Shallow Water Porcelain Crabs from the Pacific Coast of Panama and Adjacent Caribbean Waters (Crustacea: Anomura: Porcellanidae)

ROBERT H. GORE
and
LAWRENCE G. ABELE

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Robert H. Gore
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1976
ABSTRACT

Gore, Robert H., and Lawrence G. Abele. Shallow Water Porcelain Crabs from the Pacific Coast of Panama and Adjacent Caribbean Waters. (Crustacea: Anomura: Porcellanidae). Smithsonian Contributions to Zoology, number 237, 30 pages, 4 figures, 3 tables, 1976.—Collections of porcellanid crabs were made in over 130 areas in the Republic of Panama in order to sample as completely as possible all the major marine, estuarine, and freshwater biotopes on both coasts of the isthmus. Additional collections were carried out on Uva Island in the Gulf of Chiriqui, the Perlas Islands in the Bay of Panama on the Pacific coast, and at Galeta Island on the Atlantic coast. Red mangrove Rhizophora mangle, rocky intertidal, pocillopore coral Pocillopora damicornis, and the coralline back reef biotopes were extensively sampled, as well as selected areas in Miraflores, Pedro Miguel, and Gatun locks in the Panama Canal itself. As a result of the present study, 65 species of porcelain crabs are now known to occur in the tropical waters on either side of the Panamanian isthmus, 43 in the eastern Pacific and 22 in the Caribbean Sea. Included in these are seven species newly recorded for Panama and three recently described species. The porcellanid faunal component in Panama comprises 66% of the total tropical porcellanid component in the Panamic, and 67% of the Caribbean and Antillean faunal subprovinces. A key is provided to aid in identification of the porcellanid crabs that are known, or that are expected to occur in the waters on either side of the isthmus.
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<td>23. <em>Petrolisthes glasselli</em> Haig, 1957</td>
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<td>25. <em>Petrolisthes jugosus</em> Streets, 1872</td>
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<td>27. <em>Petrolisthes nobilii</em> Haig, 1960</td>
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<td>Genus <em>Pisidia</em> Leach, 1820</td>
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<td><em>Pisidia magdalensis</em> (Glassell, 1936)</td>
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<td><em>Pisidia</em> species</td>
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<td>Genus <em>Porcellana</em> Lamarck, 1801</td>
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<td>34.</td>
<td><em>Porcellana cancrisocialis</em> Glassell, 1936</td>
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<td>35.</td>
<td><em>Porcellana corbicola</em> Haig, 1960</td>
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<td>36.</td>
<td><em>Porcellana hancocki</em> Glassell, 1938</td>
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<td>37.</td>
<td><em>Porcellana paguriconviva</em> Glassell, 1936</td>
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<td>Genus <em>Ulloaia</em> Glassell, 1938</td>
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<td><em>Ulloaia perpusillia</em> Glassell, 1938</td>
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<td>Discussion</td>
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Shallow Water Porcelain Crabs from the Pacific Coast of Panama and Adjacent Caribbean Waters (Crustacea: Anomura: Porcellanidae)

Robert H. Gore and Lawrence G. Abele

Introduction

The porcellanid crab fauna in the Caribbean and Pacific waters of the Panamanian isthmus have received sporadic attention for over 100 years. Among the first species to be noted from Panama were Petrolisthes occidentalis (= P. galathinus (Bosc)) and P. armatus (Gibbes). These species were recorded by Stimpson in 1858 and 1859.* Additional studies on eastern Pacific porcellanids have been provided by several authors, notably A. Milne Edwards (1869) on material from the Pearl Islands; T. H. Streets (1871), who repeated the listing of Isthmian porcellanids of Stimpson; Faxon (1893) on material collected by the USCSS Albatross from the Bay of Panama; Nobili (1897) on material from Flamenco Island, Bay of Panama; Rathbun (1910), who listed Panamic Province material likely to occur in the Peruvian Province; Boone (1931) on material obtained from the Bay of Panama and the Canal Zone; and Haig on material from the Panama Bight (1957), a monographic study on eastern Pacific Porcellanidae (1960), and material collected by the R/V Zaca along the Pacific coast of Central America (1968).

Studies on the porcellanid fauna from the Caribbean side of Panama are less extensive. In addition to the above-mentioned work of Stimpson, Nobili (1897) provided notes on material from the Caribbean shore of Panama, Boone (1930) made brief mention of material from Limón Bay, Haig (1956, 1960, 1962, 1966) contributed to our knowledge in reporting on material collected by the Velero III and other expeditions in the vicinity of Atlantic Panama, and finally Gore and Shoup (1968) and Gore (1970, 1974) provided notes on material collected by the University of Miami R/V John Elliott Pillsbury in Caribbean waters adjacent to the Republic of Panama as well as areas of the southwestern Caribbean. The results of all these studies indicated that, prior to the initiation of the present investigation, the porcellanid crab fauna of Panama consisted of at least 36 species.

*As Haig has pointed out (1960:38), the designation "Panama" probably referred to Panama City on the Pacific coast of the isthmus. Atlantic coast references were generally to “Aspinwall,” today called Colon.
from the Pacific coast and 17 species from the Caribbean coast. The present study began in 1968 when a survey of the total decapod crustacean fauna of Panama was undertaken (Abele, 1972). Biotope diversity is more extensive on the Pacific coast than on the Atlantic, although comparisons can in many instances be made among both series of biotopes across the isthmus. Collections of porcellanid crabs were made in order to sample as completely as possible all the major biotopes occurring on both coasts of the Panamanian isthmus. Thus, during the first year of study, over 100 areas were sampled along the shores of the Bay of Panama, as well as some of the offshore islands. On the Caribbean coast 30 major areas were sampled between the towns of Piñas and Portobelo. Additional collections were made in Panama from 1972 to 1974 with special attention to Galeta Island on the Caribbean coast, Uva Island in the Gulf of Chiriqui, the eastern Pacific Ocean, and selected areas of the Panama Canal itself.

For this study the following biotopes were sampled on the Pacific side of the isthmus: (1) the red mangrove (Rhizophora mangle) areas along the shores of the Bay of Panama, and some of the offshore islands, (2) the Pocillopora damicornis coral community offshore of some islands, (3) the rocky intertidal areas along the shores of the isthmus, and (4) selected areas inside the Panama Canal. On the Caribbean side, collections were carried out in the rocky intertidal areas, including the coralline back reef and shelf at Galeta Island, and inside the Gatun Locks on the Atlantic side of the Panama Canal. Collections were also made in the Caribbean mangrove areas around Galeta Island, but no porcellanids were taken, although the area supports a substantial xanthid and gecarcinid decapod fauna. Porcellanids probably occur among oysters and other epifauna on the subtidal roots of mangroves but none are associated with the mangroves themselves. A list of all the stations at which material was collected for this study is presented in Table 1 and mapped in Figure 1.

All specimens were measured using either dial calipers or an ocular reticle calibrated with a stage micrometer on a Wild M-5 stereomicroscope. Measurements are given in millimeters rounded off to the nearest tenth. Carapace length is followed by carapace width. Specimens are deposited in the National Museum of Natural History, Washington, D.C., and the Allan Hancock Foundation, University of Southern California, Los Angeles. Other material is deposited in the Smithsonian Institution, Ft. Pierce Bureau Reference Museum, Florida.

ACKNOWLEDGMENTS.—We wish to thank Ms. Janet Haig and Dr. John S. Garth, Allan Hancock Foundation, University of Southern California, for critically commenting on the manuscript, providing us with much additional information, and for aiding with species identifications or confirmations. Miss Liberta Scotto, Harbor Branch Foundation Laboratory, Ft. Pierce, Florida, aided in measuring and sexing material from Galeta Island. Mrs. Linda Abele and Mrs. Susan Gore, helped in field collections and assisted in the laboratory. We are pleased to acknowledge the support and help provided by the Smithsonian Tropical Research Institute, and thank both the director, Dr. Ira Rubinoiff, and the staff at that facility. Portions of this study were funded (for RHG) by the Smithsonian Institution, Washington, D.C., through the auspices of its Secretary, Dr. S. Dillon Ripley, to whom we extend our joint thanks. Additional funds and support were provided (to LGA) under a Smithsonian Institution Post-Doctoral Fellowship in Tropical Biology. Finally we also wish to thank Dr. Peter Glynn for providing access to his collections and sharing his field notes from Uva Island.

Ecological Considerations

The porcellanid crab fauna of Panama, like the vast majority of species in the family in other parts of the world, is primarily littoral. For the discussion that follows the distribution and number of individuals in each species per biotope is summarized in Table 2. Number of individuals does not refer to density (i.e., number/m²) but is merely an estimate of each species' relative abundance in the habitat.

Pacific Red Mangrove Fauna.—Four species and 67 individuals were collected from Pacific red mangrove (Rhizophora mangle) swamps. Petroliisthes zacae was the most abundant species. It occurred in shallow burrows and in "crab runs" (Warner, 1969), viz., anastomosing tunnels formed by brachyuran crabs and the breakdown of mangrove roots. Petroliisthes lindae was also common
**Table 1.—List of stations on the Pacific and Atlantic sides of Panama at which Porcellanidae were collected**

<table>
<thead>
<tr>
<th>PACIFIC STATIONS</th>
<th>Station Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Golfo de Chiman</td>
<td>Bay of Panama, Golfo de Chiman; trawl; 3-8 m, 27 May 1969.</td>
</tr>
<tr>
<td>2. Isla Chepillo</td>
<td>Bay of Panama, Isla Chepillo; intertidal, 26 May 1969.</td>
</tr>
<tr>
<td>3. Juan Díaz</td>
<td>Bay of Panama, offshore from town of Juan Díaz; trawl; 6-7 m; 15 January 1969.</td>
</tr>
<tr>
<td>4. Panama City</td>
<td>Albert Einstein Institute; intertidal, 17 February 1969.</td>
</tr>
<tr>
<td>6. Panama Canal, Pacific</td>
<td>Canal Zone, east bank of Panama Canal; intertidal, 27 October 1968.</td>
</tr>
<tr>
<td>7a. Panama Canal, Pacific Entrance</td>
<td>Canal Zone, entrance to Canal; intertidal, 16 April 1969.</td>
</tr>
<tr>
<td>8. Miraflores Locks</td>
<td>Canal Zone; Miraflores Locks; sides and bottom of locks while drained for cleaning, 17 February 1972, M. L. Jones, collector.</td>
</tr>
<tr>
<td>9. Pedro Miguel Locks</td>
<td>Canal Zone, Pedro Miguel Locks; sides and bottom of locks while drained, 3 February 1969.</td>
</tr>
<tr>
<td>10. Fort Amador</td>
<td>Canal Zone, Ft. Amador, Smithsonian Tropical Research Institute; intertidal, 26 December 1968.</td>
</tr>
<tr>
<td>11. Rodman Naval Station</td>
<td>Canal Zone, Rodman Naval Station; intertidal, 17 April 1969.</td>
</tr>
<tr>
<td>12. Fort Kobbe</td>
<td>Canal Zone, Fort Kobbe, Venado Beach; intertidal, 8 May 1969, 1 July 1969.</td>
</tr>
<tr>
<td>13. Taboga Island</td>
<td>Bay of Panama, Taboga Island, 2 m, 11 April 1969.</td>
</tr>
<tr>
<td>15. Saboga</td>
<td>Bay of Panama, 8 miles west of Saboga Island, no depth available; 12 December 1970.</td>
</tr>
<tr>
<td>17. Aguadulce, Salado Playa</td>
<td>Aguadulce, south end of Salado Playa; intertidal, 9 November 1968.</td>
</tr>
<tr>
<td>18. Aguadulce, Rio Palo Banco</td>
<td>Aguadulce, Aguadulce Yacht Club, Rio Palo Banco; 3-5 m, 9 November 1968.</td>
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### Table 1.—Continued.

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<th>ATLANTIC STATIONS</th>
<th>Station Description</th>
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<td>4. Fort Randolph</td>
<td>Canal Zone, Fort Randolph; intertidal, 22 April 1969.</td>
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<tr>
<td>5. Coco Solo</td>
<td>Canal Zone, Coco Solo Naval Station; intertidal, 22 April 1969.</td>
</tr>
<tr>
<td>7. Ft. Sherman</td>
<td>Canal Zone, Ft. Sherman, on fossil reef; 0-3 m, 18 January 1969; Slimmy Beach; intertidal, 8 February 1969.</td>
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</table>

**Figure 1.**—Map of the Republic of Panama showing general localities of stations at which porcellanid crabs were collected, as noted in Table 1 and in the text.
Table 2.—The porcellanid crab fauna of Panama
(specimens taken by hand)

<table>
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<th>No. individuals examined</th>
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<td>Petrolisthes zacae</td>
<td>38</td>
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<tr>
<td>Petrolisthes lindae</td>
<td>24</td>
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<tr>
<td>Petrolisthes armatus</td>
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<td>Petrolisthes nobilii</td>
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<td>Rocky Intertidal Fauna</td>
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<td>Pacific coast</td>
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<td>Petrolisthes armatus</td>
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<td>Petrolisthes galathinus</td>
<td>17</td>
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<tr>
<td>Petrolisthes chacei</td>
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<tr>
<td>Pachycheles chacei</td>
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<tr>
<td>Megalobrachium pacificum</td>
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<td>Neopisosoma angustifrons</td>
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<td>Megalobrachium pavesi</td>
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<td>Pachycheles panamensis</td>
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<td>Atlantic coast</td>
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</table>

* No porcellanid crabs occurred in mangroves on the Atlantic coast.
lacks the rocky lava-flow intertidal zone so characteristic of the eastern Pacific. However, distinct zones of seagrass, red algae, and zoanthid anemones can nevertheless be recognized along reef flats. There are five discrete and recognizable zones progressing seaward from shore (Birkeland, Reimer, and Young, 1976): plant zones with (1) Thalassia or (2) Acanthophora; an intermediate zone characterized by (3) Zoanthus and (4) Laurencia, and (5) a coralline region that extends to the edge of the steep seaward slope. The coralline zone had the greatest number of species; 10 of the 12 that were collected occurred among the cracks and crevices of the coral rocks. As seen from Table 2, Pachycheles serratus and Petrolisthes galathinus were the two most abundant species. Both Pachycheles susanae and Petrolisthes jugosus were very common in species of the stinging coral, Mililepora. Neopilosaoma angustifrons, Pachycheles chacei, P. cristobalensis, Megalobrachium roseum, and M. poeyi were found here and among clumps of the calcareous green alga Halimeda in this zone. The remaining species seemed to be confined primarily to the calcareous rocky substratum. In the red alga Laurencia of the fourth zone, Petrolisthes jugosus occurred again, and both Clastotoechus nodosus and Pachycheles serratus were also found. In the Zoanthus, Thalassia, and Acanthophora zones, there occurred only one species each, i.e., Petrolisthes galathinus, P. armatus, and P. galathinus, respectively. The single specimen of Megalobrachium soriatum was taken from coralline rubble along the seaward edge of the reef.

It is interesting that these distributions show the majority of porcellanid species each to be restricted to a particular zone despite the fact that all the species have planktonic larvae and the zones are contiguous across the reef flat, a distance of about 100 meters. For example, over a three-year period only a single specimen of Pachycheles serratus, the dominant coralline species, was collected outside this zone in the adjacent Laurencia. Furthermore, six of the coralline zone species were found only in that zone and nowhere else.

Petrolisthes damicornis (L.) FAUNA.—Three Petrolisthes communities were sampled in Panama: Taboguilla Island, the Perlas Islands in the Bay of Panama, and Uva Island in the Gulf of Chiriqui. The species and numbers of individuals from each area are shown in Table 2 where the disparity between species abundance in the three areas can be seen. These areas can be compared in terms of both species composition and abundance because we are comparing approximately the same number (30-35) and size range (1000-20,000 cm$^3$) of coral heads in each area. Petrolisthes haigae was the dominant species at Taboquilla and Uva, and the second most common species in the Perlas Islands. It appeared to be restricted to Pocillopora coral and was not collected by us in any other habitat. Contrarily, Pisidia magdalensis was the dominant species in the Perlas Islands, though uncommon at Taboquilla and apparently absent from Uva Island.

Of additional interest is the observation that these porcellanids were not evenly distributed over the reef at Uva Island. The front and rear of the reef crest were similar in species richness and abundance, but the deeper reef flanks, especially to the rear, contained only a few individuals of a single species. This difference may be related to variant current patterns and amounts of suspended sediments on the deeper reef which could, therefore, conceivably restrict feeding by these filter feeders.

**Fauna of the Panama Canal.**—Three species of porcellanids were commonly found in the Panama Canal and all were apparently able to withstand the great variation in salinity that occurs there. Moreover, the distribution pattern of these three species is quite interesting and strongly suggests competitive interactions.

On the Atlantic coast Petrolisthes armatus was very common in the lower chambers of Gatun Locks, an area where the salinity may vary from 10% to 15% (Jones and Dawson, 1973). A few specimens were taken at the lower entrance of the middle chambers in water of about 5%. A second species, P. rothsone, was reported by Haig (1960) based on a single specimen collected from the lower chamber of Gatun Locks. It is the only Atlantic record of this eastern Pacific species which otherwise was common in the Miraflores Locks, especially in the lower chambers where the salinity may vary from 10% to 30%.

A single specimen of P. lindae was collected in the freshwater of Pedro Miguel Locks on the Pacific side, although the species is quite common in the upper and, to a lesser extent, lower chambers of the nearby Miraflores Locks. The species is thus known to occur in waters of salinity from 0% to
The eastern Pacific form of *Petrolisthes armatus* was collected just below the lower chambers of Miraflores, where it was very common.

On the Atlantic coast *P. armatus* shows a wide tolerance to varying salinities, being found in water from 28% outside of the Panama Canal, as well as in waters of about 10% inside the Gatun Locks. Yet on the Pacific coast, *P. armatus* is absent from all the locks, although it occurs outside of Miraflores Locks (in the mouth of the Canal); *P. robsonae* and *P. lindae*, however, occur on the Pacific side in the zone occupied by *P. armatus* in Gatun Locks on the Atlantic side. Furthermore, the distribution of *P. lindae* and *P. robsonae* in the Panama Canal is somewhat disjunct, with *P. lindae* occurring in lower salinity waters, and *P. robsonae* being found in waters of higher salinities. Thus, three species occur along a salinity gradient on the Pacific coast, whereas on the Atlantic coast this gradient is apparently occupied by only a single species, albeit either a close relative or conspecific of the three Pacific species in question.

### Zoogeographical Considerations

As a result of the present study 43 species of porcelain crabs are now known to occur in the tropical eastern Pacific coastal waters of Panama. Of these species, four may be extralimital. They are *Megalobrachium erosum*, *M. smithi*, *Porcellana corbicola*, and *Petrolisthes brachycarpus*. The first three species were previously thought to be restricted to the Gulf of California, Mexico, or its environs. The fourth species, known previously from the Galapagos Islands, has been previously recorded by Haig (1960) from Panama. Two other species recently described by us, *Petrolisthes lindae* and *Megalobrachium pacificum* (Gore and Abele, 1974), are also new from Pacific Panama.

The present study and previous records in the literature indicate that at least 21 species of porcelain crabs (excluding the questionable record for *Petrolishtes robosonae*) are found on the Caribbean coast of Panama. Three of these, *Clastotoechus nodosus*, *Neopisoma angustifrons*, and *Megalobrachium roseum* are new to Caribbean Panama.

The importance of the Panamanian porcelain crab faunal component can be easily seen when one considers its relationship to the total American porcelain crab fauna. Data available from several authors indicate that the total number of porcelain crab species in the eastern Pacific Ocean now stands at 88, while in the western Atlantic Ocean at least 54 species are known, for a total American faunal component of at least 122 species. The porcelain crab fauna of Panama thus accounts for over 57% of the total American porcelain crab fauna. Moreover, approximately 250 species of Porcellanidae are known throughout the world, so that the American faunal component com-
### Table 3.—Species of Porcellanidae recorded from or with ranges encompassing the Pacific or Atlantic coast of Panama

<table>
<thead>
<tr>
<th>Pacific species</th>
<th>Collected here</th>
<th>New to Panama</th>
<th>Collected here</th>
<th>Atlantic species</th>
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<tr>
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<td>+</td>
<td>+</td>
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<td>+</td>
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<td>+</td>
<td>+</td>
<td>... Meaglobrachium soriatum</td>
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<tr>
<td>Meaglobrachium pacificum</td>
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<td>+</td>
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<tr>
<td>Meaglobrachium smithi*</td>
<td>+</td>
<td>-</td>
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<tr>
<td>Megalobrachium tuberculipes</td>
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<tr>
<td>Totals .........(29+ and 19-)</td>
<td>48</td>
<td>6</td>
<td>4</td>
<td>22 (12+ and 10-)</td>
</tr>
</tbody>
</table>


* Possibly extralimital.

** Known only from a single recording, Gatun Locks, Panama Canal; locality needs verification.

presents almost 50% of the total number of species worldwide.

**Systematic Considerations**

In the following text we restrict synonymies to those of the original author, the first use of the taxon in its presently accepted sense, the work providing the best description or illustration of the species under consideration, the more important references which have appeared since Haig's monographs (1956, 1960) on the porcellanid crabs from the western Atlantic and eastern Pacific, or the recent update of Caribbean species by Gore (1974).
The key that follows may be used to determine the species of Porcellanidae which are known to occur on either side of Panama. The key is modified primarily from those that appeared in the previously cited monographic studies by Ms. Janet Haig (esp. 1960). Species that we have collected and examined are preceded by a number which refers to the discussion of the species in the text of this study. Species not so numbered in the key are those that are known to occur in Panamanian waters, or have ranges which extend to either north or south of the country, but have not yet been collected by us. Those species that have not yet been recorded from Panama but which might occur in the shallow waters on either side of the isthmus are followed in the key by an asterisk.

Key to the Species of Porcellanid Crabs
(Known to occur on the eastern Pacific and Caribbean coasts of the Republic of Panama)

1. Carapace at least 1.5 times as long as broad; form elongate, "Hippa"-like; a large orbit-like concavity on hepatic margin, its outer angle marked by a tooth.................Euceramus (2)
   Carapace less than or nearly 1.5 times as long as broad; form not elongate or "Hippa"-like; no large orbit-like concavity on hepatic margin .................................................................4

2. Carapace about 1.5 times as long as broad, with distinct transverse striations; antennal flagellum shorter than carapace, without hairs..............Euceramus transversilineatus (Lockington) (Pacific)
   Carapace at least twice as long as broad or longer, lightly plicate; antennal flagellum longer than carapace, and distinctly hairy .................................................................3

3. Median lobe of frontal region distinctly longer than lateral lobe; basal segment of the antenna with broad inward projection, and narrowly in contact with anterior margin of the carapace; propodus and dactylus of walking leg 2 normal .................................................................Euceramus praeUmgus Stimpson (Atlantic)*
   Median lobe of frontal region equal or slightly longer than lateral lobes; basal segment of antennae without inward or forward projections; dactylus of walking leg 3 flat, without a nail ........................................................................................................................................5

4. Chelipeds normally held more or less straight out in front of carapace; carapace about 1.5 times as long as broad, lateral margins armed with a series of 12-15 minute, close-set spinules posterior to the cervical groove ..........Orthochaeta pumila Glassell (Pacific)
   Chelipeds normally bent sharply at articulation of carpus and manus; carapace never as much as 1.5 times as long as broad, lateral margins never with as many as 12-15 minute, close-set spinules posterior to cervical groove ..................................................................................................................................................5

5. Basal segment of antennae short, not strongly produced forward to meet anterior margin of the carapace, movable segments with free access to the orbit .................................................................6
   Basal segment of antennae strongly produced forward and broadly in contact with the anterior margin of the carapace so that movable segments are far removed from the orbit ........................................................................................................................................51

6. Posterior portions of side walls of carapace lacking, or consisting of one or more small pieces, separated by membranous interspaces behind the epibranchial region .................................................................7
   Posterior portions of side walls of carapace entire, without small pieces or membranous area behind epibranchial region ...........................................................................................................................................27

7. Side walls of carapace incomplete, the portion posterior to epibranchial or mesobranchial area occupied by membrane .................................................Neopisosoma (8)
   Side walls of carapace consisting of one or more pieces separated by membranous interspaces in epibranchial or mesobranchial area ............................................................................................................................................12

8. Chelipeds large, robust, markedly differing in size, covered with numerous rounded, projecting granules; carpus without distinct crests; telson 5-plated; male pleopods lacking ..........................9
   Chelipeds as above, but covered with flattened granules, carpus with three more or less distinct crests; telson 7-plated (occasionally 5- or incompletely 7-plated); male pleopods present ........................................................................................................................................10

9. Side wall of carapace consisting only of small anterior wedge ending at epibranchial level; outer surface of manus at junction of fingers without large noticeable whitened granulate tubercle .................................................Neopisosoma dohemyi Haig (Pacific)
   Side wall of carapace consisting of narrow, curved portion extending posteriorly to meso-
branchial area; outer surface of manus with distinct, whitened, granulate tubercle at junction of fingers

10. Neopisosoma angustifrons (Benedict) (Atlantic)

Carpus of cheliped with 3 teeth, these occupying not more than the proximal two-thirds of the anterior margin; surface of carpus with three low, often obsolescent crests

Neopisosoma mexicanum (Streets) (Pacific)

Carpus of chelipped with 4-5 teeth, occupying entire anterior margin; surface of carpus with three, distinct longitudinal crests and a fourth along the posterior margin

11. Manus of one, or both chelipeds usually lacking pubesence (except in females in which both hands are pubescent); telson 5-, incompletely 7-, or 7-plated

Neopisosoma curacaoense (Schmitt) (Atlantic)*

Manus of one, or both chelipeds usually lacking pubesence (except in females in which both hands are pubescent); telson 5-, incompletely 7-, or 7-plated

Neopisosoma curacaoense (Schmitt) (Atlantic)*

12. Chelipeds thick, robust, distinctly dissimilar in size; front not prominent, usually transversely sinuate or rounded in dorsal view, often with distinct tuft of hairs, never distinctly trilobate in dorsal view; telson of abdomen with 5 or 7 plates; pleopods present or lacking in males

Pachycheles

13. Chelipeds thick, robust, distinctly dissimilar in size; front not prominent, usually transversely sinuate or rounded in dorsal view, often with distinct tuft of hairs, never distinctly trilobate in dorsal view; telson of abdomen with 5 or 7 plates; pleopods present or lacking in males

Pachycheles

14. Carapace strongly granulate and rugose; front not markedly elongate; brush of hair on outer margin of manus of chelipeds usually present only in females

Clastotoechus diffractus (Haig) (Pacific)

Clastotoechus nodosus (Streets) (Atlantic)

15. Carapace with a distinct tuft of hairs on front, or surface covered with distinct hairs

Clastotoechus nodosus (Streets) (Atlantic)

16. Carapace with a distinct tuft of hairs on front, or surface covered with distinct hairs

Clastotoechus nodosus (Streets) (Atlantic)

17. Carapace covered with short, nonplumose setae; chelipeds with nonplumose setae only, carpus of same with short rugae or flattened granules; telson 7-plated; male pleopods present

Pachycheles spinidactylus Haig (Pacific)

Pachycheles trichotus Haig (Pacific)

18. Telson of abdomen with 5 plates

Telson of abdomen usually with 7 plates (except P. vicarius females)

19. Carpus and manus of chelipeds nearly smooth; manus with distinct groove near outer margin; anterior margin of carpus with broad lamellar lobe, indistinctly divided into 3 teeth

Clastotoechus nodosus (Streets) (Atlantic)

Pachycheles biocellatus (Lockington) (Pacific)

19. Carpus and manus of chelipeds nearly smooth; manus with distinct groove near outer margin; anterior margin of carpus with broad lamellar lobe, indistinctly divided into 3 teeth

Pachycheles biocellatus (Lockington) (Pacific)

20. Carapace slightly roughened, plicate, not markedly convex from front to back; dactylus of walking legs without two strong fixed spines; anterior margin of carpus a broad lobe armed with about 8 small teeth or serrations; male pleopods present

Pachycheles chacei Haig (Atlantic and Pacific)

Pachycheles trichotus Haig (Pacific)
teriorly with 4 or 5 strong teeth; male pleopods absent

21. Granules on chelipeds tending to form longitudinal rows; a distinct tubercle near the base of the pollex, pubescent on distal side

Granules on chelipeds evenly distributed over surface; no distinct tubercle near the base of the pollex

Pachycheles ackleianus A. Milne Edwards (Atlantic)

Pachycheles crassus (A. Milne Edwards) (Pacific)

22. Carpus and manus of chelipeds with strong crests and grooves

Carpus and manus of chelipeds covered with granules

23. Dorsal surface of cheliped carpus with three, long, low, gently rounded crests, not interrupted and broken into large tubercles; side wall of carapace broken about midway down its length; male pleopods absent

17. Pachycheles susanae Gore and Abele (Atlantic)

Dorsal surface of cheliped carpus with 4, high, distinct crests of which the third is often interrupted and broken into large irregular tubercles; side wall of carapace broken about two-thirds down its length; male pleopods present

18. Pachycheles vicarius Nobili (Pacific)

24. Carpus and manus of chelipeds thickly covered with long, plumose hairs; no large tubercle on cutting edge of the dactyl of cheliped; first movable antennal segment without a distinct conical tubercle; male pleopods present

Carpus and manus of chelipeds devoid of hair, or at most with traces of pubescence; a large tubercle on the cutting edge of dactyl of cheliped; first movable antennal segment with a distinct conical tubercle; male pleopods absent

25. Anterior margin of the carpus of cheliped indistinctly divided into 3 teeth; pubescence on chelipeds extremely thick and fine

16. Pachycheles serratus (Benedict) (Atlantic)

Anterior margin of the carpus of cheliped cut into 3 strong, distinct teeth; pubescence not as thick as preceding species, often scarcely evident on carpus

Pachycheles setimansus (Lockington) (Pacific)

26. Carapace with posterolateral plications low, often scarcely developed; granulation on chelipeds reduced; walking legs sparsely and irregularly covered with long plumose hairs

Carapace with well-developed plications posterolaterally; granulation of chelipeds distinct; walking legs thickly covered with long, plumose hairs

12. Pachycheles calculosus Haig (Pacific)

27. Basal segment of antennule not laterally expanded; basal antennal segment neither produced inward nor forming partial suborbital margin; front triangular, prominent; carapace with distinct frontal, epibranchial and mesobranchial spinules; cheliped fingers distorted, gaping, deeply grooved along cutting edges, spooned and truncate at tips; telson 7-plated

Basal antennular segment as above; basal antennal segment either not produced inward, or if with a distinct inward projection, forming only a partial suborbital margin; front triangular or trilobate, usually prominent; carapace without mesobranchial spinules; cheliped fingers normal, not grooved along cutting edges nor spooned at tips; telson almost invariably 7-plated

PetroUSthetes (28)

28. Telson of abdomen with 5 plates

Telson of abdomen with 7 plates

29. 3 or 4 teeth on carpus of chelipeds pointed, denticulate; outer margin of manus with longitudinal groove; carapace chelipeds, and gape of fingers lightly pubescent

3 or 4 teeth on carpus of chelipeds rounded, broad; outer margin of manus with distinct longitudinal groove; carapace, chelipeds, and gape of fingers without pubescence

14. Pachycheles cristobalensis Gore (Atlantic)

25. PetroUsthes jugous (Streets) (Atlantic)

30. Epibranchial spine present (if obsolescent or vestigial its position distinctly marked at epibranchial angle by a notch); anterior margin of merus of walking legs usually spined

Epibranchial spine absent; anterior margin of merus of walking legs without spines

31. Carapace with distinct, transverse, piliferous striations, usually interrupted only at grooves defining the various regions

Carapace smooth, granulate, plicate or roughened, but never with distinct transverse piliferous striations

PetroUsthes hians Nobili (Pacific)
22. Petrolisthes edwardsii (Saussure) (Pacific)

23. Petrolisthes glasselli Haig (Pacific)

24. Petrolisthes haigae Chace (Pacific)

25. Petrolisthes agassizii Faxon (Pacific)

26. Petrolisthes lindae Gore and Abele (Pacific)

27. Petrolisthes nobilii Haig (Pacific)

28. Petrolisthes politus (Gray) (Atlantic)

29. Petrolisthes armatus (Gibbes) (Atlantic and Pacific)

30. Petrolisthes rossome Glassell (Pacific)

31. Petrolisthes munroei (Gibbes) (Atlantic and Pacific)

32. Petrolisthes zacae Haig (Pacific)
**Petrolisthes nigrotruncatus** Glassell (Pacific)
Carpus with strong teeth on the anterior margin; manus without a thick fringe of hair on the anterior margin; fingers not distinctly dissimilar in the 2 chelipeds 44

44. Manus with 2 longitudinal crests on the dorsal surface, and a heavy rounded crest along the outer margin; proximal 2 or 3 teeth on carpal margin partially or wholly coalesced to form a broad tooth, this followed by a smaller tooth ........................................................................... 45

**Petrolisthes lewisii australis** Haig (Pacific)
Manus without dorsal crests, no heavy rounded crest along the outer margin; anterior margin of carpus with 3 broad teeth 45

45. Carpus of cheliped about 1.5 times as long as wide manus with 2 low crests on dorsal surface separated by indistinct grooves, proximal two-thirds of anterior margin of carpus with a broad, strongly projecting lobe, its edge obscurely divided into 3 parts 45

**Petrolisthes lewisi australis** Glassell (Pacific)
Manus with 2 longitudinal crests on the dorsal surface, and a heavy rounded crest along the outer margin; proximal 2 or 3 teeth on carpal margin partially or wholly coalesced to form a broad tooth, this followed by a smaller tooth ........................................................................... 45

46. Manus with 2 longitudinal crests on the dorsal surface, and a heavy rounded crest along the outer margin; proximal 2 or 3 teeth on carpal margin partially or wholly coalesced to form a broad tooth, this followed by a smaller tooth ........................................................................... 45

46. Manus without dorsal crests, no heavy rounded crest along the outer margin; anterior margin of carpus with 3 broad teeth 45

47. Proximal two-thirds of the anterior margin of the carpus lobed, distal third subparallel with posterior margin; merus of walking leg 3 inflated; front narrow, triangular 46

**Petrolisthes tonsorius** Haig (Pacific)
Proximal two-thirds of the anterior margin of the carpus entire, not lobate, distal third subparallel with posterior margin; merus of walking leg 3 not noticeably inflated; front broadly triangular, without lobiform teeth at inner orbital angles 46

48. Carapace subquadrate, lateral margins nearly parallel posterior to the epibranchial angle; fingers often short and stubby 47

48. Carapace subovate, occasionally nearly subquadrate, lateral margins not parallel; fingers not short and stubby 47

49. Carapace smooth overall, front distinctly trilobate; manus not swollen, its outer edge thin; gape of fingers without a tuft of pubescence 48

49. Carapace roughened, or granulate; if smooth only anteriorly; front sinuously triangular; manus somewhat swollen on its dorsal surface, its outer margin with a crest; gape of fingers with thick tuft of pubescence 48

50. Entire carapace rough and uneven; carpus of cheliped unarmed; merus of walking leg 3 broad, inflated 49

50. Entire carapace rough and uneven; carpus of cheliped unarmed; merus of walking leg 3 broad, inflated 49

51. Dactylus of walking legs ending in 2 or more large, strong, fixed spines; carapace markedly broader than long, front nearly transverse in dorsal view 50

51. Dactylus of walking legs ending in 2 or more large, strong, fixed spines; carapace markedly broader than long, front nearly transverse in dorsal view 50

52. Dactylar ventral spines (progressing distally) subequal, the second slightly smaller and not overreaching imaginary line connecting apices of first and third; propodus of walking legs with no (or rarely one) spine ventrally plus usual three posterodistally 51

52. Dactylar ventral spines (progressing distally) subequal, the second slightly smaller and not overreaching imaginary line connecting apices of first and third; propodus of walking legs with no (or rarely one) spine ventrally plus usual three posterodistally 51

53. Propodus of walking legs without ventral spines except for usual three posterodistally 52

53. Propodus of walking legs without ventral spines except for usual three posterodistally 52

54. Dactylar ventral spines (progressing distally) subequal, the second slightly smaller and not overreaching imaginary line connecting apices of first and third; propodus of walking legs with no (or rarely one) spine ventrally plus usual three posterodistally 54

54. Dactylar ventral spines (progressing distally) subequal, the second slightly smaller and not overreaching imaginary line connecting apices of first and third; propodus of walking legs with no (or rarely one) spine ventrally plus usual three posterodistally 54

55. Propodus of walking legs with 2 spines ventrally plus usual 3 posterodistally 55

55. Propodus of walking legs with 2 spines ventrally plus usual 3 posterodistally 55
54. Movable segments of the antenna minute, flagellum rudimentary, their total length less than or scarcely exceeding the width of the eye; carapace about 1 1/2 times as long as broad, front strongly tridentate in dorsal view; a single strong spine on the lateral margin. Minyocerus (55)

Movable segments of antenna normal; not as above. Minyocerus angustus (Dana) (Atlantic)

55. Spine on cheliped merus short, acute; dorsomedial spinules on distal margin little developed or wanting; carpus with a single spine about midway on anterior margin, followed by several smaller spinules; carapace not noticeably pubescent. Minyocerus kirki* Glassell (Pacific)

56. Front prominent, tridentate or trilobate in dorsal view; carapace only slightly longer than broad. Minyocerus kirki* Glassell (Pacific)

57. Spine on cheliped merus short, acute; dorsomedial spinules on distal margin little developed or wanting; carpus with a single spine about midway on anterior margin, followed by several smaller spinules; carapace not noticeably pubescent. Minyocerus kirki* Glassell (Pacific)

58. Spine on cheliped merus short, acute; dorsomedial spinules on distal margin little developed or wanting; carpus with a single spine about midway on anterior margin, followed by several smaller spinules; carapace not noticeably pubescent. Minyocerus kirki* Glassell (Pacific)

59. Spine on cheliped merus short, acute; dorsomedial spinules on distal margin little developed or wanting; carpus with a single spine about midway on anterior margin, followed by several smaller spinules; carapace not noticeably pubescent. Minyocerus kirki* Glassell (Pacific)

60. Spine on cheliped merus short, acute; dorsomedial spinules on distal margin little developed or wanting; carpus with a single spine about midway on anterior margin, followed by several smaller spinules; carapace not noticeably pubescent. Minyocerus kirki* Glassell (Pacific)

61. Spine on cheliped merus short, acute; dorsomedial spinules on distal margin little developed or wanting; carpus with a single spine about midway on anterior margin, followed by several smaller spinules; carapace not noticeably pubescent. Minyocerus kirki* Glassell (Pacific)

62. Spine on cheliped merus short, acute; dorsomedial spinules on distal margin little developed or wanting; carpus with a single spine about midway on anterior margin, followed by several smaller spinules; carapace not noticeably pubescent. Minyocerus kirki* Glassell (Pacific)

63. Spine on cheliped merus short, acute; dorsomedial spinules on distal margin little developed or wanting; carpus with a single spine about midway on anterior margin, followed by several smaller spinules; carapace not noticeably pubescent. Minyocerus kirki* Glassell (Pacific)

64. Spine on cheliped merus short, acute; dorsomedial spinules on distal margin little developed or wanting; carpus with a single spine about midway on anterior margin, followed by several smaller spinules; carapace not noticeably pubescent. Minyocerus kirki* Glassell (Pacific)

65. Spine on cheliped merus short, acute; dorsomedial spinules on distal margin little developed or wanting; carpus with a single spine about midway on anterior margin, followed by several smaller spinules; carapace not noticeably pubescent. Minyocerus kirki* Glassell (Pacific)
66. Anterolateral and posterolateral margins forming a distinct angle behind mid-branchial level; lateral margins unarmed. \textit{Megalobrachium festai} (Nobili) (Pacific)
   Lateral margins rounded, dentate ................................................................. 67

67. Frontal, postfrontal and protogastric lobes, when viewed frontally, appearing low, rounded, indistinct, usually smooth, rarely granular. 8. \textit{Megalobrachium soriatum} (Say) (Atlantic)
   Frontal, postfrontal, and protogastric lobes, viewed frontally, appearing raised, distinctly rounded and elevated, often slightly roughened or lightly granular ................................. 9. \textit{Megalobrachium tuberculipes} (Lockington) (Pacific)

68. Carapace and chelipeds heavily eroded, uneven. 69
   Carapace and chelipeds smooth or roughened, never heavily eroded ................................................................. 70

69. Frontal region of carapace tridentate in frontal view, lateral lobes narrow, truncate, separated from median lobe by deep, rounded notches; proximal third of anterior margin of carpus of the cheliped with a broad, low triangular tooth; anterior margin of merus, carpus and propodus of walking legs with a distinct high crest ................................. 3. \textit{Megalobrachium erosum} (Glassell) (Pacific)
   Frontal region as above but lateral lobes broad and truncate, separated from median lobe by broad U- or V-shaped notches; proximal third of anterior margin of cheliped carpus with strongly projecting, narrow granular lobe; anterior margin of merus, carpus, and propodus of walking legs with a more or less sharp crest ................................................................. 4. \textit{Megalobrachium pacificum} Gore and Abele (Pacific)
   Protogastric regions, viewed frontally, distinct, and clearly elevated above the frontal and hepatic regions; propodi of walking legs more slender, from 2.8 to 3 times longer than wide 5. \textit{Megalobrachium poeyi} (Guerin) (Atlantic)
   Carapace nearly smooth; front with 3 teeth separated by deep rounded notches, strongly projecting beyond eyes, usually triangular in dorsal view ................................................................. 6. \textit{Megalobrachium roseum} (Rathbun) (Atlantic)

70. Carapace and chelipeds thickly covered with coarse hairs; chelipeds heavily and evenly granulate ................................................................. 71
   Carapace and chelipeds naked or lightly pubescent; granulation on chelipeds somewhat roughened, less even ................................................................. 72

71. Protogastric regions, when viewed frontally, indistinct, not higher than the frontal and hepatic regions; propodi of walking legs robust, 2 to 2.5 times longer than wide ................................. 4. \textit{Megalobrachium pacificum} Gore and Abele (Pacific)
   Protogastric regions, viewed frontally, distinct, and clearly elevated above the frontal and hepatic regions; propodi of walking legs more slender, from 2.8 to 3 times longer than wide 5. \textit{Megalobrachium poeyi} (Guerin) (Atlantic)

72. Carapace roughened; front with 3 shallow lobes, strongly projecting beyond eyes, rounded in dorsal view ................................................................. 7. \textit{Megalobrachium smithi} (Glassell) (Pacific)
   Carapace nearly smooth; front with 3 teeth separated by deep rounded notches, strongly projecting beyond eyes, usually triangular in dorsal view ................................................................. 6. \textit{Megalobrachium roseum} (Rathbun) (Atlantic)

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**Family PORCELLANIDAE Haworth, 1825**

**Genus Clastotoechus Haig, 1960**

1. \textit{Clastotoechus dextratus} (Haig, 1957)

\textit{Petrolisthes dextratus} Haig, 1957:8, pl. 9: figs. 1–6.
\textit{Clastotoechus dextratus}.—Haig, 1960:8, 175, 176, fig. 5(1), pl. 30: fig. 1.—Birkeland, et al., 1975:67.

**Material Examined.**—Punta Paitilla; 2 ♂, 2 ♀, 1 ovigerous; 29 Oct 1970.
**Measurements.**—3.7 × 3.8 to 6.3 × 6.5 mm; smallest ovigerous female, 3.7 × 3.8 mm.
**Remarks.**—Although its size would not necessarily cause it to be overlooked, it is apparently a rare species. The four specimens collected at Paitilla Beach and reported herein bring the total of known individuals to 27.
**Distribution.**—Known in the eastern Pacific from Cabo San Lucas, Gulf of California to Acapulco, Mexico, and Malpelo Island. The specimens herein from Panama City constitute a first recording for Panama; littoral.

2. \textit{Clastotoechus nodosus} (Streets, 1872)

**Figure 2**

\textit{Clastotoechus nodosus}.—Haig, 1960:177, fig. 5(3); 178.—Rick- ner, 1975:163.

**Material Examined.**—Galeta Island; 1 juvenile; 8 Mar 1972.
**Measurements.**—2.0 × 2.0 mm.
**Remarks.**—Haig (1956) has commented on the small size of this species. It may therefore have been overlooked in previous collections made in Panama.
**Distribution.**—The species was previously known from the littoral zone in the southwestern Gulf of Mexico, the southeastern Caribbean, and Venezuela. The Galeta Island material is the first recording for Panama and the southwestern Caribbean; littoral.

**Genus** *Megalobrachium* Stimpson, 1858

3. *Megalobrachium erosum* (Glassell, 1936)

*Pisosoma rosa* Glassell, 1936:289.

*Megalobrachium erosum*.—Chace, 1942:100.


**Material Examined.**—Perlas Islands; 1 ♂, 1 ♀; 12–13 Jun 1973.

**Measurements.**—4.0 × 4.4 to 4.4 × 5.0 mm.

**Remarks.**—The two specimens appeared typical.

**Distribution.**—Known previously from the Gulf of California and outer coast of Baja California, Mexico, the two Panamanian specimens are a first recording for Panama and constitute a range exten-
sion southward of nearly 4000 km. This species, like other Gulf of California endemics noted elsewhere in this report, is possibly extralimital; from the intertidal zone to 50 m.

4. **Megalobrachium pacificum** Gore and Abele, 1974

*Megalobrachium poeyi*—Haig, 1960:213, 214, 339, 340, pl. 16: fig. 4, pl. 39: fig. 1 [not *M. poeyi* (Guérin-Méneville, 1855)].

**Megalobrachium pacificum** Gore and Abele, 1974:568, fig. 3F.

**Material Examined.**—Panama City; 3♂, 4 ♀; ovigerous; 14–15 Apr and 5 Jun 1969.

**Measurements.**—Males 3.2 X 2.8 to 6.7 X 7.4 mm; female 6.3 X 6.8 mm; ovigerous females 3.7 X 3.5 to 8.2 X 9.0 mm.

**Remarks.**—This species has been reported previously by Gore and Abele (1974). It was considered conspecific with *M. poeyi* across the Panamanian isthmus for many years, but larval characters and meristic adult features allowed it to be separated from its present Atlantic geminate, *M. poeyi*.

**Distribution.**—Known only from the Pacific coast of Costa Rica and the Bay of Panama; littoral.

5. **Megalobrachium poeyi** (Guérin, 1855)

*Porcellana poeyi* Guérin-Méneville, 1855: pl. 2: fig. 4; 1857a: xvi; 1857b:xxxix, pl. 2: fig. 4.


**Material Examined.**—Galeta Island; 2 ♂, 1 ♀; 23 Nov 1971 and 22 May 1972, respectively.

**Measurements.**—Males 3.4 X 3.6, 3.8 X 4.3 mm, female 3.3 X 3.5 mm.

**Remarks.**—These specimens were identified by Ms. Janet Haig of the Allan Hancock Foundation, who also provided the measurements at our request. They were collected from the coralline zone on the reef flat at Galeta.

**Distribution.**—Widely distributed from eastern central Florida throughout the eastern Caribbean to Brazil, the species has only rarely been collected in Panama. *Megalobrachium poeyi* has been collected from the intertidal zone to depths of 46 m.

6. **Megalobrachium roseum** (Rathbun, 1900)

*Porcellana rosea* Rathbun, 1900:146, pl. 8: fig. 5.


**Measurements.**—Males 2.0 X 2.0 to 3.4 X 3.6 mm; female 3.7 X 4.1 mm; ovigerous female 2.8 X 2.8 mm.

**Remarks.**—In one male from Galeta Island the telson was aberrant, having only five, instead of the usual seven plates.

**Distribution.**—This species is known along the continental margin of northern South America from Brazil, Venezuela, and Colombia. The specimens reported herein mark the first recordings from Panama and Central America; littoral.

7. **Megalobrachium smithi** (Glassell, 1936)


*Megalobrachium smithi*.—Chace, 1942:100.—Haig, 1960:213, 215; pl. 16: fig. 5, pl. 39: fig. 2.

**Material Examined.**—Perlas Islands; 1 ♂, 2 ♀, 1 ovigerous; 12–13 Jun 1973.

**Measurements.**—Male 2.6 X 2.8 mm; female 3.0 X 3.4 mm; ovigerous female 2.6 X 3.0 mm.

**Remarks.**—Sexual dimorphism is exhibited in the movable finger of the female and male chelifeds.

**Distribution.**—Previously restricted to the Gulf of California, Mexico, the Panamanian specimens reported here are possibly extralimital. They nevertheless constitute the first recording for Panama and a range extension of nearly 4000 km; littoral.

8. **Megalobrachium soriatum** (Say, 1818)

**Figure 3**


**Porcellanopsis soriata*.—Haig, 1956:35.—Coelho, 1966:60.


**Material Examined.**—Galeta Island; 1 ♂; 12 Aug 1973.
Measurements.—Male 3.0 × 3.0 mm.
Remarks.—The single male specimen appeared typical.

Distribution.—The species is widely distributed from Isla Contoy, in the Gulf of Mexico, to Florida and along the eastern coast of the United States as far as North Carolina; also Barbados in the eastern Caribbean and Brazil. Haig (1956) reported it for the first time from Panama at Bahia Caledonia based on a single female. The Galeta Island specimen, a male, is thus only the second recording. This small species is apparently quite rare in the southwestern Caribbean, and its recorded occurrences suggest that it may be a continental species; shore to 111 m.

9. Megalobrachium tuberculipes (Lockington, 1878)

Figure 3

Pachycheles tuberculipes Lockington, 1878:396, 404.
Megalobrachium tuberculipes.—Haig, 1960:213, 227, pl. 16: fig. 11, pl. 40: fig. 4; 1968:57, 72.—Haig et al., 1970:24, 26.


Measurements.—Male 2.8 × 2.7 mm; female 2.7 × 3.0 mm.

Remarks.—The lateral margins of the carapaces in both specimens were rounded, without the usual dentition characteristic of the species.

Megalobrachium tuberculipes is extremely close to its western Atlantic geminate, M. soriatum. Unfortunately, comparison of trans-Panamanian material was impossible since our material from Panama of both species consisted of only three specimens. The two specimens of M. tuberculipes noted above, however, were compared with a large series of M. soriatum from the Indian River region of the central eastern Florida coast. In general, M. soriatum appeared to be a smoother species; the frontal and postfrontal lobes were, for the most part, only slightly developed, and in many instances could not be distinguished at all. The protogastric region appeared to be more coalesced, and the lobes were more shallow and rounded than those seen in M. tuberculipes. These differences, admittedly slight, could best be seen when specimens of each species were viewed frontally and slightly from below.

When viewed this way, M. tuberculipes appeared to have more developed protogastric lobes, not as coalesced as in M. soriatum. The frontal and postfrontal lobes were distinct and separate. It remains to be seen, however, whether these differences will be constant in a large series of M. tuberculipes.

Distribution.—From northern Baja California, and the Gulf of California, Mexico to Santa Elena Bay, Ecuador; shore to 20 m.

Genus Neopisosoma Haig, 1960

10. Neopisosoma angustifrons (Benedict, 1901)

Pisosoma angustifrons Benedict, 1901:135, pl. 5: fig. 6.—Haig, 1956:15.
Neopisosoma angustifrons.—Haig, 1960:124, 131; 1962:181.—
Rickner, 1975:163.

**Material Examined.**—Galeta Island; 7 ♂, 4 ♀, 2 ovigerous, 1 juvenile; 12 Aug 1973.

**Measurements.**—Males 2.4 × 2.5 to 4.6 × 5.0 mm; females 2.2 × 2.4 to 2.5 × 2.8 mm; ovigerous female 2.0 × 2.2; juvenile 1.7 × 1.7 mm.

**Remarks.**—These specimens are easily recognized by using the characters pointed out by Haig (1956). In addition, at the base of the cheliped dactylus a large white clump of granules was always present. This drab little porcellanid was found primarily among coralline clumps on the outer reef margin at Galeta Island. Other material consisting of several males and ovigerous females collected on 12–13 June 1974 has been incorporated by Gore (in press) in a paper describing the larval development of this species.

**Distribution.**—Known previously from the southwestern Gulf of Mexico, the lesser Antilles, Trinidad, Cubagua, Islas La Tortuga, Bonaire, Curacao, and from Venezuela, the Panamanian specimens extend the known range southwestward 1875 km, and constitute a first recording for the southwestern Caribbean and Central America; littoral.

**Genus Pachycheles** Stimpson, 1858

11. *Pachycheles biocellatus* (Lockington, 1878)

*Petrolistes (Pisosoma) biocellatus* Lockington, 1878:396, 403.


**Measurements.**—Males 2.2 × 2.2 to 5.0 × 5.5 mm; females 1.9 × 2.0 to 3.0 × 3.2 mm; ovigerous females 2.5 × 2.5 to 4.1 × 4.6 mm.

**Remarks.**—The smallest ovigerous female collected from Taboguilla Island is apparently the smallest yet recorded for the species. Chace (1962) noted that the smallest egg-bearing female in the series he examined had a carapace width of 3.3 mm.

**Distribution.**—Known from the Gulf of California, Espiritu Santo Island, Mexico, to Ecuador and offshore to Malpelo, Isabel, Tres Marias, Revillagigedo, Clipperton, and the Galapagos Islands; shore to 26 m.


**Material Examined.**—Punta Paitilla; 1 ♀; 7 Jul 1969.

**Measurements.**—2.0 × 2.7 mm.

**Remarks.**—The sole specimen did not appear as plicate posterolaterally as indicated in Haig's (1960) description.

**Distribution.**—Siuhuanteno Bay, Mexico to La Libertad, Ecuador; littoral to 8 m.


*Pachycheles chacaei* Haig, 1956:7, 9, pl. 1; 1960:134, 135, pl. 31: fig. 5; 1968:57, 68.


**Measurements.**—Males 2.1 × 2.2 to 3.7 × 4.1 mm; females 2.0 × 2.0 to 4.4 × 5.0 mm; ovigerous females 3.0 × 3.4 to 5.5 × 6.8 mm.

**Remarks.**—The single Pacific specimen examined had only four plates in the telson instead of five, the distal plates being fused. The Atlantic specimens were normal. The species is found under large stones and in coralline rubble on both sides of the isthmus.

**Distribution.**—In the eastern Pacific Ocean from Guatemala to Ecuador; in the Atlantic known only from the southwestern Caribbean off Panama and Colombia. Pacific, littoral to 8 m; Atlantic only in the littoral.


*Pachycheles cristobalensis* Gore, 1970:958, figs. 1, 2.


**Measurements.**—Males 2.3 × 2.4 to 3.3 × 3.9 mm; female 3.8 × 4.4 mm; ovigerous females 2.5 × 2.7 to 4.0 × 4.6 mm.

**Remarks.**—To our knowledge this diminutive species has not been collected outside a narrow area around the Atlantic entrance to the Panama Canal.
Distribution.—Known only from the type-locality, Limón Bay, and Galeta Island and the surrounding area, Atlantic side of Panama; littoral.

15. **Pachycheles panamensis** Faxon, 1893


Material Examined.—Panama City; 1 ♂; 17 Feb 1969.

Measurements.—5.4 X 5.6 mm.

Remarks.—The single specimen examined appeared typical for the species.

Distribution.—Tiburon Island, Gulf of California to Santa Elena Bay, Ecuador, and Isabel Island; littoral to 8 m.

16. **Pachycheles serratus** (Benedict, 1901)

*Pisosoma serrata* Benedict, 1901:135, pi. 3: fig. 7 [in part].


Measurements.—Males 2.0 X 2.0 to 4.8 X 5.0 mm; females 2.1 X 2.2 to 2.3 X 2.5 mm; ovigerous females 3.1 X 3.3 to 6.2 X 6.8 mm.

Remarks.—This species is by far the most common porcelainid at Galeta Island where it may be found in nearly every interstice and crevice of coralline rocks on the outer edge of the reef flat. It can be immediately distinguished in the field from a species similar in appearance, *Neopisosoma angustifrcons*, by its heavily furred chelipeds.

Distribution.—The range of this little porcelainid seems to be restricted to Puerto Rico, the Virgin Islands, and the Caribbean coast of Panama. Perhaps further collections in coralline intertidal areas will provide more recordings; littoral.

17. **Pachycheles susanae** Gore and Abele, 1974

*Pachycheles susanae* Gore and Abele, 1974:560, figs. 1, 5a.


Measurements.—Male 3.6 X 3.9 mm; female 1.7 X 1.9 mm; juveniles not measured.

Remarks.—This species was reported previously by Gore and Abele in 1974. It may be confused at first glance in the field with *Petrolisthes jugosus*, with which it shares similar red or red-orange coloration, and cryptic habitat, especially in thick clumps of the calcareous green algae *Halimeda*. *Pachycheles susanae*, however, possesses distinctive grooves and ridges on the manus of the chelipeds which are lacking in *P. jugosus*.

Distribution.—Known only from the type-locality, Galeta Island, on the Atlantic side of Panama; littoral.

18. **Pachycheles vicarius** Nobili, 1901

*Pachycheles vicarius* Nobili, 1901:19.—Haig, 1960:147, pl. 32: fig. 2; 1968:57, 69.—Gore and Abele, 1974:563.


Measurements.—3.9 X 4.4 mm.

Remarks.—This species is easily identified by distinct longitudinal ridges on the chelipeds. It shows some affinity with an Atlantic species, *P. susanae*, but differs from that species in several respects. Males of *Pachycheles vicarius* have pleopods that are lacking in the latter species.

Distribution.—Acajutla, El Salvador to Santa Elena Bay, Ecuador; shore to 8 m.

Genus *Petrolisthes* Stimpson, 1858

19. **Petrolisthes agassizii** Faxon, 1893


Measurements.—Males 3.1 X 3.0 to 6.6 X 7.0 mm; ovigerous females 3.5 X 4.0 to 6.0 X 6.9 mm.

Remarks.—In this species and also *Petrolisthes edwardsii*, a distinct red spot surrounded by a blue margin occurs on the propodus of maxillipeds 3. This spot remains quite noticeable even in preserved specimens.

Distribution.—Known from the southern end of the Gulf of California and various localities along...
the eastern Pacific coastline of Central America to Colombia; littoral to 4 m.

20. *Petrolisthes armatus* (Gibbes, 1850)

*Porcellana armata* Gibbes, 1850:190.  


**Measurements.**—Pacific. Males 2.6 × 2.4 to 13.2 × 13.0 mm; females 3.3 × 3.9 to 12.6 × 12.6 mm; ovigerous females 3.9 × 3.8 to 11.5 × 11.5 mm. Atlantic. Males 2.9 × 2.6 to 9.7 × 9.0 mm; females 2.8 × 2.6 to 7.2 × 7.0 mm; ovigerous females 4.0 × 3.9 to 8.0 × 7.6 mm.

**Remarks.**—This highly variable species is widespread on both sides of the Panamanian isthmus and is apparently able to tolerate conditions otherwise adverse to other species of porcelain crabs. Primarily a rocky intertidal species, it has been collected in muddy mangrove areas of the Pacific coast and in the rocky coralline intertidal zone at Galeta.

**Distribution.**—Widely distributed from the tropical western coast of Africa, the east central coast of Florida, the Gulf of Mexico and throughout the Caribbean as far south as Santa Catharina, Brazil; in the eastern Pacific from the Gulf of California, Mexico, to Peru. It has been known from the Pacific coast of Panama since 1859, well before construction of the Panama Canal; intertidal zone to a maximum of 20 m.

21. *Petrolisthes edwardsii* (Saussure, 1853)

*Porcellana edwardsii* Saussure, 1853:366, pi. 12: fig. 3.  

**Material Examined.**—Panama City; 1 ♀; 17 Feb 1969. Taboguilla Island; 3 dried specimens, 1 juvenile, 1 ♂; 17, 11 Apr and 12 Jul 1969. Perlas Islands; 3 ♂, 1 ♀, ovigerous; 12–13 Jun 1973.

**Measurements.**—Males 4.0 × 3.9 to 11.2 × 11.9 mm; female 5.0 × 4.6 mm; ovigerous female 9.2 × 9.6 mm.

**Remarks.**—There is a change in the length-width ratio of the carapace as the species matures, with young specimens to about 6 mm long being longer than wide, whereas those of about 9 mm carapace length are wider than long. This species exhibits a red spot surrounded by a blue margin on the outer surface of the maxilliped 3, similar to that seen in *P. agassizii* (q.v.).

**Distribution.**—Found from outer Baja and the upper Gulf of California, Mexico, to La Plata Island, Ecuador, and Isabel, Tres Marias, Revillagigedo, and the Galapagos Islands; littoral to 40 m.

22. *Petrolisthes galathinus* (Bosc, 1802)

*Porcellana galathina* Bosc, 1802:231–233, pl. 6: fig. 2.  
*Petrolisthes galathinus*—Haig, 1960:36, pl. 19: fig. 4; 1962:175.  


**Measurements.**—Males 3.0 × 2.8 to 11.0 × 10.0 mm; females 2.4 × 2.0 to 4.6 × 4.1 mm; ovigerous females 4.4 × 4.2 to 8.1 × 9.0 mm.

**Remarks.**—Some variation appears in the color pattern for this species, with juveniles not as noticeably striate or as deeply colored as adults. This material indicates that ovigerous females are present
from January to August in the southwestern Caribbean.

**Distribution.**—In the Atlantic from Cape Hatteras to Brazil, including Gulf of Mexico. Pacific distribution records come from the vicinity of the Panama Canal, and from Costa Rica and Ecuador; from shore to 54 m.

**23. Petrolisthes glasselli** Haig, 1957


**Material Examined.**—Taboguilla Island; 1 ♂, 2 ♀, ovigerous, 1 juvenile; 11 Apr and 12 Jul 1969.

**Measurements.**—Male 5.8 × 5.6 mm; 2 females, ovigerous 5.6 × 5.0 and 5.6 × 5.4 mm; juvenile 2.8 × 2.5 mm.

**Remarks.**—The specimens were typical.

**Distribution.**—Widely distributed in the tropical eastern Pacific from Gulf of California, Mexico, to Gorgona and Malpelo Islands, Colombia, and Tres Marias, Isabel, Revillagigedo, Galapagos, and Clipperton Islands offshore; shore to 8 m.

**24. Petrolisthes haigae** Chace, 1962


*Pisosoma jugosum.*—Haig, 1956:16.


**Measurements.**—Males 2.3 × 2.1 to 8.8 × 8.6 mm; females 2.6 × 2.2 to 8.9 × 8.7 mm; ovigerous females 3.2 × 3.0 to 8.0 × 8.4 mm.

**Remarks.**—Some variation was noted in the supraocular spinules on several specimens. One small male from Taboguilla Island had only a single spine on each side, a feature which might lead one to identify it with *Petrolisthes hirtispinosus* from the Gulf of California. This and other specimens similar to it, however, all possessed salient features of *P. haigae*. Apparently, variation along these lines is not uncommon in the species. Ovigerous females in the Bay of Panama occur from April through at least August.

**Distribution.**—Guaymas Bay, Gulf of California to Santa Elena Bay, Ecuador; Malpelo Island, Colombia, and offshore to Isabel, Tres Marias, Revillagigedo, Galapagos, Clipperton Islands; shore to 12 m.

**25. Petrolisthes jugosus** Streets, 1872

**Figure 4**


*Pisosoma jugosum.*—Haig, 1956:16.

**Material Examined.**—Galeta Island; 2 ♂, 3 ♀, 2 ovigerous; 12 Aug 1973.

**Measurements.**—Males 2.0 × 1.8 and 2.1 × 2.0 mm; female 2.4 × 2.4 mm; ovigerous females 2.8 × 2.8 to 2.9 × 2.9 mm.

**Remarks.**—The following color notes were taken on specimens collected from *Millepora* stinging coral at Galeta Island. Crab a deep red or brick red overall; white spots on each epibranchial area, and dorsally on the inner margin of the metabranchial region adjacent to the posteroventral delimitation of the cardiac region; a white stripe vertically along the epipera extending from the antenna to the anterior ventral margin; legs and abdomen mottled red and white. The bright red color of this small species holds in alcohol for at least one year. This same color makes the species readily distinguishable in the field from most other porcelaininds that inhabit coralline rocks and rubble.

**Distribution.**—The species is known from the southwestern Gulf of Mexico, the Antilles in the eastern Caribbean, Trinidad, Tobago, and some islands along the northern coast of South America, westward to Panama. In addition, we have seen specimens collected by Mr. Jacques Von Monfrans of Florida Atlantic University, from phragmatopomid worm reefs at Boca Raton, Palm Beach County, Florida; littoral.

**26. Petrolisthes lindae** Gore and Abele, 1974

*Petrolisthes lindae* Gore and Abele, 1974:564, figs. 2,3o,c.

**Material Examined.**—Twenty-seven specimens (17 males, 10 females, 8 ovigerous) constituting our original material were reported previously (Gore and Abele, 1974). The following material was dis-
covered after the original description of the species had been published: Pacific side, east bank of Panama Canal; 1 ♂; 27 Oct 1968. Pedro Miguel locks; Panama Canal; 1 ♀; 3 Feb 1969.

MEASUREMENTS.—Male 5.8 × 5.6 mm; female 2.8 × 3.0 mm.

REMARKS.—The male specimen, lacking all but two pereiopods, but with both chelipeds intact, showed features similar to *P. robsonae* in the spination on the outer ventral margin of the chelipeds, and in possession of two vestigial epibranchial spines. The outer orbital angle, however, was rounded, not acute, the cheliped merus had one spine plus a lobe with a small spinule, the carpus length-width ratio was 2.5, and the two pereiopods present were unarmed, all features indicative of *P. lindae*. The specimen thus seems to be another example of those individuals noted in the original description suggesting that *P. lindae* may be a result of hybridization between either *P. robsonae* or *P. nobilii*, and *P. armatus*. Notes on the female specimen indicated that it was a molted carapace from a very small specimen, obviously a juvenile, possessing no epibranchial spine, and having a deflexed tridentate front. Unfortunately, in the process of shipping the specimen to Florida from Panama it was severely damaged and now consists only of bits and pieces.

DISTRIBUTION.—Known at present only from the vicinity of the Pacific entrance to the Panama Canal; onshore.

**27. Petrolistes nobilii** Haig, 1960

*Petrolistes nobilii* Haig, 1960:25, 55, pl. 1, 18; fig. 3; 1968:57, 62.—Gore and Abele, 1974:567, 568.

MATERIAL EXAMINED.—Punta Paitilla; 2 ♀ ovi-gerous; 9 Jul 1967 and 27 Nov 1968. Taboga Is-
Petrolisthes armatus, although the female carapace was much expanded posteriorly and the chelipeds had a tuft of setae on the outer ventral margin (both features characteristic of *P. nobilii*), this specimen had distinct epibranchial spines. The male also had distinct epibranchial spines, and a carapace only slightly expanded posteriorly; unfortunately the chelipeds were missing. Consequently, both these specimens are placed in this taxon with some hesitation.

**Distribution.**—From Cabeza Bellena, Gulf of California to Santa Elena Bay, Ecuador, and Isabel Island; intertidal zone.

### 28. *Petrolisthes platymerus* Haig, 1960


**Material Examined.**—Punta Paitilla; 1 ♂; 7 Jul 1969.

**Measurements.**—3.8 × 3.6 mm.

**Remarks.**—A male and female of this species, collected at Punta Paitilla in December, 1968 were reported previously by Gore (1972). The species was considered uncommon, and only 18 specimens had been previously collected from the eastern Pacific. We subsequently found the species, however, to be common in the extreme lower intertidal under large boulders at Punta Paitilla and Venado Beach.

**Distribution.**—The range of this little species seems to be restricted in the eastern Pacific from Port Parker, and the Gulf of Nicoya, Costa Rica, to the Bay of Panama. As Haig (1968:66) points out, its small size, as well as its cryptic habit and heavy pilosity may well cause it to be overlooked by collectors; intertidal zone.

### 29. *Petrolisthes polymitus* Glassell, 1937


**Material Examined.**—Taboguilla Island; 1 ♂, 2 ♀, ovigerous; 11 Apr 1969. Perlas Islands; 1 ♀, ovigerous; 12–13 Jun 1974.

**Measurements.**—Male 3.9 × 4.0 mm; ovigerous females 3.5 × 3.2 to 4.6 × 4.8 mm.

**Remarks.**—The specimens examined appeared typical for the species and fit the description provided by Haig (1960) very well. Ovigerous females have been reported in February and March from Costa Rica and in November and December from Mexico. The Panamanian records suggest that the species may breed year round in the eastern Pacific.

**Distribution.**—Gulf of California to La Libertad, Ecuador, Tres Marias and Galapagos Islands; shore to 8 m.

### 30. *Petrolisthes robsonae* Glassell, 1945

*Petrolisthes robsonae* Glassell, 1945:227, fig. 5.—Haig, 1957:10; 1960:57, pl. 18: fig. 2; 1968:65.—Gore and Abele, 1974:567, fig. 3c.

**Material Examined.**—Mirafloros Locks, Panama Canal; 5 ♀, ovigerous; 17 Jan 1972 (M. L. Jones).

**Measurements.**—4.9 × 4.8 to 5.5 × 5.4 mm.

**Remarks.**—It is quite interesting that despite our collecting in the mouth of the Panama Canal and areas of low salinity adjacent to it our only specimens come from the Mirafloros Locks. Haig (1960) also reported a single female from the lower chamber of Gatun Locks on the Atlantic coast of Panama. The species may thus occur only in areas of large fluctuations in salinity. Unfortunately, no detailed data are available on the specimens known from other localities.

**Distribution.**—Mexico, El Salvador, Panama, and Guayaquil, Ecuador; intertidal zone.

### 31. *Petrolisthes tridentatus* Stimpson, 1859


**Material Examined.**—Punta Paitilla; 2 ♂, 5 ♀, ovigerous; 7 Jul 1969. Taboga Island; 1 ♂, 1 ♀, ovigerous; 27 Nov 1968, 14, 15 Apr, and 7 Jul 1969. Isle Chepillo; 1 ♂, 1 ♀, ovigerous; 16 Apr 1969. Panama Canal entrance, Pacific side; 1 ♂, 1 ♀, ovigerous; 26 May 1969.
MEASUREMENTS.—Males 4.5 × 4.6 to 5.7 × 5.8 mm; female 4.3 × 4.5 mm; ovigerous females 3.5 × 3.7 to 6.6 × 6.6 mm.

REMARKS.—In many of the specimens the carapace appeared distinctly quadrature, a feature which might lead to misidentification with Petrolisthes galapagensis were not the front region triangular in that species, instead of being distinctly trilobate as it is in this one. Ovigerous females are known from November through July in the Bay of Panama and it is likely that the species breeds the entire year.

DISTRIBUTION.—Although the species is widely distributed from the Bahamas to Venezuela in the Caribbean and has also been recorded from Atlantic Panama (Haig, 1956), no Atlantic specimens were collected or examined. In the eastern Pacific the species is found from San Juan del Sur, Nicaragua, to Puna Island, Ecuador; littoral.

32. Petrolisthes zacae Haig, 1968


MEASUREMENTS.—Males 2.6 × 2.4 to 9.1 × 8.7 mm; females 3.4 × 3.0 to 6.6 × 6.0 mm; ovigerous females 4.6 × 4.2 to 8.6 × 7.6 mm.

REMARKS.—This species can be found on high, exposed, muddy banks in brackish mangrove swamps on the Pacific side, where it inhabits burrows and depressions in the mud. Among the material examined are 14 specimens with two rather than three carpal spines and one specimen with four carpal spines. In all other features, however, they are typical specimens of P. Zaca.

DISTRIBUTION.—Previously known in the eastern Pacific only from the type-locality, Ballenas Bay, Costa Rica. Specimens reported by Abele (1972) include those noted herein and ovigerous females collected concurrently and reported on in another paper by Gore (1975) These are the first records for Pacific Panama; intertidal zone.

Genus Pisidia Leach, 1820

33. Pisidia magdalenensis (Glassell, 1936)

Porcellana magdalenensis Glassell, 1936:295.


MEASUREMENTS.—Males 2.4 × 2.4 to 3.8 × 3.9 mm; ovigerous females 3.2 × 3.2 to 4.8 × 5.1 mm.

REMARKS.—Ovigerous females that mature at about 3 mm carapace length, are known in the Bay of Panama from January through October. The specimens from Taboguilla Island in January 1973 were reported associated with holothurians, according to field notes in the jar. Although the species is not known to be commensal it has been collected among hydroids as well.

DISTRIBUTION.—Santa Maria Bay, outer Baja California, Petatlan Bay, Mexico, south to the area of Tumbes, Peru; from the intertidal zone to 76 m.

Pisidia species

MATERIAL EXAMINED.—Panama City; 2 ♂, 2 ♀, 1 ovigerous; 17 Feb 1969. Taboguilla Island; 1 ♂; 12 Jul 1969.

MEASUREMENTS.—Males 2.5 × 2.0 to 3.0 × 3.2 mm; female 3.1 × 3.3 mm; ovigerous female 3.1 × 3.0 mm.

REMARKS.—All the specimens have lost chelipeds and pereiopods thus making positive identification uncertain. They agree, however, in all other respects with Pisidia magdalenensis.

DISTRIBUTION.—As with P. magdalenensis, if that species.

Genus Porcellana Lamarck, 1801

34. Porcellana cancricocialis Glassell, 1936


Measurements.—Males 2.5 X 2.1 to 9.3 X 8.0 mm; females 2.8 X 2.6 to 4.9 X 4.3 mm; ovigerous females 4.0 X 3.8 to 8.6 X 7.6 mm.

Remarks.—The female from Aguadulce, although not noted in material examined above as being ovigerous, had just produced larvae when preserved. All other specimens agreed well with descriptive notes provided by Haig (1960). The majority of the specimens from Golfo de Chiman were noted as commensals with hermit crabs of the genera Dardanus and Petrochirus.

Distribution.—Now known from San Juanico Bay, outer Baja California, and Punta Penasco, Gulf of California southward along the eastern tropical Pacific coast to the area of Tumbes, Peru; offshore to Isabel Island. It is found from shore to 108 m.

35. Porcellana corbicola Haig, 1960

Porcellana corbicola Haig, 1960:197, 205, pl. 15.

Material Examined.—Taboguilla Island; 1 $, 1 $, ovigerous; 19 Feb 1975.

Measurements.—2.4 X 1.8 and 2.8 X 2.4 mm, respectively.

Remarks.—To our knowledge this material constitutes only the second and third known specimens of this species which was described from a unique ovigerous female holotype. Our material agrees well with the description and illustration provided by Haig (1960). The two specimens examined had either one or no spinules of the distal ventral margin of the propodus of the walking legs; the dactyls, as noted by Haig, are without armature of any kind.

Porcellana corbicola occurs on the ahermatypic coral Phyllangia dispersa where it appears to mimic the polyps. Field notes shared by Dr. Peter Glynn state that the crab has the same ground color as the polyps and possesses green splotches on the anterior portion of the carapace which correspond to the green beads seen on the tentacles of the coral.

Distribution.—Our material extends the known range from Rocos Consag, Gulf of California, to Taboguilla Island, Panama, a distance of 3800 kms; intertidal zone to 50 m.

36. Porcellana hancocki Glassell, 1938


Material Examined.—Saboga Island; 1 $; 12 Dec 1970.

Measurements.—6.6 X 5.7 mm.

Remarks.—Previously restricted to the Gulf of California, this species may be yet another extra-limital form that apparently reaches the Bay of Panama on occasion.

Distribution.—Gulf of California, Mexico, to area of Chiclayo, Peru; from shore to 80 m.

37. Porcellana paguriconviva Glassell, 1936


Material Examined.—Pacific coast, Panama; 2 $, 1 ovigerous; 29 Oct 1967.

Measurements.—5.1 X 4.7 mm and 6.1 X 5.7 mm (ovigerous).

Remarks.—Previously restricted to the Gulf of California, this species may be yet another extra-limital form that apparently reaches the Bay of Panama on occasion.

Distribution.—From Bahia Magdelena, outer Baja California, Punta Peñasco, Gulf of California to Taboga and Taboguilla Islands, Bay of Panama; shore to 100 m.

Genus Ulloaia Glassell, 1938

38. Ulloaia perpusillia Glassell, 1938

Ulloaia perpusillia Glassell, 1938:484, pl. 33: fig. 1.—Haig, 1960:250, fig. 11, pl. 37: fig. 2; 1962:191.

Material Examined.—Perlas Islands; 2 $, 2 $, ovigerous; 12–15 Jun 1978.

Measurements.—Males 2.0 X 1.6 to 2.2 X 2.0 mm; ovigerous females 2.5 X 2.2 to 2.7 X 2.1 mm.

Remarks.—In these specimens the frontal region
is definitely visible in dorsal view, and the dorsal carapace ridge is broken into two or three more or less distinct lobes. The general appearance of the carapace is much smoother than that illustrated by Glassell (1938). Haig (1962) also noted some variability in the rostrum of specimens she examined. The four individuals reported herein of this extremely small and rare species brings the total known from the eastern Pacific to nine specimens. However, this very small species may not be as rare as the paucity of material would indicate, since recent collections show that it may be found among the calices of the branching coral, *Pocillopora damicornis*, to which it bears a close resemblance.

**Distribution.**—Gulf of California to Perlas Islands, Bay of Panama; shore to 16 m.

**Discussion**

Despite the many stations sampled during this study, we must emphasize that our knowledge of Panamanian porcellanid crabs and, indeed, the Panamanian biota in general is far from complete. As can be easily seen in Figure 1, most of the coastline in Pacific Panama remains to be sampled. For example, on the Pacific coast we have collections from a single habitat and only one locality in the entire Gulf of Chiriqui. There are no collections from the Gulf of Montijo, and only two from all of the Darien coast. The area around Panama City and the Pacific entrance to the Panama Canal, however, has been well collected. Additional collections are also available from the nearby offshore islands of Taboga, Taboguilla, and the Perlas Archipelago in the Bay of Panama. As might be expected, logistical problems are a major consideration in Panama, thus accounting in part for the sampling bias toward populated or easily reached areas in the country.

A similar situation prevails on the Caribbean coastline. Again, we have collections from the Atlantic entrance to the Panama Canal and the nearby vicinity extending to the town of Portobelo. On the other hand, the coastline of Bocas del Toro, the Gulf of Mosquitoes, and the San Blas Archipelago have not, as yet, been adequately investigated. This is unfortunate since several major habitats occur in these regions, among them rocky outcroppings in Bocas del Toro and deep living coral reefs in the San Blas Islands. Both are attractive habitats for porcelain crabs.

Despite these obvious limitations our collections have increased the known porcellanid crab fauna of Panama by about 20% and added three new species. Yet, we were working with a faunal component that is typically restricted to shallow waters inshore where collecting is often easier than in deeper water or in more cryptic decapod faunas such as the Alpheidae or some genera of the Xanthidae. It is entirely possible that additional new species will be discovered in the smaller members of the fauna (e.g., 2-3 mm carapace width) and commensal species on the coral reefs of the areas on both coasts of Panama.

It is our hope that the data of this report will sufficiently encourage other students to continue explorations in Panama, especially in the vast stretches of as yet unsampled coastline on either shore. In our opinion, it is imperative that such explorations be carried out not only for the Porcellanidae, but also for all groups of marine organisms occurring in Panama. This country is in a region that appears ready to undergo far-reaching and permanent alterations (urban growth, industrialization, and possibly a sea-level canal) before the end of this century.
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A few points of style: (1) Do not use periods after such abbreviations as “mm, ft, yds, USNM, NNE, AM, BC.” (2) Use hyphens in spelled-out fractions: “two-thirds.” (3) Spell out numbers “one” through “nine” in expository text, but use numerals in all other cases if possible. (4) Use the metric system of measurement, where possible, instead of the English system. (5) Use the decimal system, where possible, in place of fractions. (6) Use day/month/year sequence for dates: “9 April 1976.” (7) For months in tabular listings or data sections, use three-letter abbreviations with no periods: “Jan, Mar, Jun,” etc.

Arrange and paginate sequentially EVERY sheet of manuscript—including ALL front matter and ALL legends, etc., at the back of the text—in the following order: (1) title page, (2) abstract, (3) table of contents, (4) foreword and/or preface, (5) text, (6) appendices, (7) notes, (8) glossary, (9) bibliography, (10) index, (11) legends.