STUDIES OF THE COASTAL MARINE FAUNA OF SOUTHERN SINALOA, MÉXICO.
VIII. ADDITIONAL REPORT ON THE CARIDEAN CRUSTACEANS*

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ABSTRACT

Fourteen species of caridean crustaceans are reported for marine, brackish and fresh water habitats in Southern Sinaloa, in the Southeastern Gulf of California, including a first record of Opsiphanes alphomorpha for the Tropical Eastern Pacific. This brings to 43 the number of species of caridean shrimps collected in the area.

RESUMEN

Se registran especies de camarones en aguas marinas, salobres y dulces en la parte sur de Sinaloa, en el Golfo de California, incluyendo un primer registro para Opsiphanes alphomorpha en el Pacífico Este Tropical. En total son 43 las especies de camarones conocidas que han sido colectadas hasta la fecha en el área.

INTRODUCTION

In a first publication dealing with the caridean shrimps of the Southern Sinaloa area, Hendricks et al. (1983) reported 29 species from different depths or habitats. Since, two of these species were described as new (Wicksten, 1983) and 12 additional species were found for the first time along the coast of Southern Sinaloa. The purpose of this paper is to complete the list of caridean shrimps occurring in this area and to establish a comparison with the caridean fauna of the Gulf of California such as it is presently known.

METHODS

Most of the material reported herein was collected by hand in fresh water streams, in brackish lagoons or in the rocky intertidal. In some cases (rock-pool) a fish-killer was used which proved to be quite efficient with Alpheidae and Porcellanidae.

In the Bay of Mazatlán, specimens were obtained during a two-year sampling program aboard the PC-1, a small PP vessel of the Secretaría de Educación Pública, in Mazatlán, using a small otter trawl and a Van Veen grab. Specimens from the continental shelf were collected off the coast of Sinaloa aboard the oceanographic vessel "El Puma" of the Instituto de Ciencias del Mar y Limnología, Universidad Nacional Autónoma de México, with an oyster dredge or with a Van Veen grab; most of this material was taken during a three-leg project (SIPCO project) including the study of the benthic community off the coast of Southern Sinaloa.

Environmental conditions (depth, temperature, salinity and dissolved oxygen) were taken from Orozco-Romo (1980) and Hendricks et al. (1984). Information related to sediments structure in the Bay of Mazatlán were also taken from Orozco-Romo (1980), while sediments composition at sampling stations off the coast of Sinaloa were provided by the Laboratorio de Geología Marina de la Estación Mazatlán, UNAM.

The abbreviation T.L. refers to total length of specimens.

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RESULTS

Family Atyidae

Atya crassa (Smith, 1871)


Previous Eastern Pacific records. The species has been collected in 14 localities, including 3 in México (Río Presidio and Río Balaure, Sinaloa, Río Tchuanpetec, Oaxaca).

Range. From Southern Sinaloa, México, to Ecuador (Hobbs and Hart, 1982; Hendrickx and van der Heiden, 1983).

Habitat. In fresh water streams. Together with A. crassa, there is a total of 4 species of Atya presently known from the Pacific slope of México (Hobbs and Hart, 1982).

Family Palaemonidae

Macrobrachium acanthochirinus Villalobos, 1966


Previous Eastern Pacific records. This species is known from only two localities in México (Pochuta and Tecoman, Colima).

Range. From Río Balaure, Southern Sinaloa, to Colima (Hendrickx and van der Heiden, 1983).

Habitat. In fresh water streams. The present record brings to 5 the number of species of Macrobrachium known from the drainage system of Southern Sinaloa (Hendrickx et al., 1983).

Palaemon (Palaemon) ritteri Holmes, 1895

Material. Eight specimens (including 2 ovigerous females) from Punta Sabalo, Bahía de Mazatlan (3 December 1982); 8 specimens from Puerto Viejo, Bahía de Mazatlan (March and April 1983).

Previous Eastern Pacific records. Many localities, including the Gulf of California where the species has been reported along both coasts (Holthuis, 1952; Wicksten, 1983).

Range. From San Diego, California, to Paitya, Perú, and Islas Galápagos, Ecuador (Holthuis, 1952).

Habitat. In Southern Sinaloa, the species is found on rocky shores, principally in tide-pools and under rocks at low tide. It is also found in clumps of Padina durvillae Bory in shallow water in the Bay of Mazatlan (Sánchez-Vargas, 1984), where many species of decapod crustaceans are associated with algae (Sánchez-Vargas and Hendrickx, 1987).

Brachyura biunguiculatus (Lucas, 1849)

Material. One specimen from Puerto Viejo, Bahía de Mazatlan (24 March 1983); two specimens from Isla Pájaros and Cerro del Vigla, Bahía de Mazatlan (15 March 1984).

Previous Eastern Pacific records. Many localities; from México to Colombia and Islas Galápagos; in the Gulf of California, the species is reported from the tip of the Baja California Peninsula (Punta Arena to Cabo San Lucas) (Wicksten, 1983).

Range. From Punta Arena and Bahía de Mazatlan, south to Colombia (Isla Gorgona); Isla Cocos, Costa Rica and Galápagos, Ecuador (Sánchez-Vargas, 1984).

Habitat. All specimens were found under rocks in the low intertidal.

Family Hippolytidae

Lysmata galapagensis Schmitt, 1924.

Material. Three specimens, including one ovigerous female from Isla Pájaros, Bahía de Mazatlan (15 March 1984); three specimens from Cerro del Vigla, Bahía de Mazatlan (16 March 1984).

Previous Eastern Pacific records. Bahía Magdalena, West coast of Baja California and Gulf of California (two localities in Sonora); Islas Marias, Nayarit (Gulf of California sensu lato) and Acapulco, Guerrero; Panamá; Islas Galápagos, Ecuador (Wicksten, 1983).
Range. México to Panamá; Islas Galápagos, Ecuador (Wicksten, 1983).

Habitat. Under rocks in the low intertidal.

Lysmata intermedia (Kingsley, 1878)

Material. The material from Mazatlán reported by Wicksten (1983), was not included in the previous report on caridean crustaceans from Southern Sinaloa (1 specimen; 27 November 1979). Additional material from the same area includes 1 ovigerous female (24 October 1974) and another specimen obtained the 27th of November 1980; all specimens were collected with an otter-trawl (FC-1).

Previous Eastern Pacific record. Bahía Magdalena, Baja California Sur; several localities along the continental coast of México, from Guaymas, Sonora, to Matalchen Beach, Nayarit; Tumbes, Perú (Wicksten and Méndez, 1983).

Range. Bahía Magdalena and Guaymas, Gulf of California, south to Tumbes, Perú.

Habitat. Sandy bottom (fine to very fine sand with up to 25% silt/clay) from 8 to 24 m.

Procesa peruviana Wicksten, 1983

Material. Apart from the type material reported by Wicksten (1983) (1 ovigerous female), three additional specimens have been collected off the coast of Southern Sinaloa, all with Van Veen grab (Table 1).

Previous Eastern Pacific records. The species has been reported from the Western coast of Baja California and the Gulf of California, south of Perú in as many as 20 sampling stations (Wicksten, 1983).

Range. From Isla San Benito, Baja California; Punta Piñata and Isla Montserrat, in the Gulf of California, South to Mancora, Perú.

Habitat. The material from Southern Sinaloa was collected between 37 and 72 m; sampling conditions varied considerably (temperature from 14.2 to 26.4 °C; dissolved oxygen from 1.00 to 4.13 ml/l; sediments from sandy to muddy sand) (Table 1), except salinity (34-35 %o).

Family Alpheidae

Alpheus sulaeus Kingsley, 1878

Material. Eleven specimens, including 4 ovigerous females, from Isla Pájaros, Bahía de Mazatlán (15 March 1984) (Maximum size of males, 57 mm T.L.; of females, 47 mm T.L.).

Previous Eastern Pacific records. Southern Gulf to Colombia and Isla Galápagos (Wicksten, 1983).

Range. From Mazatlan, Sinaloa, and Banco Arena, Baja California, South to Colombia; Isla Socorro and Galápagos; Eastern Atlantic (Wicksten, 1983).

Habitat. Under stones in the low intertidal.

Remarks. Alpheus arenensis Chace (1937) was recently synonymized with A. websteri (Wicksten, 1983).

<table>
<thead>
<tr>
<th>DATE</th>
<th>LOCALITY</th>
<th>NUMBER OF SPECIMENS</th>
<th>DEPTH (M)</th>
<th>TEMPERATURE (°C)</th>
<th>DISSOLVED OXYGEN (ml/l)</th>
<th>SEDIMENTS</th>
</tr>
</thead>
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<tr>
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<td>Off Punta Piñata</td>
<td>1</td>
<td>40</td>
<td>14.2</td>
<td>1.70</td>
<td>86</td>
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<tr>
<td>23 - VIII - 1981</td>
<td>Off Punta Piñata</td>
<td>1</td>
<td>72</td>
<td>21.1</td>
<td>4.09</td>
<td>75</td>
</tr>
<tr>
<td>16 - I - 1982</td>
<td>Off Punta Piñata</td>
<td>1</td>
<td>45</td>
<td>15.6</td>
<td>1.00</td>
<td>72</td>
</tr>
</tbody>
</table>
Alpheus splendidus Coutière, 1897

Material. One specimen from Cerro del Vigia, Bahía de Mazatlán (16 March 1984).

Previous Eastern Pacific records. San Carlos (Guaymas), Sonora (Wicksten and Hendrickx, 1985).


Habitat. Rocky intertidal, in tide-pool.

Alpheus mazatlanicus Wicksten, 1983

Material. In the first report on caridean crustaceans from Southern Sinaloa, the species was cited as Alpheus of A. malabaricus Fabricius and was since described as a new species belonging to the A. malabaricus complex: Alpheus mazatlanicus (Wicksten, 1983).

Additional material of A. mazatlanicus was recently obtained from the Barra de Navidad lagoon, Jalisco (6 specimens) and from several others localities in the Gulf of California, including the La Lechugilla lagoon (1 specimen; 9 November, 1983), Topolobampo, Sinaloa (1 specimen, collected in an estero; 12 April, 1984) and the Estero San Carlos, near Guaymas, Sonora (2 specimens; 6 February, 1986), thus extending the known distribution range of this species approximately 500 km southward and 650 km northward. Including the 3 previously known Southern Sinaloa records, all localities where the species has been collected correspond to shallow lagoon-type systems, with a substrate made of soft mud, mangrove and salinity usually higher than 30‰, except in La Lechugilla where the salinity at the collecting point was 28.4‰ at the time of sampling (Fig 1).


Range. The species is now known to occur along a wide section of the Mexican tropical and subtropical Pacific coast, from Estero San Carlos, Sonora (27° 56' N - 111° 04' 30" W) to Barra de Navidad, Jalisco (19° 11' 30" N - 104° 39' 30" W).

Figure 1. Distribution of Alpheus mazatlanicus along the Pacific coast of Mexico.

Alpheus malleator Dana, 1852

Material. One specimen collected in the rocky intertidal at Punta Piaxtla (23 November, 1984).


Range. From Bahía Pulmo and Punta Piaxtla, in the Southern Gulf of California to Islas Galápagos; Eastern Atlantic (Wicksten, 1983).

Habitat. Rocky intertidal, under stones.

Alpeopsis cortesiana Wicksten and Hendrickx, 1986


Previous Eastern Pacific records. First record of this genus along the coast of México and the third species of Alpeopsis known in the Eastern Pacific.
Range. Another specimen of the same species was collected off Río Fuerte, Sinaloa, during the Cortes I Cruise (R/V El Puma) in May 1982 (Wicksten and Hendrickx, 1986).

Habitat. Muddy bottom.

Family Ogyrididae
Ogyrides alphaeostris (Kingsley, 1880)

Material. A total of 57 specimens, all from Bahía de Mazatlán, including 6 ovigerous females (in January, April and November) (Table 2). All specimens collected from the FC-1 with a Van Veen grab.

Previous Eastern Pacific records. The species was reported as Ogyrides sp in check-lists of marine and coastal fauna of Southern Sinaloa, México (van der Heiden and Hendrickx, 1982; Hendrickx et al., 1982, 1983; Wicksten, 1983). It was recently reported from Bahía de Todos Santos on the East coast of Baja California, México (Carvacho and Olson, 1984).

Range. Southern California, USA (Wicksten and Méndez, in press), Bahía de Todos Santos, Baja California and Bay of Mazatlán, Sinaloa; Eastern Atlantic (Williams, 1981).

Habitat. All specimens were caught in shallow water, from 5 to 18 m. Bottom sediments varied from coarse sand with gravel to muddy substrate including up to 45% of silt/clay, however, the affinity of the species seems to be for bottom made up of fine to very fine sand mixed with a relatively low portion of silt/clay. Bottom salinity at the sampling stations was always higher than 34% while the water temperature varied from 20.0°C in winter to 30.0°C in summer (Table 2). The species is widely distributed throughout the Bay of Mazatlán (Fig. 2).

Remarks. The first record of Ogyrides on the Pacific coast of America should be attributed to Schnitt (1939), who reported specimens of this genus from off Punta Gorda, Cabo San Lucas, Baja California Sur. Specimens of Ogyrides sp had also been reported by Carvacho and Ríos (1982) from Bahía de Todos Santos, on the Pacific Ocean.

### Table 2

<table>
<thead>
<tr>
<th>Date</th>
<th>Number of Specimens</th>
<th>Depth (m)</th>
<th>Temperature (°C)</th>
<th>Salinity (%)</th>
<th>Sediments</th>
<th>Sediment Type of Sand</th>
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<tbody>
<tr>
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<td>28.5</td>
<td>34.9</td>
<td>Sandy</td>
<td>Fine to very fine sand.</td>
</tr>
<tr>
<td>9 - VII - 79</td>
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<td>13</td>
<td>30.9</td>
<td>34.6</td>
<td>Sandy</td>
<td>Fine to very fine sand.</td>
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<tr>
<td>26 - VII - 79</td>
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<td>11</td>
<td>27.9</td>
<td>34.0</td>
<td>Sandy</td>
<td>Fine to very fine sand.</td>
</tr>
<tr>
<td>27 - IX - 79</td>
<td>1</td>
<td>12</td>
<td>27.9</td>
<td>34.3</td>
<td>Sandy</td>
<td>Fine to very fine sand.</td>
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<tr>
<td>27 - IX - 79</td>
<td>2</td>
<td>08</td>
<td>29.7</td>
<td>34.1</td>
<td>Sandy</td>
<td>Fine to very fine sand.</td>
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<tr>
<td>27 - IX - 79</td>
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<td>29.6</td>
<td>34.7</td>
<td>Sandy</td>
<td>Fine to very fine sand.</td>
</tr>
<tr>
<td>26 - X - 79</td>
<td>1</td>
<td>15</td>
<td>21.7</td>
<td>34.2</td>
<td>Sandy</td>
<td>Fine to very fine sand.</td>
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<td>2</td>
<td>15</td>
<td>25.0</td>
<td>34.3</td>
<td>Sandy</td>
<td>Fine to very fine sand.</td>
</tr>
</tbody>
</table>

Numbers in parentheses are ovigerous females.
coast of Baja California; this is the same material that was latter identified as *O. alphaerostris* by Carvacho and Olson (1984).

See Christoffersen (1979) and Williams (1981) for a complete synonymy of *Ogyrides alphaerostris*.

Figure 2. Distribution of *Ogyrides alphaerostris* in the bay of Mazatlán.

DISCUSSION

Up to now, 91 species of caridean shrimps have been reported from the Gulf of California area (Carvacho and Ríos, 1982; Hendrickx *et al.*, 1983; Wicksten and Hendrickx, 1985). Several species reported by Carvacho and Ríos (1982) in their catalog of caridean shrimps of the Gulf of California should not be included. Indeed, some have since been synonymized: *Alpheus subulatus* (Forskal, 1775) with *A. lotun*, *A. arenensis* (Chace, 1937) with *A. websteri* (Wicksten, 1983). Others (*A. panamensis* Kingsley and *A. californiaensis* Holmes) were not identified correctly in the original report (Brusca, 1980). *Synalpheus herricki* Coutière reported by Chace (1937) from Banco Arena, Baja California Sur, is listed by Carvacho and Ríos (1982) as *S. brooksi* Coutière (synonymized by Christoffersen, 1979); it seems, however that *S. herricki* must be retained as a valid species, *S. brooksi* being limited in its distribution to the Atlantic and the Gulf of México (Wicksten, 1983; Dardeau, 1984).

Including *Ambidexer panamensis* Aholé not found during this study but reported from Mazatlán harbour (Williamson, 1980), 43 species of caridean crustaceans have so far been collected in marine, brackish or fresh waters of Southern Sinaloa, which represents approximately 47\% of all species known from the Gulf of California. Specimens of *Thor paschalis* (Heller) previously reported for the Southern Gulf of California (Hendrickx *et al.*, 1983) are now known to represent a distinct species, *Thor algicola* Wicksten (1987).

Many species of the Gulf, however, are associated with habitats scarcely or not found in Southern Sinaloa (e.g. coral reefs and extensive algal beds). The coastal line south and north of Mazatlán is typically made of long uninterrupted sandy beaches; water turbidity is usually very high, especially during the rainy season (June to October) when siltation is important in shallow water. Rocky shores, very limited in extension, are mostly unprotected and very often severely beaten by waves.
All these factors evidently could represent limitation to the colonization of shores by certain species which would not find optimum settlement or growing conditions.

A list of species expected to be found in Southern Sinaloa, based on their known ranges and habitats, is given in Table 3. This includes the 15 most probable species. Those with a low probability include rare species, commensals with restricted habitats and commensals for which the host is almost eradicated from the area (e.g. Pinnia rugosa in the case of Pontonia pinnae and P. simplex). The species of Pandalidae, which are found north and south of the study area, have never been collected off the coast of Southern Sinaloa, perhaps due to low bottom oxygen levels at the depth range where they normally occur (Hendrickx et al., 1984).

**Table 3**

**List of species of Caridean shrimps expected to be found in Southern Sinaloa**

<table>
<thead>
<tr>
<th>HIGH PROBABILITY</th>
<th>LOW PROBABILITY</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Palaemonella holmesi</em> (Nobili, 1907)</td>
<td><em>Pseudocantiana elegans</em> Holthuis, 1951</td>
</tr>
<tr>
<td><em>Penaeus sexoculis</em> Nobili, 1904</td>
<td><em>Chaceola keratites</em> (Wicksten, 1983)</td>
</tr>
<tr>
<td><em>Typton serratus</em> Holthuis, 1951</td>
<td><em>Pontonia pinnae</em> Lockington, 1878</td>
</tr>
<tr>
<td><em>Typton hephaestus</em> Holthuis, 1951</td>
<td><em>Pontonia longispina</em> Holthuis, 1951</td>
</tr>
<tr>
<td><em>Typton tortugae</em> McClendon, 1911</td>
<td><em>Pontonia simplex</em> Holthuis, 1951</td>
</tr>
<tr>
<td><em>Plecanonika laevifrons</em> Holthuis, 1951</td>
<td><em>Pantopus ngahaei</em> Chace, 1937</td>
</tr>
<tr>
<td><em>Plecanonika virgata</em> Chace, 1937</td>
<td><em>Heterocarpus victorius</em> Faxon, 1893</td>
</tr>
<tr>
<td><em>Hippolyte williamsoi</em> Schmitt, 1924</td>
<td><em>Hippolyte californiensis</em> Holmes, 1895</td>
</tr>
<tr>
<td><em>Lysmata galapagensis</em> Schmitt, 1924</td>
<td><em>Ambidexter waiae</em> Abele, 1972</td>
</tr>
<tr>
<td><em>Procesa aequimana</em> (Paulson, 1875)</td>
<td><em>Ambidexter sumptuosus</em> Manning &amp; Chace, 1971</td>
</tr>
<tr>
<td><em>Synalpheus lochingtoni</em> Coutière, 1909</td>
<td><em>Latreillia varius</em> Stimpson, 1866</td>
</tr>
<tr>
<td><em>Alpheus bellimanus</em> Lockington, 1877</td>
<td><em>Synalpheus hirtifrons</em> Coutière, 1909</td>
</tr>
<tr>
<td><em>Alpheus cylindricus</em> Kingsley, 1878</td>
<td><em>Synalpheus salinae</em> Coutière, 1909</td>
</tr>
<tr>
<td><em>Alpheus normanni</em> Kingsley, 1878</td>
<td><em>Berta echinocolpus</em> Lockington, 1877</td>
</tr>
<tr>
<td><em>Alpheus grahami</em> Abele, 1975</td>
<td><em>Neocalupeus argyrae</em> (De Man, 1910)</td>
</tr>
<tr>
<td></td>
<td><em>Salmones serratidigitus</em> (Coutière, 1896)</td>
</tr>
<tr>
<td></td>
<td><em>Alpheus crassidentatus</em> Rathbun, 1900</td>
</tr>
<tr>
<td></td>
<td><em>Alpheus parvus</em> Miers, 1881</td>
</tr>
<tr>
<td></td>
<td><em>Hesperalpheus mitchelli</em> (Walker, 1898)</td>
</tr>
</tbody>
</table>

**Acknowledgements**

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**Literature Cited**


