

Taxonomy and systematics

## Updated checklist of the bopyrid isopods (Epicaridea: Bopyroidea) from Mexico

### *Listado actualizado de los isópodos bopíridos (Epicaridea: Bopyroidea) de México*

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#### Abstract

Based on an extensive bibliographic review, an updated checklist of epicaridean isopods belonging to Bopyroidea recorded from Mexico is provided. A total of 55 species distributed in 3 families, 10 subfamilies and 39 genera are listed. Of these, 8 species (14.5%) have been registered only in Mexico so far, 36 species (65.4%) are distributed along the Atlantic coast and 19 (34.5%) along the Pacific coast. The lower diversity of these parasites in the latter region could reveal insufficient sampling of potential hosts. Approximately 80% of the bopyrid species parasitize individuals belonging to the infraorders Caridea (27 species, 50%) and Anomura (17 species, 30.9%). Type-localities and updated data on their known geographic ranges along both Mexican coast and those of other regions are included for all the species.

*Keywords:* Bopyrids; Decapoda; Caridea; Ectoparasites

#### Resumen

Con base en una extensa revisión bibliográfica, se proporciona una lista actualizada de los isópodos epicarideos pertenecientes a Bopyroidea registrados en México. Se enlista un total de 55 especies distribuidas en 3 familias, 10 subfamilias y 39 géneros. De ellas, 8 especies (14.5%) han sido registradas solo en México hasta ahora, 36 especies (65.4%) se distribuyen en la costa atlántica y 19 (34.4%) en la costa del Pacífico. La baja diversidad de estos parásitos en la última región podría reflejar la insuficiente recolecta de hospederos potenciales. Aproximadamente, 80% de las especies de bopíridos parasitan individuos de los infraórdenes Caridea (27 especies, 50%) y Anomura (17 especies,

30.9%). Para todas las especies se proporcionan las localidades tipo y datos actualizados sobre su distribución geográfica en las costas de México y otras regiones.

*Palabras clave:* Bopíridos; Decapoda; Caridea; Ectoparásitos

## Introduction

The order Isopoda, one of the most diverse groups of arthropods, with more than 10,655 recognized species (Boyko et al., 2024a) and widely distributed in a large variety of both terrestrial and aquatic habitats, includes some groups with a parasitic lifestyle (Boxshall & Hayes, 2019), such as those of the suborder Epicaridea. This suborder of parasites currently represents more than 8% of all known extant isopods and includes 261 genera in the superfamilies Bopyroidea and Cryptoniscoidea (Boyko & Williams, 2023). Bopyroidea has 3 families: Bopyridae, Entoniscidae and Ionidae (Boyko et al., 2013), of which Bopyridae is the largest and best-defined (Trilles, 1999). They use other crustaceans as hosts, with nearly all the species requiring a copepod intermediate host as well as decapods, peracarids or cirripedes as definitive hosts to complete their life cycles (Williams & Boyko, 2012).

Bopyrid isopods, except those of the endoparasitic subfamily Entophilinae, are obligate crustacean ectoparasites found mainly on decapods (Poulin, 1995; Williams & Boyko, 2012). The females are much larger than the males and have distorted bodies, so much so that in some species they are barely recognizable as isopods, whereas the males are more similar to free-living isopods (Román-Contreras, 2008).

The first bopyrid described from the American continent was *Argeia pugettensis*, in Puget Sound, northwest USA, by Dana (1853), parasitizing *Metacrangon munita* (Dana) (as *Crangon munitus*). Shortly after, Leidy (1855) reported *Leidyia distorta* (as *Cepon distortus*) infesting the fiddler crab *Leptuca pugilator* (Bosc) (as *Gelasimus pugilator*) for Atlantic City, New Jersey, USA, and the number of described species from North America has increased gradually, especially during the 20<sup>th</sup> Century (Markham, 1985).

In Mexico, *Bathygyge grandis* Hansen, 1897, *Pseudione galacanthae* Hansen, 1897 and *Parargeia ornata* Hansen, 1897 were the first bopyrids reported from the Pacific coast (Hansen, 1897), while *Probopyrus bithynis* Richardson, 1904 was the first bopyrid recorded from the Atlantic coast (Pearse, 1911). Currently, the estimated bopyrid diversity in Mexico is of approximately 50 species (Aguilar-Perera, 2022; Román-Contreras, 2008; Romero-Rodríguez & Álvarez, 2019, 2023a, b;

Romero-Rodríguez & Martínez-Mayén, 2017). However, information on the geographic range and host selection of this group of parasites is outdated and scattered in the literature. The aim of this study is thus to provide an updated and complete checklist of species of Bopyroidea and their associate hosts occurring in Mexico.

## Materials and methods

The present checklist is based on an extensive review of literature reporting on biological material examined for species of Bopyroidea from Mexico. The arrangement of families, subfamilies, genera and species listed follows Boxshall and Hayes (2019) and Boyko et al. (2024b), and only references of the authorities of parasitic isopods are provided. Type-locality, records from Mexico, general geographic distribution and hosts are cited for each species and, when required, the current taxonomic status of hosts is indicated in square brackets.

## Results

A total of 55 species belonging to 3 families, Bopyridae, Entoniscidae and Ionidae, 10 subfamilies, and 39 genera of Bopyroidea are distributed on both Mexican coasts, as listed below:

Order Isopoda Latreille, 1817  
Suborder Epicaridea Latreille, 1825  
Superfamily Bopyroidea Rafinesque, 1815  
Family Bopyridae Rafinesque, 1815  
Subfamily Argeiinae Markham, 1977a  
Genus *Parargeia* Hansen, 1897  
*Parargeia ornata* Hansen, 1897

*Type locality.* Off the coast of Acapulco, Guerrero, Mexico (16°33' N, 99°52'30" W), eastern Pacific coast, on *Sclerocrangon procax* Faxon [= *Metacrangon procax* (Faxon)] (Hansen, 1897).

*Records from Mexico.* The type-locality (Hansen, 1897).

*General distribution.* Currently known only from the Pacific coast of Mexico (Markham, 1977a, 2020).

Subfamily Athelginae Codreanu & Codreanu, 1956  
Genus *Anathelges* Bonnier, 1900

*Anathelges hyphalus* (Markham, 1974)

*Type locality.* Off Santa Barbara Islands, California, USA, Eastern Pacific coast (as *Stegophryxus hyphalus*), on *Parapagurodes laurentae* McLaughlin & Haig (Markham, 1974).

*Records from Mexico.* Pacific coast: near Islas San Benito, Baja California, on *P. makarovi* McLaughlin & Haig; near Punta Abreojos, Baja California Sur, on *P. laurentae* (Campos & Campos, 1989a; Markham, 1974, 2020; Román-Contreras, 2008).

*General distribution.* Eastern Pacific coast: off Santa Barbara Islands and off Carmel, California, USA, on *P. laurentae* and *P. makarovi* (Markham, 1974, 2020).

*Anathelges hyptius* (Thompson, 1902)

*Type locality.* Woods Hole, Massachusetts and Rhode Island, USA, Western Atlantic coast (as *Stegophryxus hyptius*), on *Pagurus longicarpus* Say (Thompson, 1902).

*Records from Mexico.* Atlantic coast, Laguna de Términos, Campeche, on *P. longicarpus* and *P. maclaughlinae* García-Gómez (Román-Contreras & Martínez-Mayén, 2011; Romero-Rodríguez & Álvarez, 2023a).

*General distribution.* Western Atlantic coast, USA: Woods Hole, Massachusetts; Edgartown and Warwick, Rhode Island (Markham, 1974; Richardson, 1904; Thompson, 1902); Hereford Inlet, New Jersey (Boyko & Williams, 2003; McDermott, 1998), all on *P. longicarpus*; Morehead Channel and Beaufort, North Carolina (Adkison & Heard, 1978; Markham, 1974), on *P. annulipes* (Stimpson); Sapelo Island, Georgia (Boyko & Williams, 2003; Markham, 1974), on *P. longicarpus*; Mississippi (Markham, 1988), on *P. annulipes*(?); several localities of Florida (Markham, 1974, 1988), on *P. bonairiensis* Schmitt [= *P. stimpsoni* (A. Milne-Edwards & Bouvier)], *P. miamensis* Provenzano [= *P. brevidactylus* (Stimpson)], *P. maclaughlinae*, *Iridopagurus caribbensis* (A. Milne-Edwards & Bouvier). Bahamas: Andros Islands, on *P. brevidactylus* (Boyko & Williams, 2004). Curaçao: off Portomaribaai, on *Iridopagurus* sp. [= *I. margaritensis* García-Gómez] and *P. provenzanoi* Forest and de Saint Laurent (Markham, 1978, 1988), *I. margaritensis* (García-Gómez, 1983).

Genus *Parathelges* Bonnier, 1900

*Parathelges occidentalis* Markham, 1972a

*Type locality.* Garden Key, Dry Tortugas, Florida, USA, Western Atlantic coast (24°38' N, 82°55' W) and Berry Islands, Bahamas (25°47' N, 77°55' W), on *Clibanarius tricolor* (Gibbes) (Markham, 1972a).

*Records from Mexico.* Atlantic coast: Bahía del Espíritu Santo, Quintana Roo, on *C. tricolor* (Markham et al., 1990).

*General distribution.* Western Atlantic coast, USA: North Carolina, on *Pylopagurus corallinus* (Benedict) [= *Manucomplanus unguulatus* (Studer)] (Markham, 1978); Dry Tortugas and Key West, Florida (Markham, 1972a). Bahamas: Berry Islands and Andros Island (Boyko & Williams, 2004; Markham, 1972a), all on *C. tricolor*. Venezuela: off Isla Margarita, on *Iridopagurus* sp. [= *I. margaritensis*] (Boyko & Williams, 2004; Markham, 1972b).

Genus *Pseudostegias* Shiino, 1933

*Pseudostegias atlantica* Lemos de Castro, 1965a

*Type locality.* Praia de Mucuripe, Fortaleza, Estado do Ceará, Brazil, Western Atlantic coast, on *Clibanarius* sp. (Lemos de Castro, 1965a).

*Records from Mexico.* Atlantic coast: Veracruz: Los Tuxtlas, Montepío (18°38'35.23" N, 95°05'54.43" W), on *C. antillensis*; El Morro de la Mancha (19°35'22.79" N, 96°22'45.21" W), on *Calcinus tibicen* (Herbst); Isla Verde (19°11'59.18" N, 96°04'01.28" W), detached from host, possibly *C. antillensis* (Romero-Rodríguez & Álvarez, 2023a).

*General distribution.* Western Atlantic coast. Venezuela: Laguna de la Restinga, Isla de Margarita, estado de Nueva Esparta, on *Paguristes tortugae* Schmitt (Figueredo et al., 2013). Brazil: Ceará, on *Clibanarius antillensis* Stimpson and *Clibanarius* sp. (Lemos de Castro, 1965a; Ribeiro et al., 2019a); Praia da Garça Torta, Maceió, Alagoas, on *Clibanarius* sp. (Lemos de Castro, 1965a).

Genus *Stegias* Richardson, 1904

*Stegias clibanarii* Richardson, 1904

*Type locality.* Bermuda, Western Atlantic coast, on *Clibanarius tricolor* (Richardson, 1904).

*Records from Mexico.* Atlantic coast: Veracruz, Los Tuxtlas, Montepío (18°38'34" N, 95°05'50" W), on *C. tricolor* (Romero-Rodríguez & Álvarez, 2023a).

*General distribution.* Western Atlantic coast. Bermuda (Richardson, 1904). Puerto Rico: Vicinity of Boca de Cangrejos, San Juan (Menzies & Glynn, 1968). Colombia: Tayrona Park; Bahía de Nenguange and Bahía Concha, Santa Martha (Markham, 1988), all on *C. tricolor*.

Subfamily Bathygyginae Markham, 2016

Genus *Bathygyge* Hansen, 1897

*Bathygyge grandis* Hansen, 1897

*Type locality.* Nayarit, Mexico, 21°15' N, 106°23' W (not off coast of Acapulco, Mexico, see Hansen, 1897), Eastern Pacific coast, on *Glyphocrangon spinulosa* Faxon (Hansen, 1897).

*Records from Mexico.* The type-locality (Hansen, 1897).

*General distribution.* Atlantic coast: Middle Atlantic Bight, off coast of Virginia, USA, on *G. longirostris* (Smith) and *G. sculpta* (Smith) (Markham, 1985; Wenner, 1978). South Atlantic coast: Cape Point, South Africa, on *G. sculpta* (Stebbing, 1908). Eastern Pacific coast: San Clemente Basin, off California USA, on *G. vicaria* Faxon (Markham, 2016). Central North Pacific: Magellan Rise (07°00' N, 176°00' W), unspecified host (Kaufmann et al., 1989).

Subfamily Bopyrinae Rafinesque, 1815

Genus *Bopyrella* Bonnier, 1900

*Bopyrella harmopleon* Bowman, 1956

*Type locality.* Western Atlantic coast. Venezuela: Gran Roque, on *Synalpheus brevicarpus* (Herrick); Los Roques, on *S. fritzmulleri* Coutière; La Salle, Gran Roque, on *S. hemphilli* Coutière (Bowman, 1956).

*Records from Mexico.* Atlantic coast: southern shore of Isla Lobos, Tamiagua, Veracruz (21°28'12.5" N, 97°13'34.0" W), on *S. curacaoensis* Schmitt; Cayo Arcas, Campeche (20°12'41.14" N, 91°58'42.12" W; and 20°12'15.8" N, 91°57'21.1" W), on *S. hemphilli* (Romero-Rodríguez & Álvarez, 2021); near Punta Allen, Bahía de la Ascensión, Quintana Roo, on *S. fritzmulleri* (Markham, 1988).

*General distribution.* Western Atlantic coast. Venezuela: Los Roques, on same hosts as from the type locality (Bowman, 1956). Brazil: Ilha de São Sebastião and Praia do Segredo, São Paulo, on *Synalpheus* sp. and *S. brevicarpus*, respectively (Christoffersen, 1979; Lemos de Castro, 1965b); unspecified locality, on *S. brevicarpus* (Duarte & Morgado, 1983).

Genus *Bopyrina* Kossmann, 1881a

*Bopyrina abbreviata* Richardson, 1904

*Type locality.* Punta Rassa, Florida, USA, Western Atlantic coast, on *Hippolyte zostericola* (Smith) (Richardson, 1904).

*Records from Mexico.* Atlantic coast: Laguna de Términos, Campeche, southwestern Gulf of Mexico, on *H. zostericola* (Rodríguez-Santiago et al., 2020; Román-Contreras & Romero-Rodríguez, 2005; Romero-Rodríguez & Román-Contreras, 2013).

*General distribution.* Western Atlantic coast, USA: Beaufort, North Carolina and several localities from Florida, on *H. pleuracantha* (Stimpson) (Markham, 1985; Pearse, 1953a; Rouse, 1970); Maximo Point, Boca Ciega

Bay, Florida, on *Hippolyte* sp. (Hutton & Sogandares-Bernal, 1960). Offshore from Belize, detached from hosts (Markham, 1985). Colombia: near Cali, on *H. zostericola* (Markham, 1988). Brazil: Ubatuba, São Paulo; Armação, Florianópolis and Caieiras da Barra do Sul, Santa Catarina (Lemos de Castro & Brasil-Lima, 1980). Tobago, West Indies (Markham, 1985), all on *H. curacaoensis* Schmitt [= *H. obliquimanus* Dana].

Genus *Bopyrinella* Nierstrasz & Brender à Brandis, 1925  
*Bopyrinella hadrocoxalis* Romero-Rodríguez & Álvarez, 2020a

*Type locality.* Mahahual, Quintana Roo, Mexico, Western Atlantic coast (18°42'50.8" N, 87°42'14.9" W), on *Thor manningi* Chace (Romero-Rodríguez & Álvarez, 2020a).

*Records from Mexico.* Atlantic coast: Mahahual and Playa María Irene, Puerto Morelos, Quintana Roo, on *T. manningi* (Romero-Rodríguez & Álvarez, 2020a).

*General distribution.* Currently only known from Caribbean coast of Mexico.

*Bopyrinella thorii* (Richardson, 1904)

*Type locality.* Key West, Florida, USA (as *Bopyrina thorii*), Western Atlantic coast, on *Thor floridanus* Kingsley (Richardson, 1904).

*Records from Mexico.* Atlantic Coast: Laguna de Términos, Campeche (Román-Contreras & Martínez-Mayén, 2011) and Bahía de la Ascensión, Quintana Roo (Markham, 1985; Romero-Rodríguez & Román-Contreras, 2008), on *T. floridanus*.

*General distribution.* Western Atlantic coast, USA: Biscayne Bay and Card Sound, Monroe County, Florida (Markham, 1972b, 1985). Curaçao (Markham, 1985; Nierstrasz & Brender à Brandis, 1925), all on *T. floridanus*.

Genus *Bopyrione* Bourdon & Markham, 1980

*Bopyrione sinalphei* Bourdon & Markham, 1980

*Type locality.* Western Atlantic coast, USA: 17 km west of Egmont Key, Florida, on *Synalpheus goodei* Coutière. Haiti: Mer Frappée, southern part of Bay of Port-au-Prince, on *S. bousfieldi* Chace, *S. pectiniger* Coutière, *Synalpheus* sp. (near *S. goodei*), *Synalpheus* sp. (near *S. longicarpus* (Herrick)). Curaçao: St. Michielsbaai, on *Synalpheus* sp. (Bourdon & Markham, 1980).

*Records from Mexico.* Atlantic coast: Laguna de Términos, Campeche, on *S. apioceros* Coutière (Román-Contreras & Martínez-Mayén, 2011); Arrecife Alacranes Yucatán, on *S. brooksi* Coutière and *S. elizabethae* Coutière (Romero-Rodríguez & Álvarez, 2020b); Bahía de la Ascensión, Quintana Roo, on *S. townsendii* Coutière (Markham, 1985).



*General distribution.* Western Atlantic coast, USA: coasts of Florida, on *S. longicarpus* and *S. minus* (Say) (Markham, 1985). Haiti: Port-au-Prince, on *Synalpheus* spp. (Bourdon & Markham, 1980). Dominican Republic: off Enriquillo (17°35' N, 71°25' W), on *S. pectiniger* (Markham, 1985). Southwest of Jamaica (17°23' N, 78°39' W), on *S. pectiniger* (Markham, 1985). Curaçao: St. Michielsbaai, on *Synalpheus* sp. (Bourdon & Markham, 1980). Tobago: west of Pigeon Point and Bucco Reef, on *S. minus* (Markham, 1985).

Genus *Capitetrangonia* Pearse, 1953b

*Capitetrangonia alpehi* (Richardson, 1900)

*Type locality.* Rio Parahyba do Norte, Brazil, Western Atlantic coast (as *Bopyrus alpehi*), on *Alpheus heterochaelis* Say (Richardson, 1900).

*Records from Mexico.* Atlantic coast: Isla del Ídolo, Laguna de Tamiahua, Veracruz (21°21'52.6" N, 97°27'46.8" W), on *A. estuariensis* Christoffersen (Romero-Rodríguez & Álvarez, 2020b).

*General distribution.* Western Atlantic coast, USA: Beaufort, North Carolina (Hay & Shore, 1918; Pearse, 1947, as *Probopyrus alpehi*; Richardson, 1901, as *B. alpehi*; Wilson, 1900, as *Gyge* sp.), on *A. heterochaelis*; South Carolina (Kelley, 1978; Lawler, 1978, as *P. alpehi*); several localities of Florida, on *Alpheus* sp., *A. heterochaelis*, *A. normanni* Kingsley and *A. viridari* (Armstrong) (Markham, 1985, as *Probopyria alpehi*); Card Sound and Manatee Bay, Florida, on *Alpheus* sp. (Briggs et al., 2017). Antigua: English Harbour, on *A. viridari* (Markham, 1985). Colombia: near Cali, on *Alpheus* sp. (Markham, 1988). Brazil: Rio Parahyba do Norte, on *A. heterochaelis* (Richardson, 1900).

Genus *Parabopyrella* Markham, 1985

*Parabopyrella lata* (Nierstrasz & Brender à Brandis, 1929)

*Type locality.* Between St. Thomas, Virgin Islands, and Saba, Netherlands Antilles, Western Atlantic coast (as *Bopyrella lata*), on unidentified alpheid (Nierstrasz & Brender à Brandis, 1929).

*Records from Mexico.* Atlantic coast: Puerto Morelos, Quintana Roo (20°50'50.9" N, 86°52'30" W), on *A. normanni* (Romero-Rodríguez & Álvarez, 2020b); Mahahual reef lagoon, southern coast of Quintana Roo, on *A. packardii* (Martínez-Mayén, 2021).

*General distribution.* Western Atlantic coast. Florida USA: Card Sound and Looe Key Reef, on *A. normanni* (Markham, 1985); Palmeto Key, on *Lysmata boggei* Rhyne & Lin (Boyko, 2006); Florida Bay, on *Alpheus* sp. (Briggs et al., 2017); off Homosassa Spring, on *L. boggei* (Baeza et al., 2018). Virgin Islands (Markham, 1985; Nierstrasz & Brender à Brandis, 1929). Brazil: Praia

do Pacheco, Ceará (Ribeiro et al., 2019b), and Bahía de Guanabara, Rio de Janeiro (Lemos de Castro, 1965b), on *A. packardii* Kingsley and *Alpheus* sp., respectively.

*Parabopyrella mortenseni* (Nierstrasz & Brender à Brandis, 1929)

*Type locality.* St. Thomas, Virgin Islands, Western Atlantic coast (as *Bopyrella mortenseni*), on *Hippolysmata wurdemanni* (Gibbes) [= *Lysmata wurdemanni* (Gibbes)] (Nierstrasz & Brender à Brandis, 1929).

*Records from Mexico.* Atlantic coast: Laguna de Términos, Campeche, on *Alpheus viridari* (Román-Contreras & Martínez-Mayén, 2011); Champotón, Campeche (19°29'52.30" N, 90°42'15.6" W), on *A. normanni*, and Mahahual, Quintana Roo (18°42'54.70" N, 87°42'24.4" W), on *A. cristulifrons* Rathbun (Romero-Rodríguez & Álvarez, 2020b).

*General distribution.* Western Atlantic coast, USA: several localities of Florida, on *L. wurdemanni* (Markham, 1985 and literature cited therein). Virgin Islands: outside Current Hole (Markham, 1985; Nierstrasz & Brender à Brandis, 1929). Venezuela: Bahía de Turiamo, Estado de Aragua, on *L. rathbunae* Chace (Chace, 1970, as *B. mortenseni*; Markham, 1985).

*Parabopyrella thomasi* (Nierstrasz & Brender à Brandis, 1929)

*Type locality.* St. Thomas, Virgin Islands, Western Atlantic coast (as *Bopyrella thomasi*), on *Tozeuma carolinense* Kingsley (Nierstrasz & Brender à Brandis, 1929).

*Records from Mexico.* Atlantic coast: Ría Celestún, Yucatán (20°56'59.742" N, 90°20'26.504" W) (Romero-Rodríguez & Álvarez, 2021); Bahía de la Ascensión and Bahía del Espíritu Santo, Quintana Roo, on *T. carolinense* (Romero-Rodríguez & Martínez-Mayén, 2018).

*General distribution.* Western Atlantic coast: St. Thomas, Virgin Islands (Markham, 1985; Nierstrasz & Brender à Brandis, 1929), on *T. carolinense*.

Genus *Probopyrinella* Nierstrasz & Brender à Brandis, 1929

*Probopyrinella latreuticola* (Gissler, 1882)

*Type locality.* Near Beaufort, North Carolina, Western Atlantic coast (as *Bopyroides latreuticola*), on *Latreutes ensiferus* Stimpson [= *Latreutes fucorum* (Fabricius)] (Gissler, 1882).

*Records from Mexico.* Atlantic coast: Boca de Catán, Punta de Piedra, Laguna Madre, Tamaulipas (Rodríguez-Almaraz et al., 2000); Punta Estrella, Puerto Morelos (Markham et al., 1990), and reef lagoon off Xcalak (18°16'38.87" N, 87°49'40.87" W), Quintana Roo (Castellanos-Osorio et al., 2024), on *L. fucorum*.

*General distribution.* Western Atlantic coast, USA: North Carolina (Markham, 1985); Florida (Markham, 1977b, 1985); Aransas Pass, Texas (Pearse, 1952, as *Probopyrus latreuticola*); Gulf of Mexico (Martin et al., 2019). Bermuda. Bimini. Bahamas. Haiti. Tortola Island. Virgin Islands. Jamaica. Sargasso Sea to the Azores (Markham, 1977b, 1979, 1985), all on *L. fucorum*.

Genus *Probopyrus* Giard & Bonnier, 1888

*Probopyrus bithynis* Richardson, 1904

*Type locality.* Mississippi River near Exposition grounds, New Orleans, Louisiana, Western Atlantic coast, on *Bithynis ohionis* (Smith) [= *Macrobrachium ohione* (Smith)] (Richardson, 1904).

*Records from Mexico.* Atlantic coast: Río Tamuín, San Luis Potosí (Román-Contreras, 2004); Cuatrotolapam, near San Andrés Tuxtla, Veracruz (Pearse, 1911); Laguna de Términos, Campeche (Román-Contreras & Martínez-Mayén, 2011); Río Papaloapan and Río Tuxtepec, Istmo de Tehuantepec, Oaxaca, all on *M. olfersii* (Wiegmann) (Román-Contreras, 2004).

*General distribution.* Western Atlantic coast, USA: Escatawpa, Jackson County, Mississippi; Atchafalaya River and Mississippi River, New Orleans, Louisiana, on *M. ohione* (Dale & Anderson, 1982; Richardson, 1904; Truesdale & Mermilliod, 1977). Colombia: La Rosa, Santa Martha, on *M. olfersii* (Pearse, 1915). Brazil: Baía de Guarujá and Baixo Guamá (Lemos de Castro & Brasil Lima, 1974) and near Maruim, municipal region of Gurupá, Pará, on *M. amazonicum* Heller (Corrêa et al., 2018). Uruguay: Playa Astilleros, Departamento de Colonia, on *M. borellii* (Nobili) (Verdi, 1991). Argentina: Delta Lujan, Buenos Aires, on *M. borellii* (Lemos de Castro & Brasil Lima, 1974).

*Probopyrus markhami* Román-Contreras, 1996

*Type locality.* Río La Unión, Guerrero, Mexico, Eastern Pacific coast, on *Macrobrachium americanum* Spence Bate (Román-Contreras, 1996).

*Records from Mexico.* Pacific coast: Río Piaxtla and Río Baluarte, Sinaloa; Río Coyuca and Río La Unión, Guerrero; Presa José María Morelos, Michoacán (Román-Contreras, 1996, 2004); Río Verde, Oaxaca, (Romero-Rodríguez & Álvarez, 2023b), all on *M. americanum*.

*General distribution.* Currently only known from the central to the southwest of the Mexican Pacific coast.

*Probopyrus pacificensis* Román-Contreras, 1993a

*Type locality.* Laguna de Tres Palos, Guerrero, Mexico, Eastern Pacific coast (16°43' to 16°49'N, 99°39' to 99°46'W), on *Macrobrachium tenellum* (Smith) (Román-Contreras, 1993a).

*Records from Mexico.* Pacific coast: Bahía Choya, Puerto Peñasco, and Estero Santa Cruz, Bahía de Kino, Sonora, on *Palaemon ritteri* Holmes and *P. hiltoni* (Schmitt), respectively (Rodríguez-Almaraz et al., 2000; Romero-Rodríguez & Álvarez, 2023b); Arroyo San Francisco, Nayarit (Ocaña-Luna et al., 2009); Río Purificación, Río Cutzamala (Román-Contreras, 2004), Río Ameca (Vargas-Ceballos et al., 2016) and Arroyo Palo María, Jalisco (Ocaña-Luna et al., 2009); Río Chuta and North of Playa Azul, Michoacán (Román-Contreras, 2004); Río Coyuca (Román-Contreras, 1993b, 2004) and Coyuca lagoon, Guerrero (Signoret & Brailovsky, 2002), all on *M. tenellum*; Isla Socorro, Colima, on *P. ritteri* (Romero-Rodríguez & Álvarez, 2023b).

*General distribution.* Eastern Pacific coast: Río Zunzal, and Río Conchalió, El Salvador, Central America, on *M. tenellum* (Román-Contreras, 1993a, 2004).

*Probopyrus pandalicola* (Packard, 1879)

*Type locality.* Atlantic coast of United States, unspecified locality (as *Bopyrus pandalicola*) (Markham, 1985; Packard, 1879).

*Records from Mexico.* Atlantic coast: Laguna Conchillal, Tamaulipas, and Tabasco, on *Palaemonetes pugio* Holthuis [= *Palaemon pugio* (Holthuis)] (Rodríguez-Almaraz, et al., 2000); Laguna de Términos, Campeche, on *P. pugio* and *P. intermedius* Holthuis [= *Palaemon mundusnovus* De Grave & Ashelby] (Román-Contreras & Martínez-Mayén, 2011); Isla Cerro, Progreso, Yucatán (as *Probopyrus creaseri* Pearse), on *P. carolinus* Stimpson [= *Palaemon vulgaris* Say] (Pearse, 1936); near Punta Niccehabin, Bahía de la Ascensión, Quintana Roo, on *Palaemon (Palaeander) northropi* Rankin [= *Palaemon northropi* (Rankin)] (Markham, 1985), and Bahía de Chetumal, Quintana Roo (18°35'59" N, 88°03'49" W), on same host (Castellanos-Osorio et al., 2024).

*General distribution.* Western Atlantic coast, USA: Acushnet river, Massachusetts; East Providence, Rhode Island, and Brooklyn, New York (Richardson, 1905); Atlantic City, New Jersey (Leidy, 1879; Richardson, 1905); South River, Maryland (Morris, 1948), all on *Palaemonetes vulgaris* (Say) [= *P. vulgaris*]; coast of South Carolina and Georgia, on *P. pugio* (Chaplin-Ebanks & Curran, 2007); Baldwin Lodge, Mississippi, on *Palaemonetes* sp. [= *Palaemon* sp.] (Richardson, 1905); Louisiana and Texas, on *P. pugio* (Cash & Bauer, 1993; Pearse, 1952); Wakulla River, Florida, on *Palaemonetes paludosus* (Gibbes) [= *Palaemon paludosus* (Gibbes)] (Beck, 1980). Colombia: near Cali, on *P. pugio* and *P. vulgaris* (Markham, 1988). Brazil: Contas River, Bahia, on *Macrobrachium acanthurus* (Wiegmann) (de Barros et al., 2021).

Genus *Probynia* Bourdon & Bruce, 1983

*Probynia ramiroromani* Romero-Rodríguez & Álvarez, 2021

*Type locality.* Isla de Enmedio (19°16'46.7" N, 95°56'51" W), Veracruz, Mexico, Western Atlantic coast, on *Periclimenaeus perlatus* (Boone) (Romero-Rodríguez & Álvarez, 2021).

*Records from Mexico.* The type-locality (Romero-Rodríguez & Álvarez, 2021).

*General distribution.* Currently only known from Mexico.

Genus *Schizobopyrina* Markham, 1985

*Schizobopyrina bruscai* Campos & Campos, 1990

*Type locality.* Bahía Concepción, Golfo de California, south side of El Coyote beach, Baja California Sur, Mexico, Eastern Pacific coast (26°44' N, 111°55' W), on *Thor* sp. (Campos & Campos, 1990), presumably *Thor algicola* Wicksten (see Román-Contreras, 2008).

*Records from Mexico.* The type-locality (Campos & Campos, 1990)

*General distribution.* Currently only known from the west coast of Gulf of California, Mexico (Campos & Campos, 1990).

*Schizobopyrina striata* (Nierstrasz & Brender à Brandis, 1929)

*Type locality.* San Diego, Bay, California, USA, Eastern Pacific coast (as *Bopyrina striata*), on *Hippolyte californiensis* Holmes (Nierstrasz & Brender à Brandis, 1929).

*Records from Mexico.* Pacific coast: Puertecitos, Golfo de California, Baja California, on *T. algicola* (Campos & Campos, 1990); Isla Alcatraz, Bahía de Kino, Sonora (28°49'00.4" N, 111°58'58" W), on *Periclimenes infraspinis* (Rathbun) (Romero-Rodríguez & Álvarez, 2023b).

*General distribution.* Eastern Pacific coast: as the type locality (Nierstrasz & Brender à Brandis, 1929).

*Schizobopyrina urocaridis* (Richardson, 1904)

*Type locality.* Punta Rassa, Florida, USA, Western Atlantic coast (as *Bopyrina urocaridis*), on *Urocaris longicaudata* Stimpson (Richardson, 1904).

*Records from Mexico.* Atlantic coast: Several localities of Bahía de la Ascensión and Bahía del Espíritu Santo, Quintana Roo, on *Phycomenes siankaanensis* (Martínez-Mayén & Román-Contreras), and on *U. longicaudata* in Punta Allen, Bahía de la Ascensión, Quintana Roo (Romero-Rodríguez & Martínez-Mayén, 2017).

*General distribution.* Western Atlantic coast, USA: Core Banks and Shackleford Banks, Beaufort, North

Carolina (as *Bopyrina pontoniae*), on *Pontonia margarita* Smith [= *P. manningi* Fransen] (Wells & Wells, 1966); several localities of Florida, on *Periclimenes longicaudatus* (Stimpson) [= *U. longicaudata*] (Markham, 1985). Belize, specimen detached from host (Markham, 1985). Colombia: Bahía de Chengue and Punta de Betín, Santa Martha, on *P. longicaudatus* and *Periclimenes iridescens* Lebour, respectively (Markham, 1988).

Genus *Urobopyrus* Richardson, 1904

*Urobopyrus processae* Richardson, 1904

*Type locality.* Off the east coast of South America, Brazil, Western Atlantic coast (06°59'30" S, 34°47' W), on *Processa canaliculata* Leach [= *Processa fimbriata* Manning & Chace] (Richardson, 1904).

*Records from Mexico.* Atlantic coast: Río Bermejo, Mahahual, Quintana Roo (18°36'32.79" N, 87°43'37.69" W), on *P. bermudensis* (Rankin) (Romero-Rodríguez & Álvarez, 2021).

*General distribution.* Western Atlantic coast, USA: Florida: Egmont Key, on *P. tenuipes* Manning & Chace [= *P. guyanae* Holthuis]; east of Cabbage Key, Boca Ciega, and Tarpon Spring, on *Ambidexter symmetricus* Manning & Chace and *Ambidexter* n. sp., respectively (Markham, 1985); Eagle Harbor of St. Joseph Bay, on *A. symmetricus* (Rasch & Bauer, 2015). Caribbean end of the Panama Canal, on *A. symmetricus* (Coen & Heck, 1983). Brazil: off Cabo de São Roque, on *P. fimbriata* (Markham, 1985; Richardson, 1904). Eastern Atlantic: Europe: France: Banyuls, on *P. acutirostris* Nouvel & Holthuis, *P. edulis* (Risso) and *P. robusta* Nouvel & Holthuis (Nöel, 1976); Roscoff; Alcachon, and Golfe-Juan, on *P. edulis*; Villefranche-sur-Mer and Golfe-Juan, on *P. acutirostris* (Bourdon, 1968). Monaco, on *P. canaliculata* (Monod, 1923). Italy: Naples and gulf of Naples, on *P. acutirostris* and *P. canaliculata*, respectively (Caroli, 1934; Bourdon, 1968). Africa: Pointe Noire, Congo, on *Processa* n. sp. (probably *P. compacta* Crosnier, see Crosnier, 1971) (Bourdon, 1971).

Subfamily Hemiarthrinae Markham, 1972b

Genus *Azygopleon* Markham, 1985

*Azygopleon schmitti* (Pearse, 1932)

*Type locality.* Dry Tortugas, Florida, USA, Western Atlantic coast (as *Hemiarthrus schmitti*), on *Synalpheus brooksi* Coutière (Pearse, 1932).

*Records from Mexico.* Atlantic coast: Punta Allen, Bahía de la Ascensión, Quintana Roo, on *S. longicarpus* (Markham & Donath-Hernández, 1990).

*General distribution.* Western Atlantic coast, USA: 20 miles off Beaufort Inlet, Onslow Bay, North Carolina, on *S. longicarpus* (Markham, 1985); Florida: Biscayne Bay,



Dry Tortugas, and Tampa Bay, on *S. brooksi*; 80 km west of Key West, on *S. mcclendoni* Coutière (Markham, 1985). Bimini, Bahamas (as *H. schmitti*), on *S. brooksi* (Pearse, 1951). Belize, on *Synalpheus* sp. (Markham, 1985). Haiti: Golfe de la Gonâve, on *Synalpheus* sp. and *S. hemphilli* (Markham, 1985). Off Enriquillo, Dominican Republic, and Pedro Bank, southwest of Jamaica, on *S. pectiniger* (Markham, 1985). Curaçao and Bonaire, Netherlands Antilles (as *H. schmitti*), on unspecified alpheid (Westinga & Hoetjes, 1981).

Genus *Diplophryxus* Richardson, 1904

*Diplophryxus siankaanensis* Markham, 1988

*Type locality.* Near Punta Solimán, Bahía de la Ascensión, Quintana Roo, Mexico, Western Atlantic coast, on *Alpheus formosus* Gibbes (Markham, 1988).

*Records from Mexico.* The type locality.

*General distribution.* Western Atlantic coast: Warsaw Sound, Georgia and Indian River, Florida, USA, on *Alpheus* sp. (Markham, 1988).

Genus *Eophrinxus* Caroli, 1930

*Eophrinxus subcaudalis* (Hay, 1917)

*Type locality.* Onslow Bay, about 20 miles off Beaufort Inlet, North Carolina, USA, Western Atlantic coast (as *Phryxus subcaudalis*), on *Synalpheus longicarpus* (Hay, 1917).

*Records from Mexico.* Atlantic coast: off the coast of Tamiahua, Veracruz (21°17.5' N, 91°11.1' W), on *S. anasimus* Chace (Romero-Rodríguez & Álvarez, 2020b) and Isla Mujeres, Quintana Roo, on *S. brooksi* (Markham, 1985).

*General distribution.* Western Atlantic coast, USA: off coast of North Carolina, on *S. longicarpus* (Hay, 1917); Florida: Biscayne Bay, Dry Tortugas and Key West, on *S. brooksi*, *S. goodei*, *S. longicarpus*, *S. mcclendoni* and *S. pandionis* Coutière (Markham, 1985). Cuba: La bajada, Península de Guanahacabibes, on unspecified host (Ortiz & Lalana, 2018). Haiti: Golfe de la Gonâve, on *S. hemphilli* and *Synalpheus* sp. (Markham, 1985). Dominican Republic: Enriquillo, on *S. pectiniger* (Markham, 1985). Bonaire and Curaçao, on unspecified alpheids (Westinga & Hoetjes, 1981); Curaçao, on unidentified alpheid (Hoetjes et al., 1976). Venezuela: Los Roques, on *S. longicarpus* (Markham, 1985).

Genus *Loki* Markham, 1972b

*Loki circumsaltanus* Markham, 1972b

*Type locality.* ¼ mile NE of entrance to Turkey Point Turning Basin, lower Biscayne Bay (25°22' N, 80°19' W), USA, Western Atlantic coast, on *Thor floridanus* (Markham, 1972b).

*Records from Mexico.* Atlantic coast: Laguna de Términos, Campeche, on *T. floridanus* (Romero-Rodríguez & Álvarez, 2020a).

*General distribution.* Western Atlantic coast, USA: southern of Florida, on *T. floridanus* (Markham, 1972b, 1985). Belize: south of Turneffe Island (17°10' N, 87°56.1' W), detached from host. US Virgin Islands: Tortola, on *T. manningi* Chace (Markham, 1985).

Genus *Metaphrixus* Nierstrasz & Brender à Brandis, 1931  
*Metaphrixus carolii* Nierstrasz & Brender à Brandis, 1931

*Type locality.* Christiansted, Saint Croix, US Virgin Islands, Western Atlantic coast, on unrecorded host (Nierstrasz & Brender à Brandis, 1931).

*Records from Mexico.* Atlantic coast: Laguna de Términos, Campeche, on *Hippolyte pleuracantha* (Stimpson) (Román-Contreras & Martínez-Mayén, 2011).

*General distribution.* Western Atlantic coast, USA: Flamingo, Monroe County and Murray Key, Florida, on *H. pleuracantha* (Markham, 1985). US Virgin Islands (Markham, 1985; Nierstrasz & Brender à Brandis, 1931). Colombia: Bahía de Cinto, Magdalena, on *H. curacaoensis* Schmit [= *H. obliquimanus* Dana] (Markham, 1988).

Subfamily Keponinae Boyko, Moss, Williams & Shields, 2013

Genus *Cancricepon* Giard & Bonnier, 1887

*Cancricepon choprae* (Nierstrasz & Brender à Brandis, 1925)

*Type locality.* Caracas Baai, Curaçao, Western Atlantic coast (as *Grapsicepon choprae* and *Ergyne rissoi*), on *Liomera dispar* Rathbun [= *Paraliomera dispar* (Stimpson)], and *Domecia hispida* Eydoux & Souleyet, respectively (Nierstrasz & Brender à Brandis, 1925).

*Records from Mexico.* Atlantic coast: Estación Burgos, Veracruz, on *Rhithropanopeus harrisi* (Gould) (Markham, 1975a).

*General distribution.* Western Atlantic coast, USA: North coast of South Carolina, on *Eriphia gonagra* (Fabricius); Chatham County and Ossabow Sound, Georgia, on *Panopeus herbstii* H. Milne Edwards; Mississippi Sound, Mississippi, on *Hexapanopeus angustifrons* (Benedict & Rathbun); Tortugas, Biscayne Bay, Card Sound and Miami, Florida, on *Pilumnus barbadensis* Rathbun (as *Micropanope barbadensis*) [= *Garthiope barbadensis* (Rathbun)], *Micropanope* cf. *sculptipes* Stimpson, *Neopanope packardii* (Kingsley), *P. herbstii* and *Panoplax depressa* Stimpson (An et al., 2019; Markham, 1975a). Andros Island, Bahamas, on *Panopeus boekei* Rathbun (Boyko & Williams, 2004). Curaçao: Caracas Bay, on *P. dispar* and *D. hispida* (Markham, 1975a, 1979).



Genus *Leidya* Cornalia & Panceri, 1861

*Leidya distorta* (Leidy, 1855)

*Type locality.* Atlantic City, New Jersey, USA, Western Atlantic coast (as *Cepon distortus*), on *Gelasimus pugilator* Bosc [= *Leptuca pugilator* (Bosc)] (Leidy, 1855).

*Records from Mexico.* Atlantic coast: Lagoon system of Chelem, Yucatán (21°17' N, 89°40' W), on *U. spinicarpa* Rathbun [= *Leptuca spinicarpa* (Rathbun)] (Romero-Rodríguez et al., 2017).

*General distribution.* Western Atlantic coast, USA: New Jersey and Beaufort, North Carolina, same host as from the type locality (Bourdon & Bowman, 1970; Leidy, 1855); Savannah and Sapelo Island Georgia, on *Uca pugnax* (Smith) [= *Minuca pugnax* (Smith)], *U. minax* (Le Conte) [= *M. minax* (Le Conte)], and *Uca* sp. [= *Minuca* sp.] (Bourdon & Bowman, 1970). Guadeloupe: Port de France, on *Minuca* sp. (as *Uca* sp.). Trinidad: El Sodorro (sic), on *U. vocator* (Herbst) [= *M. vocator* (Herbst)] (Bourdon & Bowman, 1970). Brazil: Ceará and Rio Grande do Norte, on *Ucides cordatus* (Linnaeus), and Guanabara, on *M. pugnax* (as *U. pugnax*) (Lemos de Castro, 1973).

*Leidya infelix* Markham, 2002

*Type-locality.* San Quintín, Baja California, Mexico, Eastern Pacific coast (30°28' N, 115°58' W), on *Pachygrapsus crassipes* Randall (Markham, 2002).

*Records from Mexico.* The type locality.

*General distribution.* Eastern Pacific coast: Laguna Beach, Seal Beach and La Jolla, California, USA, on *P. crassipes* (Markham, 2002).

Subfamily Phyllogurinae Markham, 1977c

Genus *Phyllogurus* Stimpson, 1857

*Phyllogurus abdominalis* Stimpson, 1857

*Type locality.* Puget Sound, Washington, and Tomales Bay, California, USA, Eastern Pacific coast, on “a common *Gebia*” [= *Upogebia pugettensis* (Dana)] (Stimpson, 1857).

*Records from Mexico.* Pacific coast: Punta Morro, Bahía Todos Santos, Baja California (31°54' N, 116°36' W), on *U. macginitieorum* Williams (Campos-González & Campoy-Favela, 1987).

*General distribution.* Eastern Pacific coast: Canada: Nanaimo, British Columbia, on *U. pugettensis*. USA: Puget Sound and San Juan Islands, Washington, same host; Tomales Bay, San Francisco Bay and Monterey Bay, California, same host (Markham, 1977c and cited references therein), and Tijuana Slough, 2.5 miles north of Mexican border on *U. macginitieorum* (Williams, 1986).

Subfamily Pseudioninae Codreanu, 1967

Genus *Aporobopyrus* Nobili, 1906

*Aporobopyrus bourdonis* Markham, 2008

*Type locality.* Near Isla Juanilla, Área de Conservación de Jurquillal, Guanacaste, Costa Rica, Eastern Pacific coast (10°59' N, 85°43' W), on *Petrolisthes edwardsi* (de Saussure) (Markham, 2008).

*Records from Mexico.* Pacific coast: Isla San Pedro Mártir, Sonora (28°22'49" N, 112°18'25" W), on *P. galapagensis* Haig; Isla San Lorenzo, Baja California (28°37'44" N, 112°49'34" W) detached from host (Romero-Rodríguez & Álvarez, 2019); Bahía de Chamela, Jalisco, on *P. edwardsi* (Bourdon, 1976; Markham, 2008).

*General distribution.* The type locality (Markham, 2008).

*Aporobopyrus curtatus* (Richardson, 1904)

*Type locality.* Key West, Florida, USA, Western Atlantic coast (as *Pseudione curtata*), on *Petrolisthes sexpinosus* Gibbes [= *Petrolisthes galathinus* (Bosc)] (Richardson, 1904).

*Records from Mexico.* Pacific coast: Isla San Esteban, Sonora (28°42'06" N, 112°34'29" W), on *Petrolisthes hirtispinosus* Lockington (Romero-Rodríguez & Álvarez, 2019).

*General distribution.* Western Atlantic coast, USA: North Carolina, on *Porcellana sayana* (Leach); Georgia, on unreported host; Key West, Key Biscayne, Hutchinson Island, Apalachicola, Miami and Virginia Key, Florida, on *Petrolisthes armatus* (Gibbes) and *P. galathinus*. Virgin Islands: on *P. armatus*, *P. galathinus*, *P. sayana*. St. Maarten, Netherlands Antilles: on *P. galathinus*. Saba Bank: on *Petrolisthes politus* (Gray). Curaçao: Piscadera Bay, on *Petrolisthes quadratus* Benedict (Markham, 1988 and cited references therein). Venezuela: Margarita, on *P. armatus*. Colombia: Golfo de Urabá and Magdalena, on *P. sayana* and detached from host. Brazil: Ceará, Bahía, Pará, Paraíba, Paraná (26°06' S, 45°29' W), Pernambuco and São Paulo (23°05.5' S, 45°01' W; 24°35.5' S, 45°01' W), on *P. armatus*, *P. galathinus*, *P. sayana*, *Pachycheles ackleianus* A. Milne-Edwards, *Pachycheles greeleyi* (Rathbun), and *Petrolisthes* sp. (Markham, 1988 and cited references therein).

*Aporobopyrus muguensis* Shiino, 1964

*Type locality.* Point Mugu, California, USA, Eastern Pacific coast, at 30-35 feet deep, on *Pachycheles rudis* Stimpson (Shiino, 1964).

*Records from Mexico.* Pacific coast: Punta San Miguel, Bahía Todos Santos, west coast of Baja California Sur (31°16' N, 116°45' W), on *P. rudis* (Campos-González & Campoy-Favela, 1987); Isla San Marcos (27°11'38" N, 112°04'08" W), Isla Montserrat (25°40'47" N, 111°02'43" W), and Isla Jacques Costeau (Isla Cerralvo) (24°24' N, 110°29' W), Baja California Sur, on *Petrolisthes crenulatus* Lockington (Romero-Rodríguez & Álvarez, 2019).

*General distribution.* Eastern Pacific coast: Pacific Grove, Dillon Beach, Malibu, Monterey, Point Mugu and San Simeon, California, USA, on *P. pubescens* Holmes, *P. holosericus* Nininger and *P. rudis* (Markham, 2008 and cited references therein).

*Aporobopyrus trilobatus* (Nierstrasz & Brender à Brandis, 1925)

*Type locality.* Spaansche Baai, Curaçao, Netherlands Antilles, Western Atlantic coast (as *Pseudione trilobata*), on *Pisosoma angustifrons* Benedict [= *Neopisosoma angustifrons* (Benedict)] (Nierstrasz & Brender à Brandis, 1925).

*Records from Mexico.* Pacific coast: Isla Ángel de la Guarda, Baja California, on *P. crenulatus*; Isla Jacques Costeau (Isla Cerralvo), Baja California Sur, on *P. ortmanni* (Romero-Rodríguez & Álvarez, 2019), and Bahía de Zihuatanejo, Guerrero, on *P. hians* Nobili (Bourdon, 1976).

*General distribution.* Western Atlantic coast: Curaçao: Spaansche Baai, same host as type locality (Nierstrasz & Brender à Brandis, 1925), Piscadera Bay (as *Pseudione trilobata*), on *Pachycheles pilosus* (H. Milne Edwards) (Markham, 1988). Eastern Pacific coast: Cambutal, near Roca Punta Dominical, Puntarenas, Costa Rica, on *Petrolisthes ortmanni* Nobili (Markham, 2008).

Genus *Asymmetrione* Codreanu, Codreanu & Pike, 1965  
*Asymmetrione desultor* Markham, 1975b

*Type locality.* Morehead Channel, North Carolina, USA, Western Atlantic coast, on *Pagurus longicarpus* (Markham, 1975b).

*Records from Mexico.* Atlantic coast: El Morro de la Mancha, Veracruz (19°35'22" N, 96°22'45" W), detached from host; Cozumel, Quintana Roo (20°32'39" N, 86°48'21" W), on *Pagurus simpsoni* A. Milne-Edwards & Bouvier (Romero-Rodríguez & Álvarez, 2023a).

*General distribution.* Western Atlantic coast, USA: North Carolina, on *P. longicarpus*; Key Biscayne, Florida, on *P. bonairiensis* [= *P. simpsoni*]. Cay Sal Bank and Andros Island, Bahama, on *P. brevidactylus* and *Pylopagurus* sp. (Boyko & Williams, 2004; Markham, 1988 and cited references therein). Belize: off Glover reef, on *Iridopagurus* sp. Off Antigua, on *P. provenzanoi* (Markham, 1988 and cited references therein). Westpuntbaai and Portomaribaai, Curaçao, and southern end Bonaire, on *P. provenzanoi* (Markham, 1978). Several localities of Colombia, on *P. brevidactylus*. Brazil: Abrolhos Bank, on *Paguristes tortugae* (Markham, 1988 and cited references therein).

*Asymmetrione tuxtlaensis* Romero-Rodríguez & Álvarez, 2023a

*Type locality.* Los Tuxtlas, Montepio, Veracruz, Mexico, Western Atlantic coast (18°38'35.23" N, 95°05'54.43" W), on *Clibanarius antillensis* (Romero-Rodríguez & Álvarez, 2023a).

*Records from Mexico.* Atlantic coast: Montepio, Isla Verde (19°11'59.18" N, 96°04'01.28" W), La Blanquilla reef (19°13'22.8" N, 96°06'00.0" W), and Isla Lobos reef (21°25'09" N, 97°13'18" W), Veracruz, on *C. antillensis* and *Calcinus tibicen* (Herbst); Ensenada Lamcom, NE border of Isla Blanca, Quintana Roo, (21°24'45.44" N, 86°48'35.29" W), on *C. antillensis* (Romero-Rodríguez & Álvarez 2023a).

*General distribution.* North-central region of Veracruz and Quintana Roo, Mexico (Romero-Rodríguez & Álvarez, 2023a).

Genus *Bathione* Román-Contreras & Boyko, 2007

*Bathione magnafolia* Román-Contreras & Boyko, 2007

*Type locality.* Southern Gulf of California, off Isla Altamura, Sinaloa, Mexico, Eastern Pacific coast (24°53.2' N, 108°59.4' W), at 835-870 m deep, on *Munidopsis depressa* Faxon (Hendrickx & Cordero-Ruiz, 2014; Román-Contreras & Boyko, 2007).

*Records from Mexico.* The type locality.

*General distribution.* Currently only known from the Gulf of California, Mexico.

Genus *Bopyrissa* Nierstrasz & Brender à Brandis, 1931

*Bopyrissa wolffi* Markham, 1978

*Type locality.* Key Colony Beach, Monroy County, Florida, USA, Western Atlantic coast, on *Clibanarius tricolor* (Markham, 1978).

*Records from Mexico.* Atlantic coast: Laguna de Tamiahua, Veracruz (21°16'45" N, 97°26'41" W), on *C. vittatus*; Caleta Yal-ku, Akumal, Cozumel (20°25'09" N, 87°00'42" W) and Isla Blanca, Quintana Roo, Mexico (21°24'45.44" N, 86°48'35.29" W), on *C. tricolor* (Markham et al., 1990; Romero-Rodríguez & Álvarez, 2023a).

*General distribution.* Western Atlantic coast, USA: North Carolina and Texas on *C. vittatus* (Bosc); Key Colony Beach, Florida, on *C. tricolor*. Bermuda, Bahamas and Puerto Rico (Boyko & Williams, 2004; Markham, 1978), all on *C. tricolor*.

Genus *Galathocrypta* Román-Contreras & Soto, 2002

*Galathocrypta acaudata* Román-Contreras & Soto, 2002

*Type locality.* Off Río Coatzacoalcos, southwestern Gulf of Mexico (18°54' N, 94°18' W) on *Munidopsis*

*erinaceus* (A. Milne-Edwards) [= *Munidopsis erinacea* (A. Milne-Edwards)], 502 m deep (Román-Contreras & Soto, 2002).

*Records from Mexico.* The type locality.

*General distribution.* Currently only known from the Atlantic coast of Mexico.

Genus *Gigantione* Kossmann, 1881a

*Gigantione mortenseni* Adkison, 1984

*Type locality.* Gulf of Mexico (30°08' N, 87°07' W), on *Dromida antillensis* Stimpson [= *Moreiradromia antillensis* (Stimpson)], at 32 m deep (Adkison, 1984).

*Records from Mexico.* Atlantic coast: South of Cozumel, Quintana Roo (20°03' N, 87°04' W), Yucatán Peninsula, on *M. antillensis* (as *D. antillensis*) (Adkison, 1984).

*General distribution.* Western Atlantic coast: off Florida, USA, Gulf of Mexico, on *M. antillensis* (as *D. antillensis*) and *Hypoconcha spinosissima* Rathbun. Haiti and Virgin Islands, on *M. antillensis* (as *D. antillensis*) and *H. sabulosa* (Herbst) [= *Hypoconcha parasitica* (Linnaeus)] respectively (Adkison, 1984).

Genus *Munidion* Hansen, 1897

*Munidion pleuroncodis* Markham, 1975c

*Type locality.* West coast of Baja California Sur, Mexico, off Punta Abrejos (26°22' N, 115°05' W), on *Pleuroncodes planipes* Stimpson [= *Grimothea planipes* (Stimpson)] (Markham, 1975c).

*Records from Mexico.* Pacific coast: the type locality (Markham, 1975c) and Isla Socorro, Colima (18°46'26" N, 110°58'18" W), both on *G. planipes* (Romero-Rodríguez & Álvarez, 2023b).

*General distribution.* Eastern Pacific coast: Pacific Grove, California, USA (Markham, 1975c, 1992).

Genus *Orthione* Markham, 1988

*Orthione furcata* (Richardson, 1904)

*Type locality.* Eastern shore of Virginia, USA, Western Atlantic coast (as *Pseudione furcata*), on unknown host (Richardson, 1904).

*Records from Mexico.* Atlantic coast: Puerto Morelos, Quintana Roo (20°53'39" N, 85°4'21" W), on *U. vasquezii* Ngoc-Ho (Romero-Rodríguez & Álvarez, 2021).

*General distribution.* Western Atlantic coast, USA: Wellfleet Harbor, Cape Cod, Massachusetts; Virginia (Markham, 1988); Beaufort, North Carolina (Boyko et al., 2017; Markham, 1988), on *Upogebia affinis* (Say); "Gulf coast" (Gulf of Mexico) on unknown host (Boyko et al., 2017 and cited references therein).

Genus *Progebiophilus* Codreanu & Codreanu, 1963

*Progebiophilus bruscai* Salazar-Vallejo & Leija-Tristán, 1990

*Type locality.* Bahía de la Paz, Baja California Sur, Mexico, Eastern Pacific coast, on *Upogebia dawsoni* Williams (Salazar-Vallejo & Leija-Tristán, 1990).

*Records from Mexico.* Pacific coast, Baja California: el pescador camp, 4.5 km north of San Felipe and Bahía Los Ángeles (31°04'11" N, 114°04'11" W), on *U. dawsoni*; Ensenada, on *U. macginitieorum* (Campos & Campos, 1998); Baja California Sur: Comitán, Caimancito and Enfermería, Bahía de La Paz, on *U. dawsoni* (Salazar-Vallejo & Leija-Tristán, 1990); Bahía Tortugas and Todos Santos, on *U. macginitieorum* (Campos & Campos, 1989a, b, as *Pseudione* sp.); Isla Partida (24°32.6' N, 110°23.2' W), on *Upogebia rugosa* (Lockington) [= *Pomatogebia rugosa* (Lockington)] (Markham, 2005); Tormento point, Isla Tiburón, Sonora (29° N, 112°24' W), on *U. dawsoni* (Campos & Campos, 1998).

*General distribution.* Eastern Pacific coast: Santa Julia, between Potosi and El Rosario, Nicaragua, on *U. spinigera* (Smith) (Boyko et al., 2017).

*Progebiophilus upogebiae* (Hay, 1917)

*Type locality.* Beaufort, North Carolina, USA, Western Atlantic coast (as *Pseudione upogebiae*), on *Upogebia affinis* (Hay, 1917).

*Records from Mexico.* Atlantic coast: Barra del Tordo, mouth of Río Carrizal, Tamaulipas, on *U. felderi* A. B. Williams (Boyko et al., 2017; Williams, 1993).

*General distribution.* Western Atlantic coast, USA: York River, Virginia (as *Pseudione upogebiae*), on *U. affinis* (Wass, 1972); Beaufort, North Carolina, same host (Boyko et al., 2017; Markham, 1988); South Carolina, on *U. affinis* (Fox & Ruppert, 1985); Alligator Point and Indian River Lagoon, Florida (Markham, 2005; Williams, 1993), on same host. Brazil: Ceará, on *Upogebia omissa* Gomes Corrêa (Boyko et al., 2017 and cited references therein; Lemos de Castro, 1970).

Genus *Pseudione* Kossmann, 1881a

*Pseudione* cf. *crenulata* G. O. Sars, 1898

*Records from Mexico.* Campeche bank, Gulf of Mexico, Western Atlantic coast (20°24.34' N, 91°34.86' W), on *M. valida* Smith [= *Typhlonida valida* (Smith)] in a deep of 539 m (Romero-Rodríguez & Álvarez, 2021).

*General distribution.* Only known from Gulf of Mexico, for remarks see Romero-Rodríguez & Álvarez (2021).



*Pseudione galacanthae* Hansen, 1897

*Type locality.* Gulf of California, Mexico, Eastern Pacific coast (26°48' N, 110°45'20" W) at 859 fathoms depth (~ 1,571 m), on *Galacantha diomedae* var. *parvispina* Faxon [= *Galacantha diomedae* Faxon] (Hansen, 1897).

*Records from Mexico.* Pacific coast: Gulf of California, between Ciudad Obregón, Sonora, and Loreto, Baja California Sur, on *G. diomedae* (Hansen, 1897).

*General distribution.* Western Atlantic coast: Argentina: Patagonia, on *M. rugosa* (Fabricius), Golfo de San Jorge, Puerto Deseado, Puerto San Julián and Beagle Chanel, on *M. gregaria* and *Munida* sp. Falkland (Malvinas) Islands, on *M. gregaria* (Markham, 2020 and cited references therein; Pardo et al., 2009). Eastern Pacific coast: Canada: British Columbia, on *Munida quadrispina* (Benedict) and *Munida* sp. USA: San Juan Islands, Washington (48°30' N, 123° W), on *M. quadrispina* (Markham, 2020 and cited references therein). Chile: Arica, Magallanes and Golfo de Penas, on *Munida gregaria* (Fabricius).

Genus *Robinione* Boyko, Williams & Shields, 2017

*Robinione overstreeti* (Adkinson & Heard, 1995)

*Type locality.* West end of Horn Island, Mississippi, USA, Western Atlantic coast (as *Pseudione overstreeti*), on *Callinectes islagrande* (Schmitt) (Adkinson & Heard, 1995).

*Records from Mexico.* Atlantic coast: Laguna de Tamiahua (20°58'33.18" N, 97°18'31.13" W) and Tecolutla beach (20°29'3.27" N, 97°0'44.35" W), Veracruz, on *C. islagrande* (Bortolini et al., 2021); Paraiso, Tabasco, on same host (Adkinson & Heard, 1995); Cozumel, Quintana Roo (20°28'13.84" N, 86°58'48.4" W) detached from host (Romero-Rodríguez & Álvarez, 2021).

*General distribution.* Western Atlantic coast, USA: Panama City Beach, Cape San Blas and Perdido Key, Florida, on *C. islagrande*; Gulf Shores and Dauphin Island, Alabama, same host; Horn Island and Ship Island, Mississippi, same host; Elmer's Island and bay side of Isles Dernières, Louisiana, on *C. islagrande* and *C. santarosaensis* Sakai & Türkay; Mustang Island, Texas, on *C. islagrande* (Adkinson & Heard, 1995; Boyko et al., 2017).

Family Entoniscidae Kossmann, 1881b

Subfamily Entoniscinae Kossmann, 1881b

Genus *Synalpheion* Coutière, 1908

*Synalpheion giardi* Coutière, 1908

*Type locality.* Northeast of Cabo Catoche, Yucatán channel, Quintana Roo, Mexico, Western Atlantic coast (22°08'30" N, 86°53'30" W), on *Synalpheus longicarpus* (Coutière, 1908).

*Records from Mexico.* The type locality (Coutière, 1908).

*General distribution.* Western Atlantic coast: Anclote Key, Florida, USA on *S. longicarpus* and *Synalpheus pectiniger* Coutière (Adkison, 1990).

Subfamily Entoninae Codreanu, Codreanu & Pike, 1960

Genus *Portunion* Giard & Bonnier, 1886

*Portunion conformis* Muscatine, 1956

*Type locality.* Berkeley Yacht Harbor, California, USA, Eastern Pacific coast, on *Hemigrapsus oregonensis* (Dana) (Muscatine, 1956).

*Records from Mexico.* Pacific coast: Bahía San Quintín and Estero Ensenada, Baja California on *H. oregonensis* (Kuris et al., 1980).

*General distribution.* Eastern Pacific coast: Canada: Vancouver Islands, British Columbia. USA: Washington, Oregon and California, USA, on *H. oregonensis* and *Hemigrapsus nudus* (Dana).

Family Ionidae H. Milne Edwards, 1840

Genus *Ione* Latreille, 1818

*Ione cornuta* Bate, 1863

*Type locality.* East side of Vancouver Island, British Columbia, Canada, Eastern Pacific coast, on *Callianassa longimana* Stimpson [= *Neotrypaea gigas* (Dana)] (Bate, 1863).

*Records from Mexico.* Pacific coast: Bahía de Los Angeles, Baja California, on *N. gigas* (Boyko et al., 2017).

*General distribution.* Eastern Pacific coast: Canada: Vancouver Island, Hammond Bay near to Nanaimo, British Columbia, on *Callianassa californiensis* Dana [= *Neotrypaea californiensis* (Dana)], *N. gigas*, and another unknown host. USA: Puget Sound region, Washington, on *N. californiensis*; Oregon, same host; San Francisco, California, same host and also on "*Callianassa*" sp. Western Pacific coast: South Korea, on *Nihonotrypaea japonica* (Ortmann) [= *Neotrypaea japonica* (Ortmann)]. Japan: Seto and Tokyo Bay, on *Nihonotrypaea harmandi* (Bouvier) [= *Neotrypaea harmandi* (Bouvier)], *N. japonica*, *Nihonotrypaea petalura* (Stimpson) [= *Neotrypaea petalura* (Stimpson)] and *Grynaminna tamakii* Poore (see Boyko et al., 2017 and cited references therein). China: Shandong, Liaoning, and Zhejiang Provinces, on *N. japonica*, *N. petalura*, *N. harmandi* and *Upogebia major* (De Haan) (An et al., 2009).



## Discussion

Parasitic isopods of the 3 families included in Bopyroidea have been recorded in Mexico, although the bulk of the species (94.5%) belongs to the family Bopyridae, with 8 of its 10 subfamilies (except for Orbioninae and Pleurocryptellinae) represented by at least 1 species. Regarding the genera, the most numerous are in the subfamilies Bopyrinae and Pseudioninae (11 each), with 19 species recorded for the first subfamily and 17 species for the second. Only 1 genus and 1 species have been recorded for each of the subfamilies Argeinae, Bathygyginae and Phyllodurinae, while the families Entoniscidae and Ionidae are represented by 2 and 1 species, respectively.

About 80% of the bopyrid species examined used individuals belonging to the infraorders Caridea (27 species, 50%) and Anomura (17 species, 30.9%) as hosts. The bopyrid species attached to caridean hosts have been recorded mainly in the families Alpheidae (9 species), Palaemonidae (6 species), Thoridae (5 species) and Hippolytidae (4 species), while those attached to anomuran hosts have been recorded in the families Diogenidae (5 species), Porcellanidae (4 species), Munidopsidae (3 species), Paguridae (3 species) and Munididae (2 species) (Table 1).

Of the 55 species currently registered in Mexico, only 8 (14.5%) occur exclusively in the country. Per region, 36 species (65.4%) are distributed along the Atlantic coast and 19 species (34.5%) are distributed along the Pacific coast (Table 1). The states that contribute the largest number of species along the Atlantic coast are Veracruz (13), Quintana Roo (13) and Campeche (11), whereas for Tamaulipas and Tabasco only 3 and 2 species, respectively, have been recorded. Along the Pacific coast, the largest number of records of these parasites is in Baja California (10 species), followed by Baja California Sur (5 species), Sonora and Guerrero (4 species each) and Sinaloa, Nayarit, Colima, Jalisco, Michoacán and Oaxaca (2 species each).

The lower diversity of Bopyroidea along the Pacific coast compared with the Atlantic coast of Mexico could be an underestimation due to the great variety of habitats and diversity of crustaceans present in the first region, where large areas remain little studied, as is the Mexican southern Pacific (García-Madriral et al., 2012; Romero-Rodríguez & Álvarez, 2023b). These data indicate that a greater effort is needed to improve knowledge of crustacean diversity in general, as well as on their symbionts, including the epicaridean isopods in the Mexican Pacific.

Table 1

Infraorders and families of Crustacea parasitized by bopyrid isopods in Mexico. A, Atlantic coast; P, Pacific coast.

Infraorder/ Family	Bopyrid species	Distribution
Anomura		
Diogenidae	<i>Asymmetrione tuxtlaensis</i>	A
	<i>Bopyrissa wolffi</i>	A
	<i>Parathelges occidentalis</i>	A
	<i>Pseudostegias atlantica</i>	A
	<i>Stegias clibanarii</i>	A
Muninidae	<i>Munidion pleuroncodis</i>	P
	<i>Pseudione cf. crenulata</i>	A
Munidopsidae	<i>Bathione magnafolia</i>	P
	<i>Galathocrypta acaudata</i>	A
	<i>Pseudione galacanthae</i>	P
Paguridae	<i>Anathelges hyphalus</i>	P
	<i>Anathelges hyptius</i>	A
	<i>Asymmetrione desultor</i>	A
Porcellanidae	<i>Aporobopyrus bourdonis</i>	P
	<i>Aporobopyrus curtatus</i>	P

Table 1. Continued

Infraorder/ Family	Bopyrid species	Distribution
	<i>Aporobopyrus muguensis</i>	P
	<i>Aporobopyrus trilobatus</i>	P
Axiidea		
Callianassidae	<i>Ione cornuta</i>	P
Callichiridae	<i>Robinione overstreeti</i>	A
Brachyura		
Dromiidae	<i>Gigantione mortenseni</i>	A
Grapsidae	<i>Leidya infelix</i>	P
Ocypodidae	<i>Leidya distorta</i>	A
Panopeidae	<i>Cancricepon choprae</i>	A
Varunidae	<i>Portunion conformis</i>	P
Caridea		
Alpheidae	<i>Azygopleon schmitti</i>	A
	<i>Bopyrella harmopleon</i>	A
	<i>Bopyrione sinalphei</i>	A
	<i>Capitetragonia alpei</i>	A
	<i>Diplophryxus siankaanensis</i>	A
	<i>Eophryxus subcaudalis</i>	A
	<i>Parabopyrella lata</i>	A
	<i>Parabopyrella mortenseni</i>	A
	<i>Synalpheion giardi</i>	A
Crangonidae	<i>Parargeia ornata</i>	P
Glyphocrangonidae	<i>Bathygyge grandis</i>	P
Hippolytidae	<i>Bopyrina abbreviata</i>	A
	<i>Metaphrixus carolii</i>	A
	<i>Parabopyrella thomasi</i>	A
	<i>Probopyrinella latreuticola</i>	A
Palaemonidae	<i>Probopyrus bithynis</i>	A
	<i>Probopyrus markhami</i>	P
	<i>Probopyrus pacificensis</i>	P
	<i>Probopyrus pandalicola</i>	A
	<i>Probynia ramiroromani</i>	A
	<i>Schizobopyrina urocaridis</i>	A
Processidae	<i>Urobopyrus processae</i>	A
Thoridae	<i>Bopyrinella hadrocoxalis</i>	A
	<i>Bopyrinella thorii</i>	A
	<i>Schizobopyrina bruscai</i>	P
	<i>Schizobopyrina striata</i>	P
	<i>Loki circumsaltanus</i>	A

Table 1. Continued

Infraorder/ Family	Bopyrid species	Distribution
Gebiidea		
Upogebiidae	<i>Phyllodurus abdominalis</i>	P
	<i>Orthione furcata</i>	A
	<i>Progebiophilus bruscai</i>	P
	<i>Progebiophilus upogebiae</i>	A

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