), Markham et al. (1990) and Briones-Fourzán and Lozano-Álvarez (2002) who published lists of the shallow water decapods including the palaemonids, and provided new records for the area. Complementarily, the deep water caridean shrimps have been studied by Escobar-Briones

and Villalobos-Hiriart (2003). Recently Martínez-Mayén and Román-Contreras (2006) described a new species of *Periclimenes* Costa, 1844, from Bahía de la Ascensión, and stressed the need to generate more studies for this group of crustaceans in this region. Therefore the objective of this study is to provide a list of the Palaemonidae collected in the seagrass beds of *Thalassia testudinum* Banks ex Köning, along the southern coast of the state of Quintana Roo in the Mexican Caribbean.

Material and methods

Diurnal sampling took place at different stations of Bahía de la Ascensión (19°30'-19°50' N, 87°25'-87°50' W), Bahía del Espíritu Santo (19°12'-19°25' N, 87°41' W), and Mahahual reef lagoon (18°42.88' N, 87°42.44' W), along the central southern coasts of Quintana Roo, Mexico (Fig. 1). Specimens were collected with a Colman-Seagrave sledge net with a mesh of 800 µm in *T. testudinum* meadows at depths between 0.4-1.5 m. The crustaceans were fixed with 10% formaldehyde immediately after sampling and were later preserved in 70% ethanol. Substrate sampled included sandy-mud and sandy-rock in both bays, and sand in the Mahahual reef lagoon. Data on diverse aspects (currents, temperature, salinity, sediment type, vegetation) of the study area can be found in Merino-

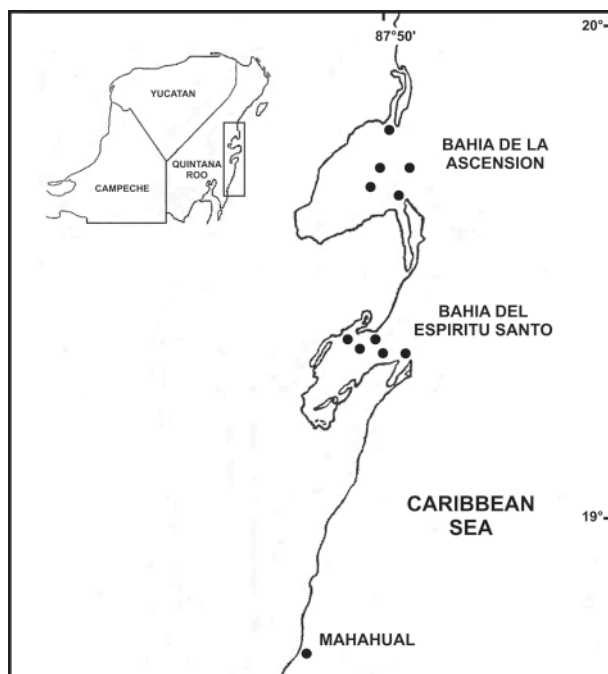


Figure 1. Study area (black point represent the sampling sites).

Ibarra (1986), Jordán-Dahlgren et al. (1994), Castellanos-Osorio and Suárez-Morales (1997) and Suárez-Morales and Rivera (1998).

The list of species included here follows the arrangement proposed by Martin and Davies (2001) and entries are ordered alphabetically. Synonymy, type-locality, material examined, habitat, previous Mexican Caribbean records, and geographic range are cited for each species. The number of individuals and collection date for each locality are also reported. Synonymies are based in the original descriptions, monographs, and specialized literature. The geographic distribution of the species in the American provinces follows Boschi (2000). All specimens are deposited in the collection at the authors' laboratory, in the Universidad Nacional Autónoma de México (UNAM).

Results

A total of 13 914 palaemonid shrimps in 10 species and 8 genera, were determined. The genus *Periclimenes* was the most diverse with 3 species. Eight species presented new local records in the studied area (Table 1).

Order Decapoda: Latreille, 1802

Suborder Pleocyemata: Burkenroad, 1963

Infraorder: Caridea Dana, 1852

Superfamily: Palaemonoidea Rafinesque, 1815

Family: Palaemonidae Rafinesque, 1815

Cuapetes americanus (Kingsley, 1878) comb. nov.

Anchistia Americana Kingsley, 1878: 96.

Periclimenes (Harpilius) americanus: Holthuis, 1951: 60 (complete synonymy), pl. 18, figs. a-j, pl. 19, figs. a-e.--Ledoyer, 1986: 162, fig. 11.--Nizinski, 2003: 104.

Periclimenes americanus: Coelho and Ramos, 1972: 147.--Chace, 1972: 31.--Felder and Chaney, 1979: 24.--Markham and McDermott, 1980: 1269.--Williams, 1984: 83, fig. 56.--Markham et al., 1990: 419.--Hernández-Aguilera et al., 1996: 26.--Campos-Vázquez, 2000: 362.--Briones-Fourzán and Lozano-Álvarez, 2002: 200.--Escobar-Briones and Villalobos-Hiriart, 2003: 101, 105.--Wehrtmann and Vargas, 2003: 270.--Wicksten, 2005: 85, fig. 18.--Coelho et al., 2006: 50.

Kemponia americanus: Bruce, 2004: 11.--De Grave et al., 2006: 1422.

Kemponia americana: Coelho Filho, 2006: 6.

Cuapetes americanus: Okuno, 2009: 67-68.

Type locality. Key West, Florida, U.S.A.

Material examined. Bahía de la Ascensión, 960 specimens, May 2002; 785 specimens, Jan 2003. Bahía del Espíritu

Table 1. Palaemonid shrimps collected in the south coast of Quintana Roo, and their distribution in the American zoogeographic provinces: Ar = Argentinian; Br = Brazilian; C = Caribbean; T = Texan; Cr = Carolinian; V = Virginian; Bo = Boreal. Sampled localities: BA = Bahía de la Ascensión; BES = Bahía del Espíritu Santo; MRL = Mahahual Reef Lagoon. (Letters in parenthesis represent first record for the locality)

Species	Locality	Abundance	Zoogeographic provinces						
			Ar	Br	C	T	Cr	V	Bo
<i>Cuapetes americanus</i> (Kingsley, 1878)	BA; BES; MRL	6 015	•	•	•	•	•		
<i>Leander tenuicornis</i> (Say, 1818)	BA; BES; (MRL)	233	•	•	•	•	•	•	•
<i>Palaemon (Palaeander) northropi</i> (Rankin, 1898)	(MRL)	3	•	•	•				
<i>Palaemonetes (Palemonetes) octaviae</i> Chace, 1972	BA	5			•				
<i>Periclimenaeus caraibicus</i> Holthuis, 1951	BA; (MRL)	5		•	•				
<i>Periclimenes rathbunae</i> Schmitt, 1924	(MRL)	1			•				
<i>Periclimenes siankaanensis</i> Martínez-Mayén and Román-Contreras, 2006	BA; BES; (MRL)	7 538			•				
<i>Periclimenes yucatanicus</i> (Ives, 1891)	(BA)	1		•	•				
<i>Typton carneus</i> Holthuis, 1951	(BA)	1		•	•	•			
<i>Urocaris longicaudata</i> Stimpson, 1860	(BA); (MRL)	112	•	•	•	•	•		

Santo, 2 985 specimens, May 2001; 404 specimens, Nov 2001. Mahahual reef lagoon, 500 specimens, Jul 1997; 381 specimens, Nov 1998. On mud and sand flats with *T. testudinum*, 0.5-1.5 m depth.

Distribution. Western Atlantic Beaufort, North Carolina (Holthuis, 1951) and Bermuda (Markham and McDermott, 1980) to One-Half Fathom Reef, southern Texas (Felder and Chaney, 1979); southwestern Gulf of Mexico, reefs of Veracruz and Campeche, and Isla Pérez, Arrecife Alacrán, Yucatán, Mexico (Hernández-Aguilera et al., 1996) to Sao Paulo, Brazil (Coelho and Ramos, 1972). Throughout West Indies to Trinidad and Aruba (Holthuis, 1951).

Previous Mexican Caribbean records. Reported as *P. americanus* from: Cape Catoche (Holthuis, 1951); Isla Mujeres (Chace, 1972; Campos-Vázquez, 2000), Puerto Morelos (Markham et al., 1990); Isla Cozumel (Chace, 1972; Briones-Fourzán and Lozano-Álvarez, 2002); Bahía de la Ascensión (Chace, 1972; Markham et al., 1990) and Bahía del Espíritu Santo (Chace, 1972); north and east of Mahahual and west central Banco Chinchorro, Quintana Roo (Escobar-Briones and Villalobos-Hiriart, 2003).

Habitat. The species inhabits sandy or rocky bottoms and macroalgae (Holthuis, 1951; Campos-Vázquez, 2000). On mangrove roots (Markham et al., 1990), and sponges associated with *Synalpheus longicarpus* (Herrick, 1891) and *Synalpheus towsendi* Coutière, 1909 (Wehrmann and Vargas, 2003); shallow water to 300 m (Escobar-Briones and Villalobos-Hiriart, 2003).

Leander tenuicornis (Say, 1818)

Palaemon tenuicornis Say, 1818: 249.

Leander tenuicornis: Holthuis, 1952: 155, pl. 41, figs. a-g, pl. 42, figs. a-f.--Chace, 1972: 19.--Carvacho, 1979: 446.-

-Markham and McDermott, 1980: 1269.--Ramos-Porto, 1986: 13, pl.5, figs. a-h, pl. 6, figs. a-g.--Martínez-Iglesias, 1986: 31, fig. 18.--Markham et al., 1990: 419.--Williams, 1984: 65, fig. 43.--Martínez-Guzmán and Hernández-Aguilera, 1993: 613.--Jayachandran, 2001: 32.--Bruce, 2002: 80.--Li et al., 2004: 516, fig. 3.--Cardoso, 2006: 27. *Type locality.* Newfoundland Banks.

Material examined. Bahía de la Ascensión, 15 specimens, May 2002; 31 specimens, Jan 2003. Bahía del Espíritu Santo, 3 specimens, May 2001; 5 specimens, Nov 2002. Mahahual reef lagoon, 140 specimens, Jul 1997; 39 specimens, Nov 1998. On fine sediments, compact sand, and mud with *T. testudinum*, 0.5-1.5 m depth. First record for Mahahual reef lagoon.

Distribution. Tropical and subtropical waters of the world (Carvacho, 1979) except for the eastern Pacific region (Williams, 1984; Bruce 2002). Western Atlantic: Newfoundland, Canada (Holthuis, 1952) and Bermuda (Markham and McDermott, 1980), east of the United States; along the Gulf of Mexico to Sao Paulo, Brazil (Cardoso, 2006); Falkland Islands (Williams, 1984); along the Antilles (Holthuis, 1952; Chace, 1972); Indo-West-Pacific region, from the Red Sea and Reunion to Japan, New Guinea, Australia and New Zealand; east Atlantic from Mediterranean Sea to south of the Azores (Jayachandran, 2001); South China Sea (Li et al., 2004). According to Bruce (2002), the Falkland Islands record has never been verified.

Previous Mexican Caribbean records. Bahía de la Ascensión and Bahía del Espíritu Santo (Chace, 1972; Markham et al., 1990).

Habitat. On plants in shallow water near the seashore; open sea on floating weeds (Li et al., 2004); associated

with *Porites* (Chace, 1972); between *Thalassia* on sand (Martínez-Guzmán and Hernández-Aguilera, 1993); littoral and pelagic (Carvacho, 1979).

Palaemon (Palaeander) northropi (Rankin, 1898)

Leander northropi Rankin, 1898: 245, pl. 30, fig. 4.

Palaemon (Palaeander) northropi: Holthuis, 1952: 192 (complete synonymy), pl. 47, figs. a-l.--Chace, 1972: 21.--Román-Contreras, 1988: 314.--Azambuja-Correa and Loyola e Silva, 1995: 218.--Ramos-Porto and Coelho, 1998: 335.

Palaemon northropi: Markham and McDermott, 1980: 1269.--Abele and Kim, 1986: 14, 168, 169, figs. a-b.--Martínez-Iglesias et al., 1996: 31.--Wicksten, 2005: 76, fig. 8.--Coelho et al., 2006: 50.

Type locality. Nassau, New Providence, Bahama Islands.

Material examined. Mahahual reef lagoon, 3 specimens, Nov 1998. In beds of *Thalassia* and sand substrate, 0.5 m depth. First record for Mahahual reef lagoon.

Distribution. Bermuda (Markham and McDermott, 1980); Florida (Abele and Kim, 1986); southwestern Gulf of Mexico, Laguna de Términos, Campeche, Mexico (Román-Contreras, 1988) to Piriapolis, Uruguay (Holthuis, 1952). West Indies, from Bahamas to Curaçao (Holthuis, 1952).

Previous Mexican Caribbean records. Bahía de la Ascensión (Chace, 1972).

Habitat. Shallow waters, sand and rocks in the vicinity of mangroves (Chace, 1972; Ramos-Porto and Coelho, 1998); in *T. testudinum* and macroalgae (Román-Contreras, 1988).

Palaemonetes (Palaemonetes) octaviae Chace, 1972

Palaemonetes (Palaemonetes) octaviae Chace, 1972: 22-24, figs. 3-4.--Carvacho, 1979: 448.--Román-Contreras, 1988: 314.

Palaemonetes octaviae: Markham and Donath-Hernández, 1990: 244.--Markham et al., 1990: 419.--Wicksten, 2005: 77, fig. 9.--Guevara et al., 2007: 989, 993.

Type locality. Sandy mud flats between Îlet à Monroux and Îlet Rat, Pointe-à-Pitre, Guadeloupe.

Material examined. Bahía de la Ascensión, 5 specimens, Jan 2003. In fine sand between *Thalassia*, 0.70 m depth.

Distribution. Laguna de Términos, Campeche (Román-Contreras, 1988; Guevara et al., 2007) and Quintana Roo, Mexico; Guadeloupe and Leeward Islands (Chace, 1972; Carvacho, 1979).

Previous Mexican Caribbean records. Bahía de la Ascensión (Chace, 1972; Markham et al., 1990).

Habitat. Marine on sandy mud flats (Chace, 1972); among mangroves (Markham and Donath-Hernández, 1990); in less than 0.60 m depth (Chace, 1972).

Periclimenaeus caraibicus Holthuis, 1951

Periclimenaeus caraibicus Holthuis, 1951: 110-113, pl. 32, figs. h-j, pl. 34, figs. a-h.--Chace, 1972: 28.--Abele and Kim, 1986: 15, 172, 173, figs. e-g.--Martínez-Guzmán and Hernández-Aguilera, 1993: 613.--Martínez-Iglesias et al., 1996: 31.--Escobar-Briones and Villalobos-Hiriart, 2003: 105.--Wicksten, 2005: 90, fig. 22.--Coelho Filho, 2006: 6. *Type locality*. Buccoo Reef, Tobago.

Material examined. Bahía de la Ascensión, 2 specimens, May 2002; 2 specimens, Jan 2003. Mahahual reef lagoon, 1 specimen, Jul 1997. On sand with *Thalassia*, 0.4-1.5 m depth. First report in Mahahual reef lagoon.

Distribution. Florida (Abele and Kim, 1986); Isla Pérez, Arrecife Alacrán, Yucatán (Martínez-Guzmán and Hernández-Aguilera, 1993) to Banco Chinchorro, Quintana Roo, Mexico (Escobar-Briones and Villalobos-Hiriart, 2003); Ceará, Brazil (Coelho Filho, 2006); in the Antilles, from Cuba (Martínez-Iglesias et al., 1996) to Tobago (Chace, 1972).

Previous Mexican Caribbean records. Bahía de la Ascensión (Chace, 1972) and west central Banco Chinchorro, Quintana Roo, Mexico (Escobar-Briones and Villalobos-Hiriart, 2003).

Habitat. Sandy bottoms with *T. testudinum* (Martínez-Iglesias et al., 1996), near to mangrove swamp, associated with coral rocks (Chace, 1972), and among coral rubble and debris; to 260 m (Escobar-Briones and Villalobos-Hiriart, 2003).

Periclimenes rathbunae Schmitt, 1924

Periclimenes rathbunae Schmitt, 1924: 70, figs. 5-6.--Chace, 1972: 38.--Crales, 1984: 310.--Markham et al., 1990: 420.--Spotte et al., 1991: 301, figs. 1-3.--Hernández-Aguilera et al., 1996: 27.--Martínez-Iglesias et al., 1996: 32.--Wicksten 2005: 88, fig. 20.

Periclimenes (Harpilius) rathbunae: Holthuis, 1951: 58, pl. 17, figs. a-h.

Type locality. Spanish Port, Curaçao.

Material examined. Mahahual reef lagoon, 1 specimen, Nov 1998. On sandy mud with *T. testudinum*, 0.4-0.8 m depth. First record for Mahahual reef lagoon.

Distribution. Dry Tortugas, Florida (Chace, 1972; Wicksten, 2005); recorded from Isla Sacrificios, Veracruz, Mexico (Hernández-Aguilera et al., 1996); Bahía de la Ascensión, Quintana Roo, Mexico (Chace, 1972) and Carrie Bow Cay, Belize (Spotte et al., 1991); also reported off Santa Marta, Colombia (Crales, 1984); West Indies, from Arrecife Diego Pérez, Gulf of Batabanó, Cuba (Martínez-Iglesias et al., 1996) and Pine Cay, Caicos Bank, Turks and Caicos Islands (Spotte et al., 1991) to Tobago (Chace, 1972) and Curaçao (Holthuis, 1951).

Previous Mexican Caribbean records. Halfmoon Bay,

near Akumal (Wicksten, 2005) and Bahía de la Ascensión (Chace, 1972).

Habitat. Associated with sea anemones in shallow waters (Spotte et al., 1991); Chace (1972) reported this species in dead coral and rocks in sandy beaches; collected to a depth of 15 m (Criales, 1984).

Periclímenes siankaanensis Martínez-Mayén and Román-Contreras, 2006

Periclímenes siankaanensis Martínez-Mayén and Román-Contreras, 2006: 33-42, figs. 1-3.

Type-locality. Cayo Culebras, Bahía de la Ascensión, Quintana Roo, Mexico.

Material examined. Bahía de la Ascensión, 3 629 specimens, May 2002; 1 049 specimens, Jan 2003. Bahía del Espíritu Santo, 2 664 specimens, May 2004; 194 specimens, Nov 2001. Mahahual reef lagoon, 1 specimen, Jul 1997; 1 specimen, Nov 1998. First record for Mahahual reef lagoon.

Distribution. Bahía de la Ascensión and Bahía del Espíritu Santo, Mexican Caribbean coast.

Habitat. Very abundant in *T. testudinum* seagrass meadows on sandy bottoms, in less than 1 m of depth (Martínez-Mayén and Román-Contreras, 2006).

Periclímenes yucatanicus (Ives, 1891)

Palaemonella Yucatanica Ives, 1891: 183-184, pl. 5, fig. 8.

Periclímenes (Periclímenes) yucatanicus Holthuis, 1951: 38, pl 10, figs. a-l.--Limbaugh et al., 1961: 240, fig. 2.

Periclímenes yucatanicus: Chace, 1972: 38.--Rodríguez, 1980: 88, fig. 26.--Criales, 1984: 310.--Román-Contreras, 1988: 314.--Markham et al., 1990: 420.--Spotte et al., 1991: 309.--Martínez-Iglesias et al., 1996: 32.--Briones-Fourzán and Lozano-Álvarez, 2002: 200.--Wicksten, 2005: 83, fig. 16, pl. 3, fig. B.--Coelho et al., 2006: 50.

Type locality. Off Progreso, Yucatán.

Material examined. Bahía de la Ascensión, 1 specimen, Jan 2003. Sandy mud substrate with *Syringodium* and *Thalassia*, 1 m depth. First record for Bahía de la Ascensión.

Distribution. Cape Florida, Dade Co., S. E. Florida (Holthuis, 1951); in southwestern Gulf of Mexico, from Laguna de Términos, Campeche (Román-Contreras, 1988) and Progreso, Yucatán, Mexico (Ives, 1891). Southward to Bahía, Brazil (Ramos-Porto and Coelho, 1998). West Indies from Bahamas (Limbaugh et al., 1961) to Antigua Island (Chace, 1972).

Previous Mexican Caribbean records. Isla Cozumel (Chace, 1972; Markham et al., 1990) and Chankaanab Park, on the same island (Briones-Fourzán and Lozano-Álvarez, 2002); Akumal, Quintana Roo (Wicksten, 2005).

Habitat. Commonly associated with sea anemones (Spotte et al., 1991) and the benthic medusa *Cassiopea xamachana* Bigelow (Criales, 1984); to a maximum depth of 20 m (Martínez-Iglesias et al., 1996).

Typton carneus Holthuis, 1951

Typton carneus Holthuis, 1951: 162-165 (in part), pl. 51, figs. a, e, k, l.--Chace, 1972: 46-49 (emended description), fig. 12.--Felder and Chaney, 1979: 24.--Abele and Kim, 1986: 17, 186, 187, figs. f-h.--Ramos-Porto and Coelho, 1998: 340.--García-Madrigal et al., 2002: 145.--Coelho et al., 2006: 50.

Type locality. Tortugas, Florida.

Material examined. Bahía de la Ascensión, 1 specimen, Jan 2003. In sand-rocky bottom with *T. testudinum*, shallow water at less than 1 m.

Distribution. South and west coasts of Florida (Holthuis, 1951) and Seven and One-Half Fathom Reef, southern Texas (Felder and Chaney, 1979); Paraíba, Brazil (Ramos-Porto and Coelho, 1998). West Indies from Bahamas to Tobago (Chace, 1972).

Previous Mexican Caribbean records. Listed by García-Madrigal et al. (2002) (unspecified locality).

Habitat. Holthuis (1951) reported this species in coarse gray sand and broken shells in depths of ca 20 to 73 m. Species of the genus *Typton* commonly are found in sponges and corals (Chace, 1972).

Urocaris longicaudata Stimpson, 1860

Urocaris longicaudata Stimpson, 1860: 39.--Rathbun, 1902: 126.--Bruce, 2007a: 61-66, figs. 1-3.

Periclímenes (Periclímenes) longicaudatus Holthuis, 1951: 26, pl. 6, figs. a-m, pl. 8, fig. m.--Nizinski, 2003: 104.

Periclímenes longicaudatus: Chace, 1972: 37.--Coelho and Ramos, 1972: 147.--Carvacho, 1979: 453.--Williams, 1984: 86, fig. 58.--Martínez-Iglesias, 1986: 32, fig. 19A.-Hernández-Aguilera et al., 1996: 27.--Arrivillaga and Baltz, 1999: 307.--García-Madrigal et al., 2002: 145.--Barba et al., 2005: 715.--Wicksten, 2005: 84, fig. 17.

Type locality. Coast of Carolina (unspecified site).

Material examined. Bahía de la Ascensión, 43 specimens, May 2002; 4 specimens, Jan 2003. Mahahual reef lagoon, 61 specimens, Jul 1997; 4 specimens, Nov 1998. Collected in sand and mud with *Thalassia*, 0.5-1.5 m depth. First record for both localities.

Distribution. Cape Hatteras, North Carolina (Williams, 1984) to near the Brazos Santiago Pass jetty at South Padre Island, Texas (Wicksten, 2005); southwestern Gulf of Mexico from Campeche, Mexico (Hernández-Aguilera et al., 1996; Barba et al., 2005) to Sao Paulo, Brazil (Coelho and Ramos, 1972); West Indies from Bahamas Islands

(Andros Bank) to Trinidad (Holthuis, 1951).

Previous Mexican Caribbean records. The species was listed by García-Madriral et al. (2002) as *P. longicaudatus* for the Mexican Caribbean, but the collecting site was not specified.

Habitat. Abundant on seagrass beds of *Sargassum*, *Leptogira* and *T. testudinum* (Williams, 1984; Arrivillaga and Baltz, 1999), in sponges (Holthuis, 1951) and coral *Porites* (Chace, 1972); shallow waters to ca 27 m (Holthuis, 1951).

Remarks. Recently the genus *Urocaris* Stimpson, 1860 was resurrected by Bruce (2007a) being the type species *Urocaris longicaudata*.

Discussion

Analyzed species represent 41.6% of the marine palaemonid shrimps reported for shallow waters of the Caribbean coast of Quintana Roo (24 species) (Chace, 1972; Markham and Donath-Hernández, 1990; Markham et al., 1990; Briones-Fourzán and Lozano-Álvarez, 2002; García-Madriral et al., 2002; Martínez-Mayén and Román-Contreras, 2006). This percentage is relatively high considering that sampling was carried out only in seagrass meadows.

Although *Periclimenes* was the most diverse genus, only *P. siankaanensis* was very abundant. This could be because it is a conspicuous inhabitant of the *T. testudinum* beds (Martínez-Mayén and Román-Contreras, 2006), whereas the majority of the other species are associated a wide variety of invertebrate hosts (Bruce, 2007b) as *P. rathbunae* and *P. yucatanicus* both reported living on anemones (Spotte et al., 1991). According to Bruce (2008), the anemones are commonly found amongst seagrass beds being probable that the collecting activities detach the shrimps from their hosts. This would explain the presence and low abundance of these species in our samples.

Bauer (1985) reported that *Cuapetes americanus* (mentioned as *Periclimenes americanus*) is abundant in seagrass beds, which is confirmed in the present study, being the species with the second greatest number of organisms only after *P. siankaanensis* (Table 1). The reason for other pontonine species such as *Typton carneus* presenting low abundance, is probably due to the species constitutes part of the cryptofauna and is better represented in coral rocks and cavities of sponges (Chace, 1972), which were not sampled in this study.

All crustaceans collected belong to the Caribbean province, which extends from the mouth of the Orinoco River to Cabo Rojo, Gulf of Mexico (21°36'N), the Caribbean Islands and southern of Florida, from Cape

Romano (25°54'N) in the Gulf of Mexico to Cape Canaveral in the Atlantic Ocean (Boschi, 2000; Briggs, 1974). In this zone, water temperature ranges from 20° to 25°C in winter, and 28° and 30°C in summer (Boschi, 2000).

The strongest affinity of the palaemonid fauna treated here, besides that to the Caribbean region, was with the Brazilian region (70%) and in a lesser degree with the Argentinian (40%), Texan (40%), Carolinian (30%), Virginian (10%), and Boreal (10%) zoogeographic provinces (Boschi, 2000). On the other hand, *L. tenuicornis*, *C. americanus*, and *U. longicaudata* have wider distributional range with respect to the other species; whereas *Palaemonetes (P.) octaviae*, *Periclimenes rathbunae*, and *P. siankaanensis* are limited only to the Caribbean province, and should be considered endemic for this region.

The distribution of decapods has been associated with different ecological features such as productivity, habitat, physiological tolerance of the species (Gorny, 1999), as well as marine currents (Lemaitre and Alvarez-León, 1992). However, according to Boschi and Gavio (2005), temperature is the main factor determining the distribution of crustaceans. Species considered to be tropical live in marine waters with a temperature of 20°C or more for much of the year (Wicksten and Hernández, 2000). In this case, the carcinological fauna of Quintana Roo has a tropical affinity (Markham et al., 1990), which explains that the greater concentration of species, besides the Caribbean, is distributed in the Brazilian zoogeographic province, where the temperature fluctuates from 22° to 30°C (Boschi, 2000). The same author suggested that both tropical and subtropical species decrease in number towards the temperate and cold regions, explaining why the palaemonid shrimp reported in this study have less affinity with more temperate zoogeographic provinces. It is necessary to carry out a more detailed systematic study of the crustacean fauna of the area in order to preserve its diversity and the protection of the different substrata from the marine zone (Briones-Fourzán and Lozano-Álvarez, 2002), where the urban and tourist activities (Castellanos-Osorio and Suárez-Morales, 1997) alters and degrades the habitat and modify the marine biota.

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Literature cited

- Abele, L. G. and W. Kim. 1986. An illustrated guide to the marine decapod crustaceans of Florida. Technical Series of the State of Florida Department of Environmental Regulation 8:1-326.
- Arrivillaga, A. and D. M. Baltz. 1999. Comparison of fishes and macroinvertebrates on seagrass and bare-sand sites on Guatemala's Atlantic coast. *Bulletin of Marine Science* 65:301-319.
- Azambuja-Correa, E. de and J. de Loyola e Silva. 1995. Lista das espécies de Dendrobranchiata e Caridea (Crustacea, Decapoda) do Museu de História Natural Capao da Imbuia, Curitiba e do Centro de Estudos do Mar, Paranaguá, Paraná, Brasil. *Revista Brasileira de Zoologia* 12:211-220.
- Barba, E., A. Raz-Guzmán and A. J. Sánchez. 2005. Distribution patterns of estuarine caridean shrimps in the southwestern Gulf of Mexico. *Crustaceana* 78:709-726.
- Bauer, R. T. 1985. Diel and seasonal variation in species composition and abundance of caridean shrimps (Crustacea, Decapoda) from seagrass meadows on the north coast of Puerto Rico. *Bulletin of Marine Science* 36:150-162.
- Boschi, E. E. 2000. Species of decapod crustaceans and their distribution in the American marine zoogeographic provinces. *Revista de Investigación y Desarrollo Pesquero* 13:7-136.
- Boschi, E. E. and M. A. Gavio. 2005. On the distribution of decapod crustaceans from the Magellan Biogeographic Province and the Antarctic region. *Scientia Marina* 69. Suppl. 2:195-200.
- Briggs, J. C. 1974. *Marine zoogeography*. McGraw-Hill Company, New York. 475 p.
- Briones-Fourzán, P. and E. Lozano-Álvarez. 2002. Shallow-water benthic decapod crustaceans of Chankanaab Park, Cozumel Island, México. *In* Modern approaches to the Study of Crustaceans, E. Escobar-Briones and F. Álvarez (eds.). Kluwer, Amsterdam. p. 197-204.
- Bruce, A. J. 2002. *Leander manningi*, a new palaemonine shrimp from Western Australia (Crustacea, Decapoda, Palaemonidae), with a review of the Indo-West Pacific species of the genus *Leander* E. Desmarest, 1849. *Records of the Western Australian Museum* 21:71-81.
- Bruce, A. J. 2004. A partial revision of the genus *Periclimenes* Costa, 1884 (Crustacea: Decapoda: Palaemonidae). *Zootaxa* 582:1-26.
- Bruce, A. J. 2007a. The resurrection of the pontoniine genus *Urocaris* Stimpson, 1860, (Crustacea: Decapoda: Palaemonidae). *Zootaxa* 1632:61-67.
- Bruce, A. J. 2007b. A re-definition of the genus *Periclimenes* Costa, 1844 and the designation of a new genus *Margitonia* (Crustacea: Decapoda: Pontoniinae). *Cahiers de Biologie Marine* 48:403-406.
- Bruce, A. J. 2008. *Phycomenes zostericola* gen. nov., sp. nov., a new pontoniine shrimp (Crustacea: Decapoda: Palaemonidae) from Moreton Bay, Queensland. *Proceedings of the Thirteenth International Marine Biological Workshop, The marine fauna and flora of Moreton Bay, Queensland*, P. J. F. Davie and J. A. Phillips (eds.). *Memoirs of the Queensland Museum-Nature* 54:219-232.
- Bruce, A. J. 2010. Additions to the genus *Phycomenes* Bruce, 2008 (Crustacea: Decapoda: Pontoniinae) *Zootaxa* 2372:367-368.
- Burkenroad, M. D. 1963. The evolution of the Eucarida (Crustacea, Eumalacostraca) in relation to the fossil record. *Tulane Studies in Geology* 2:2-17
- Campos-Vázquez, C. 2000. Crustáceos asociados a macroalgas en Bajo Pepito, Isla Mujeres, Caribe Mexicano. *Revista de Biología Tropical* 48:361-364.
- Cardoso, I. 2006. Caridea (Crustacea, Decapoda) collected on the Brazilian (13°/22°S) continental shelf and slope. *Zootaxa* 1364:1-44.
- Carvacho, A. 1979. Les crevettes carides de la mangrove guadaloupéenne. *Bulletin du Muséum national d'Histoire naturelle*, Paris, 4^e séries, section A, n° 2:445-470.
- Castellanos-Osorio, I. A. and E. Suárez-Morales. 1997. Observaciones sobre el zooplankton de la zona arrecifal de Mahahual, Quintana Roo (Mar Caribe Mexicano). *Anales del Instituto de Biología, Universidad Nacional Autónoma de México, Serie Zoología* 68:237-252.
- Chace, F. A., Jr. 1972. The shrimps of the Smithsonian-Bredin Caribbean Expeditions with summary of the West Indian shallow-water species (Crustacea: Decapoda: Natantia). *Smithsonian Contributions to Zoology* 98:1-179.
- Chace, F. A., Jr. and A. J. Bruce. 1993. The caridean shrimps (Crustacea: Decapoda) of the *Albatross* Philippine Expedition, 1907-1910, part 6: Superfamily Palaemonoidea. *Smithsonian Contributions to Zoology* 543:1-152.
- Coelho, P. A. and M. de A. Ramos. 1972. A constituição e a distribuição da fauna de decápodos do litoral leste da América do Sul entre as latitudes de 5° N e 39°S. *Trabalhos do Instituto Oceanográfico da Universidade Federal de Pernambuco* 13:133-236.
- Coelho, P. A., A. O. de Almeida, J. F. de Souza-Filho, L. E. A. Bezerra and B. W. Giraldes. 2006. Diversity and distribution of the marine and estuarine shrimps (Dendrobranchiata, Stenopodidea and Caridea) from north and northeast Brazil. *Zootaxa* 1221:41-62.
- Coelho Filho, P. A. 2006. Checklist of the decapods (Crustacea) from the outer continental shelf and seamounts from the northeast of Brazil—REVIZEE Program (NE III). *Zootaxa* 1184:1-27.
- Criales, M. M. 1984. Shrimps associated with coelenterates, echinoderms, and molluscs in the Santa Marta Region, Colombia. *Journal of Crustacean Biology* 4:307-317.
- Dana, J. D. 1852. Crustacea, part I. *In* United States Exploring Expedition, during the years 1838, 1839, 1840, 1841, 1842, under the command of Charles Wilkes, U. S. N. Philadelphia,

- C. Sherman. Vol 13. p. 1-685.
- De Grave, S., D. Livingston and M. R. Speight. 2006. Diel variation in sea grass dwelling shrimp: when to sample at night? *Journal of the Marine Association of the United Kingdom* 86:1421-1422.
- Escobar-Briones, E. and J. L. Villalobos-Hiriart. 2003. Deep-water caridean shrimps (Crustacea: Decapoda) from Banco Chinchorro and adjacent areas in the northern Caribbean. *Bulletin of Marine Science* 73:99-122.
- Felder, D. L. and A. H. Chaney. 1979. Decapod crustacean fauna of Seven and One-Half Fathom Reef, Texas: species composition, abundance, and species diversity. *Contributions in Marine Science* 22:1-29.
- García-Madrigal, M. S., C. Campos-Vázquez and N. E. González. 2002. Sección de crustáceos de referencia de bentos costero de ECOSUR. *Universidad y Ciencia* 18:140-148.
- Gorny, M. 1999. On the biogeography and ecology of the Southern Ocean decapod fauna. *Scientia Marina* 63. Suppl. 1:367-382.
- Guevara, E., H. Álvarez, M. Mascaró, C. Rosas and A. Sánchez. 2007. Hábitos alimenticios y ecología trófica del pez *Lutjanus griseus* (Pisces: Lutjanidae) asociado a la vegetación sumergida en la Laguna de Términos, Campeche, México. *Revista de Biología Tropical* 55:989-1004.
- Hernández-Aguilera, J. L., R. E. Toral-Almazán and J. A. Ruiz-Nuño. 1996. Especies catalogadas de crustáceos estomatópodos y decápodos para el Golfo de México, Río Bravo, Tamps. a Puerto Progreso, Yuc. Secretaria de Marina y Comisión Nacional para el Conocimiento y Uso de la Biodiversidad. 132 p.
- Holthuis, L. B. 1951. A general revision of the Palaemonidae (Crustacea Decapoda Natantia) of the Americas. I. The Subfamilies Euryrhynchinae and Pontoniinae. *Allan Hancock Foundation Occasional Papers* 11:1-332.
- Holthuis, L. B. 1952. A general revision of the Palaemonidae (Crustacea Decapoda Natantia) of the Americas. II. The Subfamily Palaemoninae. *Allan Hancock Foundation Occasional Papers* 12:1-396.
- Ives, J. E. 1891. Crustacea from the northern coast of Yucatan, the harbor of Vera Cruz, the west coast of Florida and the Bermuda islands. *Proceedings of the Academy of Natural Sciences of Philadelphia* (1891):176-207.
- Jayachandran, K. V. 2001. Palaemonid prawns: biodiversity, taxonomy, biology and management. *Science Publishers, Inc., Enfield (NH), USA*. 624 p.
- Jordán-Dahlgren, E., E. Martín-Chávez, M. Sánchez-Segura and A. González de la Parra. 1994. The Sian Ka'an Biosphere Reserve coral reef system, Yucatán peninsula, Mexico. *Atoll Research Bulletin* 423:1-31.
- Kingsley, J. S. 1878. Notes on the North American Caridea in the museum of the Peabody Academy of Science at Salem, Mass. *Proceedings of the Academy of Natural Sciences of Philadelphia* 30:89-98.
- Latreille, P. A. 1802. *Histoire naturelle générale et particulière des Crustacés et des Insectes*. Paris 3:1- 467.
- Ledoyer, M. 1986. Faune mobile des herbiers de phanérogames marines (*Halodule* et *Thalassia*) de la laguna de Términos (Mexique, Campêche) I. Les Caridea (Crustacea Decapoda)
- Ledoyer, M. 1986. Faune mobile des herbiers de phanérogames marines (*Halodule* et *Thalassia*) de la laguna de Términos (Mexique, Campêche) I. Les Caridea (Crustacea Decapoda) et aperçu sur la faune globale. *Anales del Instituto de Ciencias del Mar y Limnología, Universidad Nacional Autónoma de México* 13:147-160.
- Lemaitre, R. and R. Alvarez-León. 1992. Crustáceos decápodos del Pacífico Colombiano: lista de especies y consideraciones zoogeográficas. *Anales del Instituto de Investigaciones Marinas Punta Betún* 21:33-76.
- Li, X., A. J. Bruce and R. B. Manning. 2004. Some palaemonid shrimps (Crustacea: Decapoda) from northern South China Sea, with descriptions of two new species. *The Raffles Bulletin of Zoology* 52:513-553.
- Limbaugh, C., H. Pederson and F. A. Chace, Jr. 1961. Shrimps that clean fishes. *Bulletin of Marine Science of the Gulf and Caribbean* 11:237-257.
- Markham, J. C. and J. J. McDermott. 1980. A tabulation of the Crustacea Decapoda of Bermuda. *Proceedings of the Biological Society of Washington* 93:1266-1276.
- Markham, J. C. and F. E. Donath-Hernández. 1990. Crustacea of Sian Ka'an, including orders Nectiopoda, Stomatopoda, Thermosbaena, Mysidacea, Cumacea, Tanaidacea, Isopoda and Decapoda. *In Diversidad Biológica en la Reserva de la Biósfera de Sian Ka'an Quintana Roo, México*. Vol. 1, D. Navarro L. and J. G. Robinson (eds.). Centro de Investigaciones de Quintana Roo and Program of Studies in Tropical Conservation, University of Florida. p. 239-256.
- Markham, J. C., F. E. Donath-Hernández, J. L. Villalobos-Hiriart and A. C. Díaz-Barriga. 1990. Notes on the shallow-water marine Crustacea of the Caribbean Coast of Quintana Roo, Mexico. *Anales del Instituto de Biología, Universidad Nacional Autónoma de México, Serie Zoología* 61:405-446.
- Martin, J. W. & G. E. Davies. 2001. An updated classification of the recent Crustacea. *National History Museum of Los Angeles County, Science Series* 39:1-124.
- Martínez-Guzmán, L. A. and J. L. Hernández-Aguilera. 1993. Crustáceos estomatópodos y decápodos del Arrecife Alacrán, Yucatán. *In Biodiversidad Marina y Costera de México*, S. I. Salazar-Vallejo and N. E. González (eds.). Comisión Nacional de la Biodiversidad y CIQRO, México. p. 609-629.
- Martínez-Iglesias, J. C. 1986. Los crustáceos decápodos del Golfo de Batabanó. *Caridea y Penaeidea*. *Poeyana* 321:1-37.
- Martínez-Iglesias, J. C., A. Carvacho and R. Ríos. 1996. Catálogo de los carideos marinos (Crustacea, Decapoda, Caridea) de las aguas someras de Cuba. *Avicennia* 4/5:27-40.
- Martínez-Mayén, M. and R. Román-Contreras. 2006. A new species of *Periclimenes* Costa, 1844 (Crustacea: Decapoda: Palaemonidae) from the Caribbean coast of Quintana Roo, Mexico, and a key for the "iridescens" complex. *Proceedings of the Biological Society of Washington* 119:32-42.
- Merino-Ibarra, M. 1986. Aspectos de la circulación costera superficial del Caribe Mexicano con base en observaciones utilizando tarjetas de deriva. *Anales del Instituto de Ciencias del Mar y Limnología, Universidad Nacional Autónoma de México* 13:31-46.
- Nizinski, M. S. 2003. Annotated checklist of decapod crustaceans

- of Atlantic coastal and continental shelf waters of the United States. *Proceedings of the Biological Society of Washington* 116:96-157.
- Okuno, J. 2009. *Cuapetes* Clark, 1919, a senior synonym of *Kemponia* Bruce, 2004 (Crustacea: Decapoda: Palaemonidae). *Zootaxa* 2028:67-68.
- Rafinesque, C. S. 1815. *Analyse de la nature ou tableau de l'Univers et des corps organisés*. Palermo. 224 p.
- Ramos-Porto, M. 1986. Revisão das espécies do género *Leander* E. Desmarest que ocorrem no litoral brasileiro. *Trabalhos Oceanográficos da Universidade Federal de Pernambuco* 19:7-26.
- Ramos-Porto, M. and Coelho P. A. 1998. Malacostraca-Eucarida. Caridea (Alpheoidea excluded). *In Catalogue of Crustacea of Brazil. Serie Livros 6*, P. S. Young (ed.). Museu Nacional, Rio de Janeiro. p. 325-350.
- Rankin, W. M. 1898. The Northrop Collection of crustacean from the Bahamas. *Annals of the New York Academy of Sciences* 11:225-258.
- Rathbun, M. J. 1902. The Brachyura and Macrura of Porto Rico. *United States Fisheries Commission Bulletin* 20:1-127.
- Rodríguez, G. 1980. Los crustáceos decápodos de Venezuela. Instituto Venezolano de Investigaciones Científicas, Caracas. 494 p.
- Román-Contreras, R. 1988. Características ecológicas de los crustáceos decápodos de la Laguna de Términos. *In Ecología de los ecosistemas costeros en el sur del Golfo de México: la región de la Laguna de Términos*, Yáñez-Arancibia, A. and J. W. Day (eds.). Instituto de Ciencias del Mar y Limnología, UNAM and Coast. Ecol. Inst. Editorial Universitaria, México, D. F. p. 305-322.
- Say, T. 1818. An account of the Crustacea of the United States. *Journal of the Academy of Natural Sciences of Philadelphia* 1: 235-253, 313-319, 374-401, 423, 441, 445-458.
- Schmitt, W. L. 1924. The macruran, anomuran and stomatopod Crustacea. *Bijdragen tot de kennis der fauna van Curaçao. Resultaten eener reis van Dr. J. C. van der Horst in 1920. Bijdragen tot de Dierkunde* 23:61-81.
- Spotte, S., R. W. Heard, P. M. Bubucis, R. R. Manstan and J. A. McLelland. 1991. Pattern and coloration of *Periclimenes rathbunae* from the Turks and Caicos Islands, with comments on host associations in other anemone shrimps of the West Indies and Bermuda. *Gulf Research Report* 8:301-311.
- Stimpson, W. 1860. Crustacea Macrura. *Prodromus descriptionis animalium evertibratorum, quae in expeditione ad Oceanum Pacificum Septentrionalem, a Republica Federata missa, Cadwaladaro Ringgold et Johanne Rodgers Ducibus, observatorum et descriptorum, Pars VIII. Proceedings of the Academy of Natural Sciences of Philadelphia* 12:22-48.
- Suárez-Morales, E. and E. Rivera A. 1998. Zooplankton e hidrodinámica en zonas litorales y arrecifales de Quintana Roo, México. *Hidrobiológica* 8:19-32.
- Wehrtmann, I. S. and R. Vargas. 2003. New records and range extensions of shrimps (Decapoda: Penaeoidea, Caridea) from the Pacific and Caribbean coasts of Costa Rica, Central America. *Revista de Biología Tropical* 51:268-274.
- Wicksten, M. K. 1989. A key to the palaemonid shrimp of the eastern Pacific region. *Bulletin of the Southern California Academy of Sciences* 88:11-20.
- Wicksten, M. K. 2005. Palaemonid Shrimps. *In Camarones, langostas y cangrejos de la costa este de México. Vol. 1. (Shrimps, lobsters and crabs of the Eastern Coast of Mexico. Vol. 1)*, J. L. Hernández Aguilera, J. A. Ruiz-Nuño, R. E. Toral-Almazán and V. Arenas Fuentes (eds.). Estudio y Conservación de la Naturaleza y Comisión Nacional para el Conocimiento y Uso de la Biodiversidad, México. p. 67-97.
- Wicksten, M. K. and L. Hernández. 2000. Range extensions, taxonomic notes and zoogeography of symbiotic caridean shrimps of the tropical eastern Pacific (Crustacea: Decapoda: Caridea). *Bulletin of the Southern California Academy of Sciences* 99:91-100.
- Wicksten, M. K. and M. E. Hendrickx. 2003. An updated checklist of benthic marine and brackish water shrimps (Decapoda: Penaeoidea, Stenopodidea, Caridea) from Eastern Tropical Pacific. *In Contributions to the study of east Pacific crustaceans. 2. (Contribuciones al estudio de los crustáceos del Pacífico este. 2)*, M. E. Hendrickx (ed.). Instituto de Ciencias del Mar y Limnología, UNAM. p. 49-76.
- Williams, A. B. 1984. Shrimps, lobsters, and crabs of the Atlantic coast of the Eastern United States, Maine to Florida. *Smithsonian Institution Press, Washington, D. C.* 550 p.