

Porcellanid Crabs from the  
Coasts of Mexico and  
Central America  
(Crustacea: Decapoda: Anomura)

ROBERT H. GORE

SMITHSONIAN CONTRIBUTIONS TO ZOOLOGY • NUMBER 363

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## ABSTRACT

Gore, Robert H. Porcellanid Crabs from the Coasts of Mexico and Central America (Crustacea: Decapoda: Anomura). *Smithsonian Contributions to Zoology*, number 363, 34 pages, 2 figures, 1982.—Collections made by members of the Smithsonian Institution scientific staff and collaborating investigators from other institutions produced 2029 specimens of porcellanid crabs over a nine-year period from November 1966 to January 1976. Specimens were obtained along the Pacific coastline from Sonora, Mexico to the Republic of Panama, including offshore islands in the Bay of Panama. Other specimens were collected at onshore and island sites along the Caribbean coastline of Panama, as well as in the locks at both ends of the Panama Canal. Specimens belonging to 50 species of seven genera were obtained, and several interesting range extensions or records were noted for the Republic of Panama and the Pacific coast of Mexico. The present collections, added to data obtained earlier, show that the waters in and adjacent to the Republic of Panama support 64 species in 12 genera; 24 species (including five or six trans-Panamanian conspecifics) occur in Caribbean waters, and 45 are found on the Pacific side of the isthmus. The Panamanian porcellanids thus comprise nearly 70% of all the species in this family recorded from both the eastern Pacific and Caribbean faunal provinces.

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# Contents

	<i>Page</i>
Introduction .....	1
Acknowledgments .....	2
Methodology .....	2
Expeditionary Results .....	4
Family PORCELLANIDAE Haworth, 1825 .....	4
Genus <i>Clastotoechus</i> Haig, 1960 .....	4
<i>Clastotoechus diffractus</i> (Haig, 1957) .....	4
Genus <i>Megalobrachium</i> Stimpson, 1858 .....	5
<i>Megalobrachium erosum</i> (Glassell, 1936) .....	5
<i>Megalobrachium festae</i> (Nobili, 1901) .....	6
<i>Megalobrachium mortenseni</i> Haig, 1962 .....	6
<i>Megalobrachium pacificum</i> Gore and Abele, 1974 .....	6
<i>Megalobrachium poeyi</i> (Guérin-Méneville, 1855) .....	6
<i>Megalobrachium roseum</i> (Rathbun, 1900) .....	7
<i>Megalobrachium tuberculipes</i> (Lockington, 1878) .....	7
Genus <i>Pachycheles</i> Stimpson, 1858 .....	7
<i>Pachycheles ackleianus</i> A. Milne-Edwards, 1880 .....	7
<i>Pachycheles biocellatus</i> (Lockington, 1878) .....	7
<i>Pachycheles calculosus</i> Haig, 1960 .....	8
<i>Pachycheles chacei</i> Haig, 1956 .....	8
<i>Pachycheles crassus</i> (A. Milne-Edwards, 1869) .....	8
<i>Pachycheles cristobalensis</i> Gore, 1970 .....	8
<i>Pachycheles panamensis</i> Faxon, 1893 .....	9
<i>Pachycheles serratus</i> (Benedict, 1901) .....	9
<i>Pachycheles spinidactylus</i> Haig, 1957 .....	9
<i>Pachycheles susanae</i> Gore and Abele, 1974 .....	10
<i>Pachycheles trichotus</i> Haig, 1960 .....	10
Genus <i>Petrolisthes</i> Stimpson, 1858 .....	10
<i>Petrolisthes agassizii</i> Faxon, 1893 .....	10
<i>Petrolisthes armatus</i> (Gibbes, 1850) .....	11
<i>Petrolisthes artifrons</i> Haig, 1960 .....	12
<i>Petrolisthes edwardsii</i> (Saussure, 1853) .....	12
<i>Petrolisthes galapagensis?</i> Haig, 1960 .....	13
<i>Petrolisthes galathinus</i> (Bosc, 1802) .....	13
<i>Petrolisthes haigae</i> Chace, 1962 .....	14
<i>Petrolisthes hians</i> Nobili, 1901 .....	14
<i>Petrolisthes hirtipes</i> Lockington, 1878 .....	15
<i>Petrolisthes holotrichus</i> Nobili, 1901 .....	15
<i>Petrolisthes jugosus</i> Streets, 1872 .....	15
<i>Petrolisthes lewisi austrinus</i> Haig, 1960 .....	15

<i>Petrolisthes lewisi lewisi</i> (Glassell, 1936) .....	16
<i>Petrolisthes lindae</i> Gore and Abele, 1974 .....	16
<i>Petrolisthes magdalenensis</i> Werding, 1978 .....	16
<i>Petrolisthes marginatus</i> Stimpson, 1859 .....	17
<i>Petrolisthes nobilii</i> Haig, 1960 .....	17
<i>Petrolisthes ortmanni</i> Nobili, 1901 .....	18
<i>Petrolisthes platymerus</i> Haig, 1960 .....	18
<i>Petrolisthes polymitus</i> Glassell, 1937 .....	18
<i>Petrolisthes robsonae</i> Glassell, 1945 .....	19
<i>Petrolisthes rosariensis</i> Werding, 1978 .....	19
<i>Petrolisthes sanfelipensis</i> Glassell, 1936 .....	20
<i>Petrolisthes tonsorius</i> Haig, 1960 .....	20
<i>Petrolisthes tridentatus</i> Stimpson, 1859 .....	20
<i>Petrolisthes zacae</i> Haig, 1968 .....	21
Genus <i>Pisidia</i> Leach, 1820 .....	21
<i>Pisidia magdalenensis</i> (Glassell, 1936) .....	21
Genus <i>Polyonyx</i> Stimpson, 1858 .....	21
<i>Polyonyx confinis</i> Haig, 1960 .....	21
Genus <i>Porcellana</i> Lamarck, 1801 .....	21
<i>Porcellana cancrisocialis</i> Glassell, 1936 .....	21
<i>Porcellana paguriconviva</i> Glassell, 1936 .....	22
<i>Porcellana sayana?</i> (Leach, 1820) .....	22
Discussion .....	22
Appendix: Station List .....	24
Literature Cited .....	32

# Porcellanid Crabs from the Coasts of Mexico and Central America (Crustacea: Decapoda: Anomura)

*Robert H. Gore*

## **Introduction**

The family Porcellanidae is comprised of at least 230 species in 26 genera (Haig, in litt.), with well over half the genera and species recorded from tropical and temperate waters of the Western Hemisphere. Primarily a family of shallow water forms, porcellanid crabs occupy a variety of habitats ranging from fresh or nearly fresh waters (in canal locks), to muddy burrows in mangrove swamps, and in brackish and estuarine waters, to more stenohaline habitats on wave-exposed rocky shores or within the crevices and interstices of sabellariid worm, or coralline reefs (Haig, 1960; Gore and Abele, 1976; Gore et al., 1976; Abele, 1979). Several species are commensal with other invertebrates, while others exhibit at least a generalized symbiotic association with colonial or social sessile marine invertebrates.

During the approximately nine years from November 1966 to January 1976 members of the Smithsonian Institution scientific staff, along with collaborating investigators from other institutions, made a series of collecting expeditions along the Pacific coast of Central America from Sonora, Mexico to the Republic of Panama in-

cluding some offshore islands in the Bay of Panama, at selected onshore and island sites on the Caribbean coast, and within the locks of the Panama Canal. A large series of porcellanid crabs was collected from regions often little explored in regard to this fauna. This paper reports on 2029 specimens that fall into seven genera and 50 species. Most of the large number of specimens proved to be common forms, and although no new species were discovered in the collected material, data from the samples allow a reassessment of the identity of a species previously thought to represent a range extension from Africa (Gore, 1974). In addition, several interesting new records and range extensions were noted for taxa on both the Pacific and Atlantic coasts.

As a perusal of the collecting data shows, the Porcellanidae of this report are overwhelmingly from shallow water, and predominantly littoral, but some species are restricted to sublittoral waters, though no specimens were collected beyond SCUBA depth. The members of this widely dispersed and easily collected group of crabs presently have no economic importance except perhaps in the aquarium trade or as fishing bait. They do, however, have acknowledged ecological importance and they hold a major trophic position in several decapod crustacean assemblages

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*Robert H. Gore, 66-1 Drexelbrook Drive, Drexel Hill, Pennsylvania 19026.*

because they are primarily filter feeders (Gore et al., 1976; Reed et al., 1982). Among decapod crustaceans, they thus share this nutritional mode with only a few shrimp species in the littoral and shallow sublittoral region.

**ACKNOWLEDGMENTS.**—I thank Dr. Raymond B. Manning and Mr. C. Allan Child, National Museum of Natural History (NMNH), Smithsonian Institution, Washington, D.C. for placing the collections at my disposal, providing much additional data concerning the expeditions, and for their patience in waiting while I labored too long on the material. Raymond Manning, Clyde F.E. Roper (NMNH), Austin B. Williams (National Marine Fisheries Service), and Janet Haig (Allan Hancock Foundation, University of Southern California at Los Angeles) critically read earlier drafts of the manuscript or discussed several taxonomic problems with me, providing valuable insights on the species being considered. Liberta E. Scotto and Cindy L. VanDover made some of the measurements on the material and generally kept my laboratory notes in order.

### Methodology

Taxa are listed alphabetically by genus and species. Each specimen examined for this report was measured and its sex was determined. A series of 99 specimens in the genus *Petrolisthes* either lacked pereopods and/or chelae, were damaged, or were too immature to be positively identified to species. In many cases, with only carapaces present, assignment was tentatively made only to species groups exhibiting similar morphology, such as *Petrolisthes armatus-robsonae-lindae*, or *Petrolisthes tridentatus-lewisi austrinus*. These specimens are not considered further in this report except as part of the overall totals for the taxa.

Stations are listed by country, state or province, and specific location, followed by the appropriate station number. Location names are given as they appear in the collector's field notes. Any additional stations occupied in the same vicinity are then listed only by number, without repeating

locale. With the exception of some made on the Caribbean coast of Panama, all the collections were made along the Pacific coast of Mexico and Central America (Figure 1). Unless otherwise specified (i.e., PANAMA, Atlantic), all other stations from that country were located on the Pacific coast. Complete station data are given in the Appendix, and include all the pertinent information copied verbatim from field notebooks maintained by the field party chiefs of the various expeditions.

Measurements are the maximum carapace length followed by carapace width (cl × cw) in mm, obtained either by stage micrometer with a dissecting stereomicroscope, or with dial calipers, from the smallest and largest specimens; the same measurements were taken for the smallest ovigerous female in a taxon. All available data on breeding have been gathered for the various species and are included under the subheading "Ovigerous Females." In the following paragraph stations are listed according to the month in which they were occupied and in order of their location from north to south. When used in conjunction with the data on ovigerous females this list should facilitate a comparison of breeding seasons among the species. No stations were occupied in February, September, and October.

**STATIONS.**—*January*: Panama: 1523, 1521, 1524, 1525, Uva, LGA 69-14, Biffar and Abele (presumed Panama). *March*: Panama (Atlantic): 81, 1687, Meek and Hild. (presumed Panama). *April*: Panama: 20, 1607, 23, 86, 88, 132, 85, 134, 1531, 1604, 1605, 29, 46, 22, 28, 26, 82, 131, 25, 84, 129, 92, 133, 130, 150, 32, 33, 26, LGA 69-70; Panama (Atlantic): 93, 135, 94, 136, 8, Portobelo, 145, 10, 147, 14, 144, 11. *May*: Panama: 37, 38, 39, 40, 42. *June*: El Salvador: 1466; Honduras: 1468; Costa Rica: 1478; Panama: 1483. *July*: Mexico: 1548, 1551, 1554, 1555, 1557, 1558, 1559; El Salvador: 1295; Panama: 1496, 1499. *August*: Mexico: 1235; El Salvador: 1564; Nicaragua: 1565; Costa Rica: 1566, 1567; Panama: 1711, 1718, 1720, 1324. *November*: Panama: 2001, 108, 2002, 54, 111, 56, 113, 50, 105, 106, 2003, 52, 53, 107, 58, 166, 110,



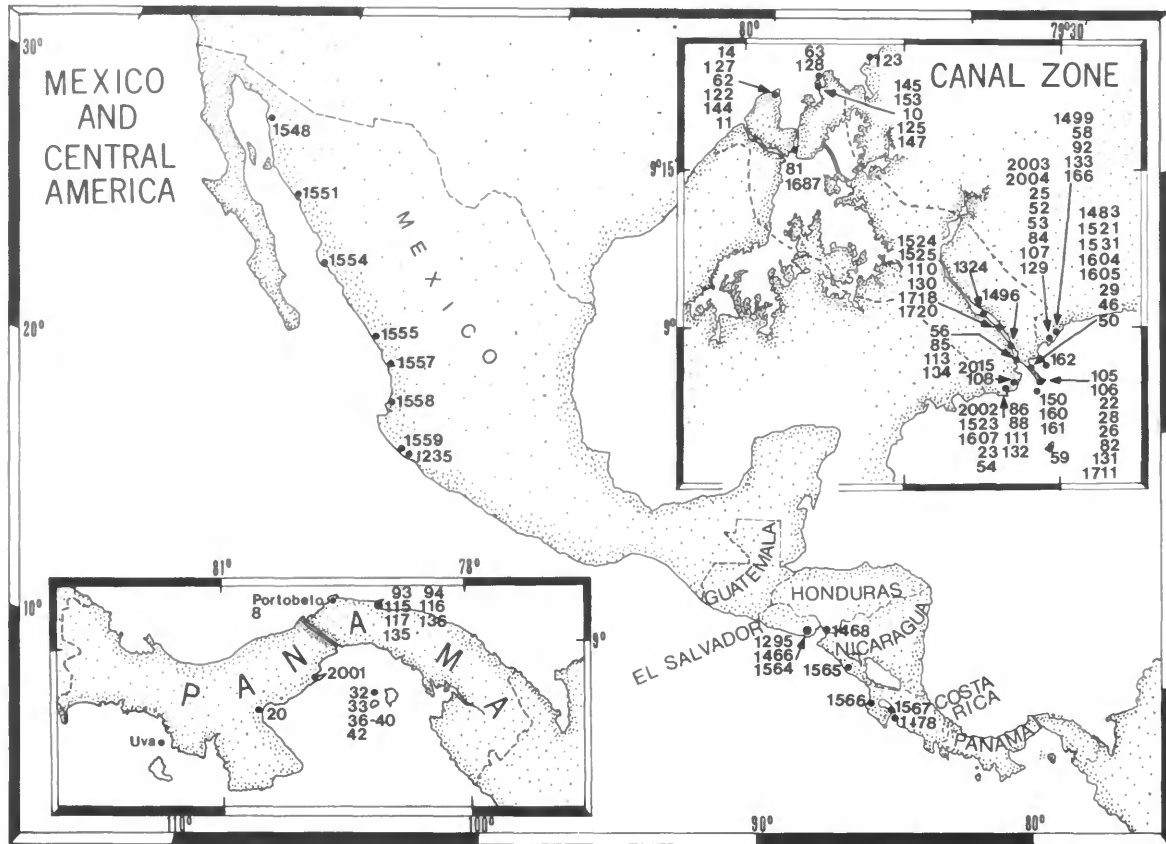


FIGURE 1.—Map of the Central American countries showing location of most stations. For more detailed descriptions of locations, see Appendix.

59, 160, 161, 162; Panama (Atlantic); 115, 117, 116, 123, 63, 126, 153, 125, 127, 62, 122. *December*: Panama: 2015, 2004, LGA 68-30. *Date and Location Unknown*: Fox Bay, LGA 1969.

Under the subheading "Distribution" appear the geographical ranges. Unless a range extension is noted, all geographical distributions are generalized only to country, because precise zoogeographical boundaries remain in a continual state of flux, and the presence or absence of a particular species at a specific locality may only indicate the maximum range obtained by some individuals of that species, and not be necessarily indicative of a breeding colony. The reader may refer to the monographs by Haig (1956, 1960), or papers by

Haig (1962), Haig et al. (1970), Gore (1970, 1974), Gore and Abele (1974, 1976), Rickner (1975), and Werding (1977, 1978b) for details on the general localities noted herein.

For complete synonymies the reader is also directed to Haig's studies and the subsequent updates on Caribbean and eastern Pacific species. Other references that either were not listed in, or have appeared since, the systematic publications by Haig, Gore, and by Gore and Abele, are added under the appropriate species account.

The collections have been returned to the National Museum of Natural History, Washington, D.C. Selected specimens of rare or unusual

species have been given USNM catalog numbers and are listed under their respective accounts.

### Expeditionary Results

The majority of the 116 stations occupied during this study were located in Panama. Collections were concentrated there during April and November and in Mexico in July; the greatest percentage of collections from El Salvador, Nicaragua, and Costa Rica were made in August. The bias toward Panama is a result, of course, of the location of facilities of the Smithsonian Tropical Research Institute at Naos Island, on the Pacific side, or Galeta Island on the Atlantic side of the isthmus. Of the 91 Panamanian stations, 23 (25%) were on the Atlantic coast. A total of 15 of the 68 eastern Pacific stations (16% of the Panamanian stations) were sampled offshore, either by trawling from research vessels, or by hand-collecting on several islands located in the Bay of Panama. Within the locks of the Panama Canal, seven stations (8% of the Panamanian stations) were either in Miraflores or Pedro Miguel Locks on the Pacific side, and two (ca. 2%) were within Gatun Locks on the Atlantic side. The 91 Panamanian stations thus comprised 78% of the 116 stations occupied in Mexico and Central America. As a consequence of this focus, several species are recorded in Panama for the first time, or questionable records are confirmed for the country. Such occurrences are noted in the following systematic account. Though other Central American countries are not well represented, data collected there are not without value, and several range extensions or occurrences of species supplement the meager data presently available on the Porcellanidae of these areas. In addition, morphological anomalies and variation in several species came to light, thus adding to systematic knowledge of the taxa. Furthermore, while it may seem that much is known about the species treated here, knowledge of aspects such as larval development is woefully inadequate at present. Of the seven genera and 50 species listed, larval development is known for only eight species

in three genera. There is thus ample room for more studies on these small, abundant, easily collected crabs, which are also easily maintained in the laboratory.

In addition, few studies have considered the ecological aspects of the Porcellanidae in decapod crustacean communities (see Gore et al., 1976; Abele, 1979; Reed et al., 1982). In view of the abundances implied from the collections reported here, such studies could prove productive. In the three studies cited, for example, porcellanid crabs ranked either first or quite highly in relative abundance to other decapod crustaceans. Species-interactions with other decapod crustaceans as well as competition among the members within the family Porcellanidae could have important ramifications for such communities.

### Family PORCELLANIDAE Haworth, 1825

#### Genus *Clastotoechus* Haig, 1960

#### *Clastotoechus diffractus* (Haig, 1957)

**MATERIAL EXAMINED.**—MEXICO, *Jalisco*, Bahía Cuastecomate (sta 1559), 4♂, 1♀; USNM 184903.

**MEASUREMENTS.**— $2.3 \times 2.1$  to  $4.1 \times 4.5$  mm.

**REMARKS.**—Janet Haig informed me (in litt.) that she and Bernd Werding will describe another eastern Pacific species of the genus *Clastotoechus*, which was collected in Isla Gorgona, Colombia, and is quite closely related to this species. This will bring to four the number of species in this small genus, the other two occurring in the Caribbean Sea. The specimens noted above from Mexico differed from Haig's descriptions (1957a, 1960) in having more noticeably granulate chelipeds, the meral teeth of which were acutely rather than broadly triangular. In two of the males the outer ventral margin of the manus carried a distinct brush of hairs, a sexually dimorphic character previously thought to be restricted to females of the species.

**OVIGEROUS FEMALES.**—October, January, and February (Haig 1960; Gore and Abele 1976).

DISTRIBUTION.—Gulf of California to Panama; littoral.

Genus *Megalobrachium* Stimpson, 1858

*Megalobrachium erosum* (Glassell, 1936)

FIGURE 2

MATERIAL EXAMINED.—PANAMA, E of Venado Island (sta 54), 1♀ ovigerous, USNM 189210; Bay of Panama, Perlas Islands, Isla Pajaros (sta 42), 1♀, USNM 184904.

MEASUREMENTS.— $3.2 \times 3.8$  to  $3.8 \times 4.2$  mm.

REMARKS.—This species is easily recognized by the greatly eroded appearance of the carapace and the heavily granulate and eroded chelipeds. The carapace width in the two specimens examined noticeably exceeds the carapace length, and thus is not “about as broad as long” (Haig, 1962). The cheliped carpal tooth is only little developed, and an irregular row of smaller teeth runs along the anterior margin of the carpus.

OVIGEROUS FEMALE.—The Venado Island specimen obtained in November 1971 is the first and

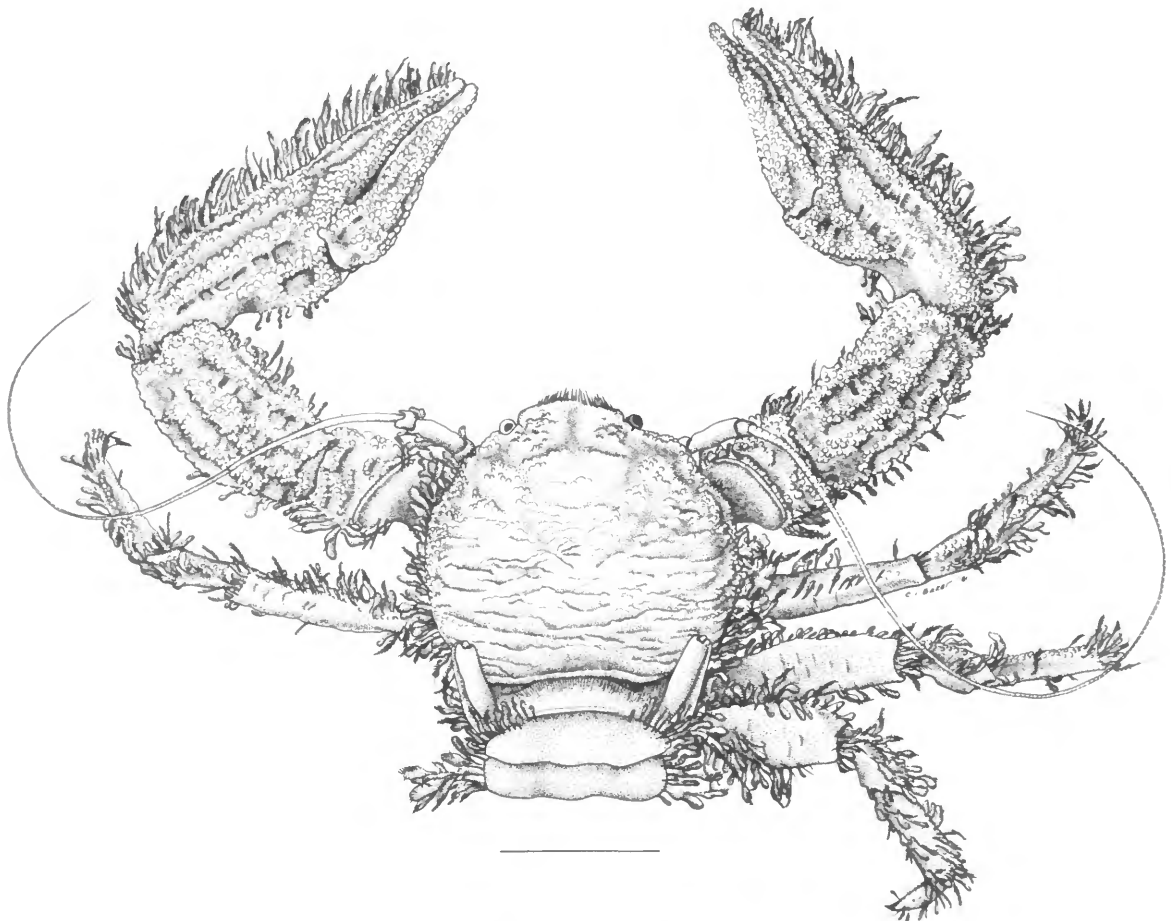


FIGURE 2.—*Megalobrachium erosum* (Glassell, 1936): ovigerous female, sta 54, PANAMA, E of Venado Island, 4 November 1971; USNM 189210. Scale line equals 2 mm.

to this point the only ovigerous female to be collected.

**DISTRIBUTION.**—Gore and Abele (1976) considered previous Panamanian records to be extralimital. The specimens examined above suggest otherwise, and the range now extends from Baja and the Gulf of California to Panama; littoral.

***Megalobrachium festae* (Nobili, 1901)**

*Porcellanides festae* Nobili, 1901:21.

*Megalobrachium festai.*—Haig, 1957b:15; 1960:213, 226, pl 16: fig. 10; pl 40: fig. 3; 1968:57, 72.—Gore and Abele, 1976:15 [key].

**MATERIAL EXAMINED.**—PANAMA, *Fort Amador*, Culebra Island (sta 28-2), 1♀, USNM 184906; *Panama City*, Panama Reef (sta 58-4), 1♀ ovigerous, USNM 184905.

**MEASUREMENTS.**—1.5 × 1.4 to 3.9 × 4.4 mm.

**REMARKS.**—Though this species is known from several areas north and south of Panama, the two specimens recorded above are the first from Panamanian waters. According to field notes, the species should be looked for in rocky reef areas.

**OVIGEROUS FEMALES.**—November, and February to April (Haig, 1960, 1968).

**DISTRIBUTION.**—Mexico to Ecuador; littoral to 8 m.

***Megalobrachium mortenseni* Haig, 1962**

*Megalobrachium mortenseni* Haig, 1962:189, figs. 2-5.—Coêlho, 1971:233.—Coêlho and Ramos, 1972:175.—Werding, 1977:175, 181, fig. 4; 1978b:215.

**MATERIAL EXAMINED.**—PANAMA, Atlantic, *Limon Bay*, Fort Randolph (sta 153-1), 1♂.

**MEASUREMENTS.**—3.2 × 3.2 mm.

**REMARKS.**—Chelipeds and walking legs are missing in the specimen, but the eroded pattern on the carapace and the seven-plated telson are sufficient to identify the species. It is the Atlantic analog of *M. erosum* (Glassell, 1936).

**OVIGEROUS FEMALES.**—Known from March to April and September to October (Werding, 1977, 1978b).

**DISTRIBUTION.**—The disparate range of this

species from the Virgin Islands, Panama, and the Caribbean coast of Colombia to Brazil, is undoubtedly a result of both scattered collections and the rarity of the species. Its range is littoral and extends to 30 m.

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

**MATERIAL EXAMINED.**—PANAMA, *Fort Amador*, Naos Island (sta 106), 1♂; Culebra Island (sta 28-2), 1 juv; Isla Perico (sta 82-A, C), 3♀; *Panama City*, Punta Paitilla (sta 107-1), 2♀ (1 ovigerous); *Bay of Panama*, Taboguilla Island (sta 59), 1♂.

**MEASUREMENTS.**—2.3 × 2.3 to 9.0 × 9.4 mm; ♀ ovigerous, 6.3 × 7.4 mm.

**REMARKS.**—The juvenile male from sta 106 has only five instead of the usual seven plates in the telson, but otherwise appears normal for the species.

**OVIGEROUS FEMALES.**—April, June, November, and December (Gore and Abele, 1974, 1976).

**DISTRIBUTION.**—Apparently uncommon in the eastern Pacific, and presently recorded only from Panama and Costa Rica; littoral.

***Megalobrachium poeyi* (Guérin-Méneville, 1855)**

*Megalobrachium poeyi.*—Gore and Abele, 1974:570ff, fig. 3E.—Werding, 1977:175, 181, 183, fig. 5; 1978b:215.

**MATERIAL EXAMINED.**—PANAMA, Atlantic, *Limon Bay*, Fort Sherman (sta 127-1), 1♂, 1♀.

**MEASUREMENTS.**—2.5 × 2.7 and 3.8 × 4.3 mm.

**REMARKS.**—Much like its geminate form, *M. pacificum* (q.v.), this species has never appeared to be common in Panamanian waters. The heavy pilosity seen on some specimens tends to collect large amounts of detritus, often making these crabs difficult to see, and perhaps causing them to be overlooked.

**OVIGEROUS FEMALES.**—Known from April through July (Coêlho, 1966; Gore and Abele, 1974; Werding, 1977).

**DISTRIBUTION.**—Eastern central Florida and the Caribbean Sea to Brazil; littoral to 46 m.

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

*Megalobrachium roseum*.—Coelho and Ramos, 1972:175.—Scelzo and Boschi, 1973:213 [listed].—Werdning 1977:175, 181, 183ff., fig. 6; 1978b:217.

**MATERIAL EXAMINED.**—PANAMA, Atlantic, Galleta Island (sta 128-1), 1♀; *Limón Bay*, Toro Point (sta 125-1), 1♂; (sta 147-3), 2♂, 1♀; Fort Sherman, Shimmey Beach (sta 14-2), 1 juv; Devil's Beach (sta 127-1), 1♂; S of Fort Sherman (sta 144), 1♀.

**MEASUREMENTS.**—2.6 × 2.6 to 4.4 × 4.4 mm.

**REMARKS.**—A diminutive species which also seems to be uncommon in Panamanian waters, *M. roseum* has been found associated with sponges. Although scanty collections undoubtedly account in part for its scarcity, the extremely small size of this crab, its tendency to attract detrital matter to itself, and its lethargic movements probably also cause it to be overlooked.

**OVIGEROUS FEMALES.**—January, February, April, and July through November (Haig, 1956; Coelho, 1966; Gore and Abele, 1976; Werdning, 1977).

**DISTRIBUTION.**—Caribbean Panama, Colombia, and Venezuela to Brazil; littoral to 5 m.

***Megalobrachium tuberculipes* (Lockington, 1878)**

**MATERIAL EXAMINED.**—MEXICO, *Sonora*, Playas Arenosas (sta 1548), 3♀ (2 ovigerous).

**MEASUREMENTS.**—2.0 × 2.1 and 2.5 × 2.8 mm (measurements for ovigerous females).

**REMARKS.**—Gore and Abele (1976) provided evidence supporting the separation of *M. tuberculipes* from its Atlantic geminate, *M. soriatum*, using carapacial characters. The two species are otherwise extremely close in general morphology.

**OVIGEROUS FEMALES.**—Occur in February, and from May to July (Haig, 1960; Gore and Abele, 1976).

**DISTRIBUTION.**—Northern Baja and Gulf of California to Ecuador; littoral to 20 m.

**Genus *Pachycheles* Stimpson, 1858*****Pachycheles ackleianus* A. Milne-Edwards, 1880**

*Pachycheles ackleianus*.—Coelho and Ramos, 1972:173.—Scelzo and Boschi, 1973:213 [listed].—Rickner, 1975:162.—Werdning, 1977:174, 175, 188, fig. 10.

**MATERIAL EXAMINED.**—PANAMA, Atlantic, *Golfo de San Blas*, Pico Feo (sta 93-4), 2♂, 2♀ ovigerous; Isla Mira (sta 136-3), 1♀ ovigerous.

**MEASUREMENTS.**—3.6 × 4.4 to 4.9 × 6.6 mm; smallest ovigerous ♀, 4.5 × 6.1 mm.

**REMARKS.**—Field notes stated that the specimens were associated with loggerhead sponges [*Spherospongia vesparia* (Lamarck, 1814)]. Werdning (1977) provided additional ecological data on the various sponge and gorgonian coral species in which this porcellanid is found. All of the specimens from Pico Feo had one irregular telson plate, a malformation often seen in other sponge-inhabiting decapods, such as pistol shrimps in the genus *Synalpheus* (Gore, unpubl. data).

**OVIGEROUS FEMALES.**—Occur in January, March to April, July, September, and December (Coelho 1966; Gore 1970, 1974; Werdning, 1977), suggesting that females are ovigerous throughout the year.

**DISTRIBUTION.**—Florida and the Gulf of Mexico, the Antilles, Panama, and Colombia to Brazil; from shallow sublittoral waters to 82 m.

***Pachycheles biocellatus* (Lockington, 1878)**

**MATERIAL EXAMINED.**—PANAMA, *Bay of Panama*, Perlas Islands, Pedro Gonzales Island (sta 32), 1♂, 2♀ ovigerous; Isla Chapera (sta 37), 1♂; (sta 39), 1♂.

**MEASUREMENTS.**—2.2 × 2.5 to 4.2 × 5.0 mm; smallest ♀ ovigerous, 3.4 × 3.7 mm.

**REMARKS.**—This species seems to prefer offshore habitats, perhaps exhibiting a response to higher salinity or more rapidly flowing water.

**OVIGEROUS FEMALES.**—The species is ovigerous throughout the year (Haig, 1960; 1968; Chace, 1962; Gore and Abele, 1976).

DISTRIBUTION.—Gulf of California to Ecuador, and the islands of Malpelo, Isabel, Tres Marias, Revillagigedo, Clipperton, and the Galapagos; littoral to 26 m.

***Pachycheles calcosus* Haig, 1960**

MATERIAL EXAMINED.—MEXICO, *Sonora*, Playas Arenosas (sta 1548), 1♂, 1 juv; EL SALVADOR, *La Unión*, Los Maquillis (sta 1564), 1♂; COSTA RICA, *Puntarenas*, Golfo de Nicoya (sta 1567), 1♂ [tentative identification, chelipeds lacking]; PANAMA, Fort Kobbe (sta 108-1), 1♂, 1♀; Isla Venado (sta 86-2), 3♂; (sta 111-1), 1♂, 2♀ (1 ovigerous), 1 juv; Farfan (sta 56-1), 2♂; *Fort Amador*, Naos Island (sta 29-1), 1♂; Culebra Island (sta 28-1, 2), 2♂, 3♀ (2 ovigerous); *Panama City*, Paitilla Beach (sta 52-1), 1♂; Punta Paitilla (sta 107-1), 2♂, 1 juv; Recife de Casa de Putas (sta 133-5B), 1♀ ovigerous.

MEASUREMENTS.—1.6 × 1.6 to 7.5 × 8.8 mm; smallest ♀ ovigerous, 2.5 × 3.0 mm.

REMARKS.—The juvenile from Sonora, Mexico (sta 1548) has fine setae along the outer ventral margins of the carpus and manus; this setation is lacking in adults. The large male from Fort Kobbe, Panama (sta 108) has only five plates in the telson, but corresponds to the description of the species in all other characteristics, including lack of male pleopods. On the other hand, a 5.5 mm (cw) male from Culebra Island, Panama (sta 28) has seven telsonic plates, but possesses male pleopods, so apparently some variation can occur in these specific characters, albeit rarely. The male from Isla Venado (sta 111) was parasitized by a bopyrid isopod.

OVIGEROUS FEMALES.—November, and January through May (Haig, 1960).

DISTRIBUTION.—The record from Playas Arenosas (Cholla Bay), Sonora, Mexico extends the range of this species northward from Sinaloa, Mexico approximately 700 km (450 miles) to the northeastern Gulf of California. It occurs southward to La Libertad, Ecuador; littoral to 8 m.

***Pachycheles chacei* Haig, 1956**

*Pachycheles chacei*.—Werdning, 1977:175, 188, fig. 11, 190; 1978b:217 [Atlantic synonymy].

MATERIAL EXAMINED.—PANAMA, Atlantic, Galleta Island (sta 63-1), 3♂, 2♀ (1 ovigerous), 1 intersex?; USNM 184907.

MEASUREMENTS.—2.1 × 2.5 to 4.4 × 5.2 mm (♀ ovigerous); intersex?, 4.0 × 4.2 mm.

REMARKS.—The specimen designated as intersex has pleopods on abdominal somites 2–4, but no gonopores; it is not noticeably parasitized. Ovigerous females from 2.7 mm (cw) in the eastern Pacific, and 3.0 mm (cw) from Caribbean Panama indicate that the species matures at a size considerably smaller than that of the intersex specimen (see also Haig, 1968; Gore and Abele, 1976).

OVIGEROUS FEMALES.—Known in the Pacific from January to March and in June (Haig, 1960), and in the Atlantic from January, March, and April, and August through December (Haig, 1956; Gore and Abele, 1976; Werdning, 1977).

DISTRIBUTION.—Eastern Pacific from Guatemala to Ecuador; Atlantic from Panama and Colombia; littoral to 4 (Atlantic) or 8 m (Pacific).

***Pachycheles crassus* (A. Milne-Edwards, 1869)**

*Pachycheles crassus*.—Haig, 1960:141, fig. 4, pl. 31: fig. 1; 1968: 57, 68.—Gore and Abele, 1976:11 [key].

MATERIAL EXAMINED.—PANAMA, *Bay of Panama*, Perlas Islands, Pedro Gonzales Island (sta 32), 1♀, ovigerous.

MEASUREMENTS.—5.6 × 7.8 mm.

REMARKS.—This species is the eastern Pacific analog of *P. ackleianus*, and seems to be rare, being previously known from 12 specimens. It is found in coralline and rocky areas, whereas *P. ackleianus* is usually associated with sponges.

OVIGEROUS FEMALES.—Known in January, April, and November (Haig, 1960, 1968).

DISTRIBUTION.—Guerrero, Mexico, to Isla Gorgona, Colombia; littoral to 8 m.

***Pachycheles cristobalensis* Gore, 1970**

*Pachycheles cristobalensis*.—Werdning, 1977:175 [distribution].

MATERIAL EXAMINED.—PANAMA, Atlantic, *Li-*

*món Bay*, Fort Randolph, Toro Point (sta 147-3), 2♂, 1♀ ovigerous, USNM 184909; Fort Sherman, Shimmey Beach (sta 14-2), 5♂, 5♀, 10 juv, USNM 184908; 1/2 mile [805 m] S of Fort Sherman (sta 144), 1♂, 3♀ (2 ovigerous), USNM 184910.

MEASUREMENTS.—1.4 × 1.4 to 5.6 × 6.8 mm; smallest ♀ ovigerous, 2.9 × 3.3 mm.

REMARKS.—Usually only two epimeral plates are distinguished in this species, but the largest female from Fort Sherman (sta 144) has a third, smaller plate.

OVIGEROUS FEMALES.—February, April, July, and August (Gore, 1970; Gore and Abele, 1976; Gore, unpubl. data).

DISTRIBUTION.—Apparently restricted to the type-locality, Limón Bay, and the immediate surroundings; littoral.

### *Pachycheles panamensis* Faxon, 1893

MATERIAL EXAMINED.—PANAMA, W of Venado Island (sta 54), 2♀ ovigerous; Isla Venado (sta 88-4), 5♂, 4♀ ovigerous; (sta 132-1B, C), 1♂, 2♀ (1 ovigerous); *Fort Amador*, Culebra Island (sta 28-2), 6♂, 2♀ (1 ovigerous); *Panama City*, Punta Paitilla (sta 53), 1♀ ovigerous; Panama Reef (sta 58-4), 3♂, 7♀ (6 ovigerous); Recife de Casa de Putas (sta 92-4), 2♂, 1♀ ovigerous; (sta 166-1), 6♂, 2♀ ovigerous.

MEASUREMENTS.—2.6 × 2.9 to 8.8 × 11.3; smallest ♀ ovigerous, 4.0 × 5.3 mm.

REMARKS.—Some interesting variation was observed in the number of telson plates (usually seven) and male pleopods (usually present) in this species. An 8.0 mm (cw) ovigerous female has only five well-formed plates, and another non-ovigerous female (9.9 cm cw) has an incompletely seven-plated telson. A large male (7.3 × 8.1 mm) lacks any vestige of pleopods, exhibiting a type of variability similar to that seen in *Pachycheles calculosus* (q.v.). Another female from Panama Reef (sta 58-4) is parasitized by a bopyrid isopod.

OVIGEROUS FEMALES.—Known from March through November (Haig, 1960, 1968).

DISTRIBUTION.—Baja and Gulf of California to

Ecuador, and offshore to Isabel Island; littoral to 8 m.

### *Pachycheles serratus* (Benedict, 1901)

*Pachycheles serratus*.—Werding, 1977:176, 187, 194, fig. 15; 1978b:214, 219.

MATERIAL EXAMINED.—PANAMA, Atlantic, Galleta Island (sta 63-1), 2♂, 2♀ ovigerous; (sta 128-1), 4♀ (3 ovigerous); *Limón Bay*, Fort Randolph, Toro Point (sta 125-1), 2♀ ovigerous; (sta 147-3), 1♂; Fort Sherman, Shimmey Beach (sta 14-2), 3♂; Devil's Beach (sta 127-1), 7♂, 6♀ ovigerous; Fort Sherman entrance (sta 122-1), 4♂, 2♀ ovigerous; 1/2 mile [0.8 km] S of Fort Sherman (sta 144), 1♂.

MEASUREMENTS.—1.5 × 1.4 to 6.3 × 6.9 mm; smallest ♀ ovigerous, 3.6 × 3.9 mm.

REMARKS.—In some specimens the characteristic brush of hair along the outer ventral margin of the manus is missing. Gore (1970) noted a similar occurrence in specimens collected from the general vicinities noted above, and Werding (1977) observed the same variation in some of his Colombian specimens.

OVIGEROUS FEMALES.—Recorded from January through April and July through November (Haig, 1956; Gore, 1970; Gore and Abele, 1976; Werding, 1977), leading me to believe that the species breeds throughout the year.

DISTRIBUTION.—Antilles, Panama, and Colombia; littoral to 6 m.

### *Pachycheles spinidactylus* Haig, 1957

*Pachycheles spinidactylus* Haig, 1957a:31, pl. 7: figs. 1-4; 1960:134, 153, pl. 33: fig. 2; 1968:57, 69.—Haig et al., 1970:26, 29.—Gore and Abele, 1976:10 [key].

MATERIAL EXAMINED.—COSTA RICA, *Puntarenas*, Golfo de Nicoya (sta 1567), 1♂; PANAMA, *Bay of Panama*, Perlas Islands, Pedro Gonzales Island (sta 32), 5♂, 7♀ (4 ovigerous), 2 juv.

MEASUREMENTS.—1.8 × 1.8 to 5.6 × 6.3 mm; smallest ♀ ovigerous, 3.5 × 3.5 mm.

REMARKS.—This is yet another species in the

genus showing occasional variation in the number of telson plates, a 4.6 mm (cw) male from the Perlas Islands having five instead of the usual seven plates.

**OVIGEROUS FEMALES.**—November, and January through April (Haig, 1960, 1968).

**DISTRIBUTION.**—Baja and Gulf of California to Colombia; littoral to 8 m.

#### *Pachycheles susanae* Gore and Abele, 1974

*Pachycheles susanae*.—Werdning, 1977:176, 187, 195, fig. 16; 1978b:214, 219.

**MATERIAL EXAMINED.**—PANAMA, Atlantic, Galeta Island (sta 128-1), 1♂, 1♀ ovigerous, USNM 184911.

**MEASUREMENTS.**—2.3 × 2.5 mm; ♀ ovigerous, 2.6 × 2.9 mm.

**REMARKS.**—Werdning (1977) noted that some female specimens from the vicinity of Santa Marta, Colombia had only five instead of seven telson plates. The single ovigerous female carried four large (0.5 × 0.7 mm) eggs.

**OVIGEROUS FEMALES.**—Known only from October and November (Werdning, 1977).

**DISTRIBUTION.**—Galeta Island and vicinity in Panama, eastward to Santa Marta, Colombia; littoral to 3 m.

#### *Pachycheles trichotus* Haig, 1960

*Pachycheles trichotus* Haig, 1960:134, 157, pl. 12, pl. 32: fig. 3; 1968: 57, 69.—Gore and Abele, 1976:10 [key].

**MATERIAL EXAMINED.**—PANAMA, Isla Venado (sta 132-1B), 1♀ ovigerous, USNM 184913; *Fort Amador*, Culebra Island (sta 28-2), 1♂, USNM 184912.

**MEASUREMENTS.**—3.1 × 3.5 (ovigerous female), and 3.4 × 3.8 mm.

**REMARKS.**—This extremely rare species, known previously from only four specimens, is similar to *Pachycheles panamensis* and *P. spinidactylus*. In all three species the males usually have telsons which are seven-plated, or incompletely so. The type and distribution of plumose and clubbed setae on

the chelae also shows some overlap among the three species. However, the epimeral plate formula appears to be both distinctive and consistent, comprising a single large plate in *P. trichotus*, one large and one small plate in *P. spinidactylus*, and one large and several smaller fragments in *P. panamensis*. Male pleopods, almost always present in *P. panamensis*, are wanting in the other two species.

**OVIGEROUS FEMALES.**—Known only from the month of April at present.

**DISTRIBUTION.**—Previously recorded from Acajutla, El Salvador, Corinto, Nicaragua, Isla Verde in Panama, and now from the vicinity of Panama City; littoral.

#### Genus *Petrolisthes* Stimpson, 1858

##### *Petrolisthes agassizii* Faxon, 1893

**MATERIAL EXAMINED.**—MEXICO, *Nayarit*, Chacala (sta 1557), 1♀; Isla Jaltimba (sta 1558), 1♀; COSTA RICA, *Guanacaste*, Playa del Coco (sta 1566), 24♂, 33♀ (17 ovigerous), 2 juv; *Puntarenas*, Golfo de Nicoya (sta 1567), 2♂; PANAMA, Isla Venado (sta 86-1, 4), 5♂, 3♀ (2 ovigerous); (sta 88-2), 2♀ ovigerous; (sta 111-4), 2♂; (sta 132-1B, C), 4♂, 3♀ (2 ovigerous); *Fort Amador*, Culebra Island (sta 28-1, 2), 4♂, 1♀ ovigerous; Isla Perico (sta 26-3), 1♀ ovigerous; (sta 82-B), 2♂; Naos Island, "Scout" Island (sta 1711), 2♀ (1 ovigerous); *Panama City*, Punta Paitilla (sta 53), 1♂; Panama Reef (sta 58-4), 3♂; Recife de Casa de Putas (sta 92-1), 1♀ ovigerous, 1 juv [jar broken, specimens destroyed]; *Bay of Panama*, Taboguilla Island (sta 59), 1♂, 1♀ (molt), 1 crushed specimen; Perlas Islands, Pedro Gonzales Island (sta 32), 1♂, 1♀ ovigerous.

**MEASUREMENTS.**—2.3 × 2.2 to 8.8 × 10.3 mm; smallest ♀ ovigerous, 3.8 × 4.0 mm.

**REMARKS.**—*P. agassizii* is superficially similar to *P. edwardsii*. The meristic data suggest that *P. agassizii* matures at a smaller size than does *P. edwardsii*, with both sexes attaining maturity at about 4 mm (cl).

**OVIGEROUS FEMALES.**—November to January,



March to June, and August (Haig, 1960, 1962, 1968; Gore and Abele, 1976).

DISTRIBUTION.—Gulf of California to Colombia; littoral to 10 m.

***Petrolisthes armatus* (Gibbes, 1850)**

*Petrolisthes armatus*.—Holthuis and Manning, 1970:242.—Coelho and Ramos, 1972:174.—Werdling, 1977:174, 176, 197, 198, fig. 18; 1978b: 214, 219. [Atlantic synonymy.]

MATERIAL EXAMINED.—MEXICO, *Sinaloa*, Tobolobampo Harbor (sta 1554), 1♂; *Nayarit*, Chacala (sta 1557), 1♂; *Jalisco*, Bahía Cuastecomate (sta 1559), 1 cheliped; EL SALVADOR, *La Unión*, W of Punta Mala (sta 1295), 1♂; Los Maquilis, W of Punta Amapala (sta 1466), 2♂; (sta 1564), 12♂, 14♀ (12 ovigerous); HONDURAS, *Valle*, Golfo de Fonesca (sta 1468), 2♂, 3♀ (1 ovigerous); NICARAGUA, *Managua*, Playas Masachapa (sta 1565), 1♀ ovigerous; PANAMA, *Aquadulce*, Bahía Parita (sta 20-3, 6), 14♂, 31♀ (19 ovigerous), 1 juv; Fort Kobbe (sta 2015), 6♂; (sta 108-1, 2, 7), 13♂, 11♀ (8 ovigerous), 2 juv; Venado Beach (sta 2002), 1♀ ovigerous; (sta 1607), 6♂, 2♀ ovigerous; W of Venado Island (sta 23-1, 2), 10♂, 16♀ (12 ovigerous); E of Venado Island (sta 54), 10♂, 7♀ (5 ovigerous); Isla Venado (sta 88-5, 6), 3♂, 3♀ (1 ovigerous), 2 juv; (sta 111-1, 4), 19♂, 13♀ (12 ovigerous), 1 juv; (sta 132-1E), 7♂, 2♀; Farfan (sta 56-1), 8♂, 8♀ (6 ovigerous), 3 juv; (sta 85-2, 8, 9), 6♂, 6♀ ovigerous, 3 juv; (sta 113-1, 2), 8♂, 5♀ ovigerous; (sta 134-1D), 2♂ ovigerous; *Fort Amador*, Naos Island causeway (sta 1483), 1♂; (sta 1521), 1♂; (sta 1531), 1♀ ovigerous; (sta 1604), 5♂, 4♀ ovigerous; Naos Island (sta LGA 69-14), 3 juv; (sta 50), 3♂, 2♀ ovigerous; (sta 105), 11♂, 9♀ (6 ovigerous), 1 juv, 1 molt; (sta 106), 45♂, 24♀ (18 ovigerous), 15 juv; Culebra Island (sta 22-3), 7♂, 9♀ (5 ovigerous), 53 juv; (sta 28-1, 2) 8♂, 4♀ ovigerous, 14 juv; Naos Island, "Scout" Island (sta 131-1A), 1♂ ovigerous; *Panama City*, Punta Paitilla (sta 2003), 1♂; Bay W of Punta Paitilla (sta 2004), 1♂, 1♀ ovigerous; Paitilla Beach (sta 25-2, 3), 10♂, 4♀ ovigerous; (sta 84-B, E), 8♂, 3♀ (1 ovigerous); (sta 107-1), 15♂, 4♀ ovigerous, 1 juv; (sta 129-1A, 2B), 3♂, 3♀ (2 ovigerous); Pan-

ama Reef (sta 1499), 1♂, 2♀ (1 ovigerous); (sta 58-4), 10♂, 6♀ (4 ovigerous), 1 crushed specimen; Recife de Casa de Putas (sta 92-4, 5), 13♂, 9♀ (7 ovigerous); (sta 133-5A, B), 24♂, 13♀ (12 ovigerous); *Bay of Panama*, Perlas Islands, Pedro Gonzales Island (sta 33-3), 1♀ ovigerous; (sta 38-1), 2♂, 2♀; PANAMA, Atlantic, *Golfo de San Blas*, Pico Feo (sta 115-3), 1♂; Isla Mira (sta 116-1), 2 juv; *Colon*, E of Maria Chiquita (sta 123-1), 2♂, 1 juv; *Limón Bay*, Fort Randolph (sta 145-3, 6), 7♂, 8♀ (3 ovigerous); (sta 153-1, 4), 2♂, 2♀ ovigerous; Toro Point (sta 10-5), 1♀ ovigerous; (sta 125-1), 5♂, 3♀ (2 ovigerous), 1 juv; Fort Sherman (sta 62), 3♂; (sta 122-1, 2), 5♂, 4♀ ovigerous; 1/2 mile [0.8 km] S of Fort Sherman (sta 144), 1♂, 1♀ (ovigerous); *Canal Zone*, Gatun Locks (sta 81-1, 2, 4, 9), 27♂, 35♀ (6 ovigerous); (sta 1687), 2♂, 1♀; UNKNOWN LOCATIONS, Biffar and Abele station, 1♂; LGA 1969 [Abele station], 1♂; Atlantic [Meek and Hildebrand station], 2♀ (1 ovigerous).

MEASUREMENTS.—Pacific specimens, 2.0 × 1.8 to 16.8 × 16.5 mm, smallest ♀ ovigerous, 3.8 × 3.5 mm; Atlantic specimens, 1.1 × 1.1 to 10.4 × 9.1 mm, smallest ♀ ovigerous, 4.1 × 3.8 mm.

REMARKS.—*Petrolisthes armatus* on either side of the Panamanian isthmus matures at a relatively small size (ca. 4 mm cw), but the adults seem to grow larger on the Pacific coast. A large male from El Salvador (sta 1295) measures 15.3 × 12.9 mm, and the largest specimen noted in the measurements section above came from Punta Paitilla (sta 84-E) in Panama City. The latter area is heavily polluted with sewage, and specimens there may find more planktonic food available than elsewhere. Variation is also seen in cl to cw ratios; in some older individuals cw is greater than cl, though in the majority of specimens the opposite is true. The posterolateral margins and branchial regions become greatly expanded in these larger specimens, producing greater cw values. A very small ovigerous female from Limón Bay (sta 122-1) with a cw of 2.9 mm was examined. Unfortunately, the carapace is crushed, so an accurate cl measurement could not be obtained, but the small cw value indicates that *P. armatus* is capable of reproducing at a very small

size, which may account in part for the widespread distribution of the species in the eastern and western Atlantic and eastern Pacific Oceans. Whether the forms on either side of the isthmus will continue to be regarded as identical is not certain, because larvae from eastern Pacific and western Atlantic forms differ in many morphological attributes (Gore 1972a). Subspecific or full specific status may be warranted at some future date.

A series of specimens from both eastern Pacific and Caribbean Panama stations exhibited varying degrees of pilosity on the carapace and outer faces of the chelipeds, ranging from the presence of scattered but noticeable hairs to a thick pilosity. Several morphological characters were examined in these specimens and compared with "true" (i.e., not noticeably hirsute) *P. armatus*, but no outstanding or consistent differences were detectable in either the number or position of cheliped carpal spines, presence or absence of epibranchial spines, ornamentation along the outer margin of the cheliped, inner or outer orbital angles, walking-leg meral spines, and gonopod/gonopore morphology. The only noticeable difference between the forms thus remains the presence or absence of hair on the carapace and chelipeds. Janet Haig (in litt.) also could find no appreciable differences in comparing some of this material with a long series of specimens at her disposal, and was inclined to consider them all *P. armatus*. She suggested that statistical analysis might eventually provide a means for separating the "*P. armatus* complex" into distinct groups.

**OVIGEROUS FEMALES.**—Recorded in the eastern Pacific for every month but March; western Atlantic from every month of the year except August and December (Haig, 1960, 1968; Gore, 1972a; Gore and Abele, 1976; Werding, 1977, 1978b).

**DISTRIBUTION.**—Atlantic Ocean from West Africa to Florida, the Caribbean Sea to Brazil; eastern Pacific from the Gulf of California to Peru; littoral to about 30 m (Haig, 1960). Although common along the Panamanian coastline, the species was curiously absent from all offshore

stations, including the islands sampled in the Bay of Panama.

### *Petrolisthes artifrons* Haig, 1960

*Petrolisthes artifrons* Haig, 1960:27, 119, pl. 22: fig. 4.—Gore and Abele, 1976:13 [key].

**MATERIAL EXAMINED.**—PANAMA, *Fort Amador*, Culebra Island (sta 22-3), 1♂, USNM 184915; Isla Perico (sta 82-A), 1♂, USNM 184914.

**MEASUREMENTS.**—4.4 × 4.6 and 5.8 × 6.5 mm.

**REMARKS.**—Although the large type series (Haig 1960) would suggest that this is not a rare species, it has not been recollected since the original description. This species may be difficult to separate from *Petrolisthes lewisi austrinus*, with which it occurs. In *P. artifrons*, the granulation on the cheliped carpus is low and the furrows shallow, and not nearly as distinct as in *P. l. austrinus*; the rugae on the cheliped are much less developed; the posterior margin of the carpus is noticeably rounded and not almost straight; and the outer orbital angle on the carapace is developed into a rounded tooth. The proximal margin of the carpus of the cheliped in *P. artifrons* is irregularly subdivided into a two-toothed lobe, whereas in *P. l. austrinus* this lobe is distinctly and more evenly bi- or tridentate.

**OVIGEROUS FEMALES.**—Taken from January through March and in May and September (Haig, 1960).

**DISTRIBUTION.**—Costa Rica to Ecuador; littoral to 20 m.

### *Petrolisthes edwardsii* (Saussure, 1853)

**MATERIAL EXAMINED.**—MEXICO, *Nayarit*, Isla Jaltimba (sta 1558), 1♂; *Jalisco*, Bahía Cuastecomate (sta 1559), 2♂, 2♀ (1 ovigerous); Tenacatita Bay (sta 1235), 1♂, 2♀ ovigerous; COSTA RICA, *Puntarenas*, Golfo de Nicoya (sta 1567), 14♂, 18♀ (13 ovigerous), 2 crushed specimens; PANAMA, *Panama City*, Punta Paitilla (sta 53), 1♂; (sta 84-B), 1♀; Panama Reef (sta 58-4), 1♂; *Bay of Panama*, Perlas Islands, Pedro Gonzales Island (sta 32), 3 juv; (sta 33-3), 1♀; Isla Pajaros (sta 42), 1♂.

MEASUREMENTS.— $2.3 \times 2.0$  to  $17.3 \times 17.5$  mm; smallest ♀ ovigerous,  $4.8 \times 4.8$  mm.

REMARKS.—In Mexican specimens (sta 1559), the metabranchial area appears as a distinct, flattened, embossed plate, and the ornamentation on the cheliped carpus is more like rugae, whereas in Panamanian specimens the metabranchial area is of low relief and the carpus ornamentation appears as flattened tubercles. Larger males often possess a very well developed supraocular spine, this being usually obsolete or occasionally even wanting in similarly sized females.

OVIGEROUS FEMALES.—Probably all year (Haig, 1960, 1962, 1968; Gore and Abele, 1976); only records from February and April are lacking.

DISTRIBUTION.—Baja and Gulf of California to Ecuador; littoral to 40 m.

#### *Petrolisthes galapagensis?* Haig, 1960

MATERIAL EXAMINED.—MEXICO, Jalisco, Bahía Cuastecomate (sta 1559), 1♂, USNM 184916.

MEASUREMENTS.— $3.1 \times 2.9$  mm.

REMARKS.—Previously known only from the Galapagos Islands, this species was recorded for the first time on the Central American coast by Haig (1968) based on material obtained from Jasper Island, Gulf of Nicoya, Costa Rica. The single Mexican specimen listed above agrees with many of the particulars given by Haig in her original description (1960). Only one cheliped is attached, but the subparallel carpal margins, the gape with a distinct but sparse pubescence, the noninflated merus of walking leg 3, and the slightly produced interorbital angle of the carapace, are all characters seen in *P. galapagensis*, and which can be used to eliminate *Petrolisthes tridentatus* from consideration. The lobe on the cheliped carpus is not well developed, however, and there is no low granular crest along the outer margin of the manus, two features noted by Haig as occurring in her species. The general form of the frontal region and the cheliped carpus does not resemble that seen in *P. tonsorius*, another closely related species. Comparisons with specimens of that species collected at the same station (q.v.) show that

the two forms are distinct. A very easily seen feature (along with the well-developed carpal lobe) are the noticeably setose antennal flagella in *P. tonsorius*, which in *P. galapagensis* are only sparsely hairy (see Haig, 1960:84).

It is certainly not beyond the realm of possibility that *P. galapagensis* could occur on the Mexican coast, inasmuch as it has already been found at Costa Rica. However, the current patterns in and around the Galapagos Archipelago probably tend to restrict the species mainly to those islands. To arrive as far north as Mexico would require either a more northerly colonization route, or transport from the Galapagos back toward the mainland, perhaps via the Pacific equatorial counter-current, and subsequent entrainment in a gyre known to occur above the Albatross plateau. Of course, the possibility of a relict population existing on the mainland must also be considered (Manning, in litt.). The single specimen is thus listed provisionally as this species until more material becomes available.

OVIGEROUS FEMALES.—Collected from December to February (Haig, 1960).

DISTRIBUTION.—Mexico?, Costa Rica, and the Galapagos Islands; littoral to 5 m.

#### *Petrolisthes galathinus* (Bosc, 1802)

*Petrolisthes galathinus*.—Haig, 1966:352.—Coelho and Ramos, 1972:174.—Scelzo and Boschi, 1973:213 [listed].—Werdning, 1977:176, 196, 201, 208, fig. 20; 1978b:219.

*Petrolisthes palathinus*.—Werdning, 1977:208 [lapsus]. [Entire synonymy restricted to western Atlantic.]

MATERIAL EXAMINED.—COSTA RICA, Guanacaste, Playa del Coco (sta 1566), 1♂, 2♀ (1 ovigerous); PANAMA, Guarume Island (sta 2001), 1♂ ovigerous; Venado Beach (sta 1523), 1♂; (sta 1607), 4♂, 3♀ ovigerous; W of Venado Island (sta 23-2), 1♂; (sta 54), 6♂, 5♀ ovigerous; Isla Venado (sta 86-1, 4), 15♂, 9♀ ovigerous, 3 dried specimens; (sta 88-2, 4), 8♂, 3♀ (2 ovigerous); (sta 111-4), 1♂; (sta 132-1B, C), 3♂, 3♀ (1 ovigerous); Farfan (sta 56-1), 1♀ ovigerous; Fort Amador, Naos Island causeway (sta 1605), 1♂; Culebra Island (sta 28-2), 1♂, 1♀; Isla Perico (sta 82-B), 1♂, 2♀ ovigerous, 1





MEASUREMENTS.—4.0 × 4.1 (smallest ♀ ovigerous) to 5.6 × 6.3 mm.

REMARKS.—The Panamanian specimens vary somewhat from the description provided by Haig (1960) in that the lobe-like teeth of the cheliped carpus bear distinct raised granules (not depressed), and the rugae on the posterior margin of that article are well developed; the rugae on the manus are also quite distinct.

OVIGEROUS FEMALES.—Collected from December through April, and in September (Haig, 1960, 1968).

DISTRIBUTION.—Nicaragua to Ecuador; littoral.

### *Petrolisthes lewisi lewisi* (Glassell, 1936)

*Pisosoma lewisi* Glassell, 1936:287.

*Petrolisthes lewisi lewisi*.—Haig, 1960:27, 113, pl. 23: fig. 1; 1968:57, 66.

MATERIAL EXAMINED.—MEXICO, *Jalisco*, Bahía Cuastecomate (sta 1559), 4♀.

MEASUREMENTS.—2.3 × 2.4 to 3.0 × 3.3 mm.

REMARKS.—Though of small size, the specimens agreed well with characters enumerated by Haig (1960) in establishing and separating this subspecies from its more southerly congener. Two megalopae from Pedro Gonzales Island in the Bay of Panama might also belong to this species, but owing to their very small size and the similarity among this taxon, *P. l. austrinus*, and *Petrolisthes hians*, the identification remains uncertain.

OVIGEROUS FEMALES.—November through April (Haig, 1960, 1968).

DISTRIBUTION.—Gulf of California, Mexico, and the islands of Isabel and Tres Mariás; littoral to 6 m.

### *Petrolisthes lindae* Gore and Abele, 1974

MATERIAL EXAMINED.—PANAMA, *Canal Zone*, Diablo Heights (sta 1496), 1♂, 2♀ (1 ovigerous); *Panama City*, Punta Paitilla (sta 129-1A), 10♂; *Canal Zone*, Miraflores Locks (sta 1525), 6♂, 5♀; (sta 1718), 6♂, 8♀ (4 ovigerous); (sta 1720), 7♂, 14♀ (9 ovigerous); Spillway pool (sta 110-1), 3♂,

1♀; (130-2B), 21♂, 2♀; *Canal Zone*, Pedro Miguel Locks (sta 1324), 5♂.

MEASUREMENTS.—2.6 × 2.6 to 10.7 × 10.5 mm; smallest ♀ ovigerous, 3.2 × 3.4 mm.

REMARKS.—Some specimens from Miraflores Locks bear a fringe of hair on the outer margin of the manus; another from Miraflores spillway has three spines on the carpus of the left cheliped, instead of one or two. Both types of variation have been noted in the closely related *Petrolisthes robsonae* Glassell, also found associated with the fresh- and brackish-water areas adjacent to the Canal locks. *Petrolisthes lindae* is known to inhabit mangrove swamps near the Pacific mouth of the Canal, but no related form has yet been found on the Atlantic side of the isthmus. The record of this species for Pedro Miguel locks is only the second from that far into the Panama Canal proper. These and the previous records from Miraflores Locks (Gore and Abele, 1974, 1976) indicate that the species can easily tolerate large fluctuations in salinity, ranging from about 0–30‰.

OVIGEROUS FEMALES.—Occur in January, April, and July to August (Gore and Abele, 1974) including two spent females from Miraflores Locks (sta 1525).

DISTRIBUTION.—Presently restricted to the areas in the vicinity of the Pacific mouth of the Panama Canal; littoral.

### *Petrolisthes magdalenensis* Werdning, 1978

*Petrolisthes* sp. II.—Werdning, 1977:174, 176, 197, 209, fig. 27; 1978b:214 [reference].

*Petrolisthes magdalenensis* Werdning, 1978a:307, fig. 1; 1978b:214, 220.

MATERIAL EXAMINED.—PANAMA, Atlantic, Portobelo, 1♂, USNM 184918

MEASUREMENTS.—3.2 × 3.2 mm.

REMARKS.—This small species is closely related to *Petrolisthes jugosus* Streets in the Caribbean Sea, and to *P. lewisi austrinus* Haig from the eastern Pacific. The taxon was recently described by Werdning (1978a) from the area around Santa Marta, Colombia, and later (1978b) from the

Gulf of Urubá on the Panamanian-Colombian Caribbean border. The label in the jar with this specimen states that it was collected in April 1912, so the species has been present in the Caribbean since before the opening of the Panama Canal in 1914. The jar label also states that the specimen was found "on large holothurians." The species is probably only facultatively commensal, because Werding's material was all collected from under stones.

**OVIGEROUS FEMALES.**—Recorded from March to May and August to October (Werding, 1977, 1978b).

**DISTRIBUTION.**—Caribbean coastline of Colombia to Panama; littoral to 3 m.

### *Petrolisthes marginatus* Stimpson, 1859

*Petrolisthes marginatus* Stimpson, 1858:227 [nomen nudum]; 1859:74 [p. 28 on separate].—Haig, 1956:26. [Not Benedict, 1901:134, pl. 3: fig. 1, = *Petrolisthes* new species.]

*Petrolisthes cessacii*.—Coelho, 1971:233 [listed].—Coelho and Ramos, 1972:173.—Gore, 1974:710, fig. 4.—Rickner, 1975:163.—Werding, 1977: 176, 197, 199, fig. 19. [Entire synonymy restricted to western Atlantic.]

**MATERIAL EXAMINED.**—PANAMA, Atlantic, *Golfo de San Blas*, Pico Feo (sta 135-4), 1♂, 1♀ ovigerous, USNM 184919.

**MEASUREMENTS.**—9.5 × 9.8 (♀ ovigerous) and 10.0 × 10.1 mm.

**REMARKS.**—This species, and *Petrolisthes cessacii* (A. Milne-Edwards, 1878) resemble each other so closely, that for a number of years they were confused with each other, resulting in several supposedly great extensions of range for *P. cessacii* from western Africa (e.g., Gore, 1974). In the preparation of a forthcoming report on the decapod crustaceans from Ascension Island, R. B. Manning and F. A. Chace, Jr. recorded *P. marginatus* from that locality, and further concluded that *P. cessacii* is a junior synonym of this species. The species identified by Benedict (1901) as *P. marginatus*, and inadvertently perpetuated as such by later authors, is, in fact, undescribed (Manning, in litt.). Drs. Manning and Chace provided me with a summary of the confusion surrounding

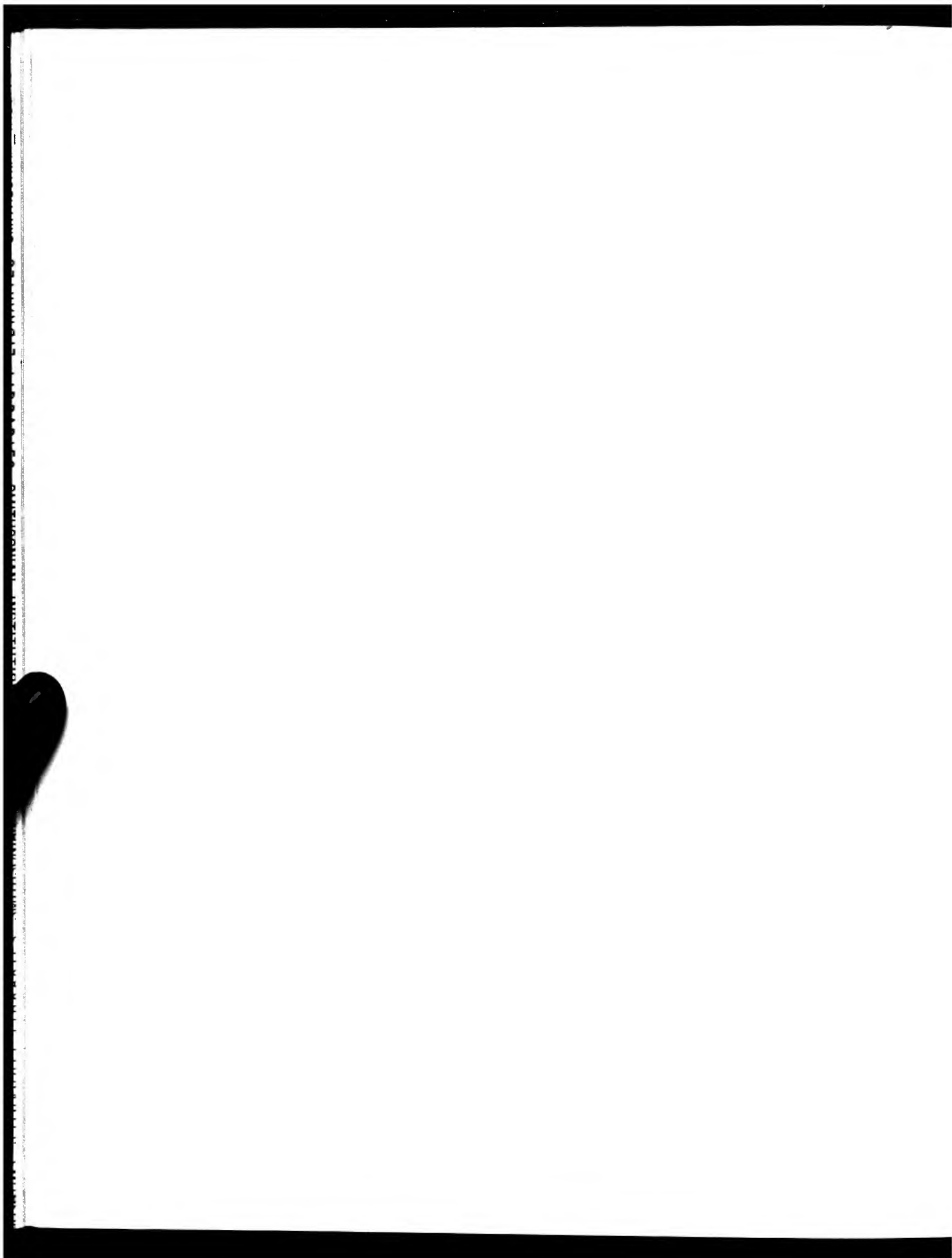
*P. marginatus* identified as *P. cessacii*, as well as information on the previous misidentifications by Benedict and later authors, of the Caribbean species that was subsequently shown to be new. The latter species will be described and illustrated in a forthcoming report, and complete synonymies and commentary will be given at that time. In the interim, *P. marginatus* can be distinguished from Benedict's misidentified species by the presence (usually) of only one epibranchial spine instead of two, (rarely a nubbin of a second may be present), by a single spine on the ventral margin of the cheliped merus, a bifid spine terminating the posterior series of spines on the cheliped carpus, and by the much greater size (up to nearly 18 mm cl). The first and third of these characters are readily apparent in the illustration provided by Gore (1974), and identified as *Petrolisthes cessacii*.

**OVIGEROUS FEMALES.**—Known from November, January, February, and May in the eastern Atlantic (Chace, 1956; Holthuis and Manning, 1970); January, February, April to July, and possibly December in the western Atlantic (Haig, 1962; Gore, 1974; Rickner, 1975; Werding, 1977). All records originally as *P. cessacii*.

**DISTRIBUTION.**—Western Africa, Ascension Island, and the southern Caribbean Sea from Barbados to Panama and the northern coast of South America, and Brazil; littoral to 3 m.

### *Petrolisthes nobilii* Haig, 1960

**MATERIAL EXAMINED.**—MEXICO, *Sinaloa*, Mazatlan (sta 1555), 1♂, 1♀ ovigerous; *Nayarit*, Isla Jaltimba (sta 1558), 2♀ ovigerous; *Jalisco*, Bahía Cuastecomate (sta 1559), 1♂; NICARAGUA, *Managua*, Playas Maschapa (sta 1565), 1♂; PANAMA, *Fort Amador*, Culebra Island (sta 22-3), 2♂; (sta 28-2), 1♂, 4♀ (3 ovigerous); Isla Perico (sta 82-A, B), 2♂, 2♀ ovigerous; *Panama City*, Punta Paitilla (sta 129-1A), 4♂, 3♀ (2 ovigerous), 1 crushed specimen; *Bay of Panama*, Perlas Islands, Isla Chapera (sta 38-1), 4♂, 4♀ (2 ovigerous), 1 early crab; (sta 40), 2♂, 1♀.







the specimen illustrated in figure 26 of his 1977 report. This situation will be corrected in his forthcoming paper (Werding, 1982).

**OVIGEROUS FEMALES.**—April, June, September, November, and December (Werding, 1977).

**DISTRIBUTION.**—Vicinity of Santa Marta, Colombia and Limón Bay, Panama; littoral.

### *Petrolisthes sanfelipensis* Glassell, 1936

*Petrolisthes sanfelipensis* Glassell, 1936:281.—Haig, 1960:24, 30, pl. 20: fig. 3.—Haig et al., 1970:22, 26, 28.—Brusca and Haig, 1972:56.

**MATERIAL EXAMINED.**—MEXICO, *Sonora*, Playas Arenosas (sta 1548), 1♂, 1♀ ovigerous, USNM 184930.

**MEASUREMENTS.**— $5.8 \times 6.9$  (♀ ovigerous) and  $6.4 \times 6.2$  mm (male).

**REMARKS.**—Known from approximately 50 specimens in collections, this species does not seem to be common, although distributional records (e.g., Haig et al., 1970) indicate that it is relatively widespread in the Baja Gulf of California area.

**OVIGEROUS FEMALES.**—March, June (Haig, 1960), and July.

**DISTRIBUTION.**—Outer Baja and Gulf of California to Cabo San Lucas, and southern Sinaloa, Mexico; littoral to about 50 m.

### *Petrolisthes tonsorius* Haig, 1960

*Petrolisthes tonsorius* Haig, 1960:28, 85, pl. 3; pl. 26: fig. 1; 1968: 57, 66.—Gore and Abele, 1976:13 [key] [Pacific synonymy].

*Petrolisthes tonsorius*.—Werding, 1977:174, 176, 195, 205, fig. 24; 1978b: 214, 220 [Atlantic synonymy].

**MATERIAL EXAMINED.**—MEXICO, *Jalisco*, Bahía Cuastecomate (sta 1559), 1♂, 1♀, 1 juv.

**REMARKS.**—*Petrolisthes tonsorius* is widely distributed in the eastern Pacific from the Gulf of California to Ecuador, and the islands of Revillagigedo, Cocos, and the Galapagos. Werding (1977) first reported the species from the Atlantic, on the Caribbean coast of Colombia, where it was found associated with vermetid mollusk

tubes. Werding also provided characters allowing separation of *P. tonsorius* from its close relative *Petrolisthes quadratus* Benedict, 1901, thereby negating a suggestion by Haig that her species might eventually prove to be synonymous with the latter.

**OVIGEROUS FEMALES.**—Taken from November through March in the eastern Pacific (Haig 1960, 1968); January, March through May, and October in the southwestern Caribbean (Werding 1977, 1978b; Gore, unpubl. data).

**DISTRIBUTION.**—As above for the eastern Pacific, littoral to 20 m; In the Atlantic only along the littoral Caribbean coast of Colombia.

### *Petrolisthes tridentatus* Stimpson, 1859

*Petrolisthes tridentatus*.—Werding, 1977:176, 196, 208, fig. 25 [Atlantic synonymy].

**MATERIAL EXAMINED.**—PANAMA, Venado Beach, (sta 1607), 2♂, 1♀, 1 damaged; Isla Venado (sta 132-1D), 1♂; *Fort Amador*, Naos Island (sta LGA 68-30), 4♂, 1♀ ovigerous; (sta LGA 69-14), 2♂; (sta 46-1), 1♀; (sta 105), 17♂, 15 ♀ (13 ovigerous); (sta 106), 1♂, 1♀; Culebra Island (sta 28-1, 2), 8♂, 6♀ (4 ovigerous); *Panama City*, Punta Paitilla (sta 84-E), 2♀ (1 ovigerous); (sta 107), 1♀; *Bay of Panama*, Perlas Islands, Isla Chapera (sta 38-1), 1♂, 1♀ ovigerous, 1 juv; (sta 40), 4♂, 1♀ ovigerous; UNCERTAIN LOCATION, (sta LGA 1969), 1♀ ovigerous.

**MEASUREMENTS.**— $2.4 \times 2.3$  to  $6.5 \times 6.6$  mm; smallest ♀ ovigerous,  $3.7 \times 3.7$  mm.

**REMARKS.**—This species is known from both the Caribbean and eastern Pacific coasts of the Panamanian isthmus. It is by far the more abundant in the Pacific, according to available collecting records (Haig, 1960; Gore, unpubl. data), although relatively more widely distributed in the Atlantic than in the Pacific. *P. tridentatus*, however, is rather scarce in the southwestern Caribbean, and the majority of specimens have been taken in Colombian waters in the vicinity of Santa Marta (Werding 1977; Gore, unpubl. data).

**OVIGEROUS FEMALES.**—In the Pacific from October through May (Haig, 1960, 1968; Gore and Abele, 1976); in the Atlantic in February and from April to June (Haig, 1956, 1962; Werding, 1977; Gore unpubl. data).

**DISTRIBUTION.**—Nicaragua to Ecuador in the Pacific, and the Bahamas and Caribbean Sea to Venezuela in the Atlantic; a littoral species in both oceans.

***Petrolisthes zacae* Haig, 1968**

**MATERIAL EXAMINED.**—PANAMA, Canal Zone, Miraflores Locks spillway (sta 130-3), 1♂, USNM 184931.

**MEASUREMENTS.**—9.2 × 9.2 mm.

**REMARKS.**—This species is usually associated with muddy mangrove areas.

**OVIGEROUS FEMALES.**—February, July, and August (Haig, 1968; Gore, 1975; Gore and Abele, 1976).

**DISTRIBUTION.**—Costa Rica and Panama; littoral.

**Genus *Pisidia* Leach, 1820**

***Pisidia magdalenensis* (Glassell, 1936)**

**MATERIAL EXAMINED.**—PANAMA, W of Venado Island (sta 23-2), 1♂, 3♀; (sta 54-2), 1♂; Isla Venado (sta 86-1, 4), 1♂, 1 unsexed specimen; (sta 88-4), 4♂, 3♀ (2 ovigerous), 1 juv; (sta 132-1B), 1♂, 1♀ ovigerous, 1 molt; Farfan (sta 85-2), 1♂, 1♀; Fort Amador, Culebra Island (sta 28-1, 2), 1♂, 1♀ ovigerous, 5 juv; Isla Perico (sta 82-B), 1♂, 2 juv; Panama City, Paitilla Beach (sta 25-1), 6♂, 8♀ (4 ovigerous), 1 juv; Panama Reef (sta 58-4), 1♀ ovigerous; Recife de Casa de Putas (sta 92-1), 1♂, 2♀ ovigerous; (sta 166-1), 2♂; Gulf of Chiriqui, Uva Island, 1♀; Bay of Panama, Taboguilla Island (sta 59), 1♂, 2♀ ovigerous; Canal Zone, channel (sta 150-B, D), 68♀, 80♀, (68 ovigerous); (sta 160-1, 3), 2♂, 3♀ (2 ovigerous), 1 juv; (sta 161-2), 6♂, 8♀ (3 ovigerous); Bay of Panama, off Flamenco Island (sta 162-6), 2♀ ovigerous; Perlas Islands, Pedro Gonzales Island (sta 32), 1♂.

**MEASUREMENTS.**—1.3 × 1.3 to 4.0 × 4.0 mm; smallest ♀ ovigerous, 2.0 × 2.0 mm.

**REMARKS.**—*Pisidia magdalenensis* is often remarkably abundant at offshore stations, especially those in which coralline rubble is found. It was only rarely collected intertidally. The species matures at a very small size and never grows very large. Several specimens of approximately 3.5 mm (cw) are parasitized by bopyrid isopods.

**OVIGEROUS FEMALES.**—Specimens are recorded from October through July (Haig, 1960, 1962, 1968; Gore and Abele, 1976), and thus probably occur all year.

**DISTRIBUTION.**—Baja California to Peru; littoral to 76 m.

**Genus *Polyonyx* Stimpson, 1858**

***Polyonyx confinis* Haig, 1960**

*Polyonyx confinis* Haig, 1960:233, 234, fig. 12(3), pl. 17; 1968:57, 72.—Gore and Abele, 1976:13 [key].

**MATERIAL EXAMINED.**—PANAMA, W of Venado Island (sta 23-2) 1♀ ovigerous, USNM 184932.

**MEASUREMENTS.**—5.0 × 8.0 mm.

**REMARKS.**—This extremely rare species was previously known only from the male holotype and female paratype, collected at Corinto, Nicaragua (Haig, 1960, 1968). The single Panamanian female constitutes a first record for that country, and extends the range southward approximately 950 km (570 miles). The ovigerous female certainly infers a breeding population but not necessarily a viable colony. There were no data as to a possible commensal host.

**OVIGEROUS FEMALES.**—The ovigerous paratype was collected in January (Haig, 1960), the Panamanian female in April.

**DISTRIBUTION.**—Corinto, Nicaragua and Panama City, Panama; littoral to 6 m.

**Genus *Porcellana* Lamarck, 1801**

***Porcellana cancrisocialis* Glassell, 1936)**

**MATERIAL EXAMINED.**—PANAMA, Canal Zone, channel (sta 150-C), 2♂.

MEASUREMENTS.— $5.4 \times 5.8$  and  $6.4 \times 5.5$  mm.

REMARKS.—The species is a known associate of hermit crabs, but no records indicating such commensalism were on the specimen labels.

OVIGEROUS FEMALES.—August (probably September) and October through May (Haig 1960, 1968; Gore and Abele 1976), suggesting that the species breeds the entire year.

DISTRIBUTION.—Baja and Gulf of California to Peru, and Isabel Island; littoral to 108 m.

### *Porcellana paguriconviva* Glassell, 1936

MATERIAL EXAMINED.—PANAMA, Recife de Casa de Putas (sta 166-1), 1♀; Bay of Panama, Perlas Islands, Pedro Gonzales Island (sta 36-3), 1♂, 1♀; Fort Amador, Culebra Island (sta 22-3), 1 damaged juv.

MEASUREMENTS.— $4.9 \times 4.7$  to  $6.0 \times 5.6$  mm.

REMARKS.—Another known associate with hermit crabs in the genera *Aniculus*, *Dardanus*, *Paguristes*, and *Petrochirus* (see, e.g., Haig, 1960; Haig et al., 1970), the Panamanian specimens were apparently free-living because there is no indication of commensalism on the collecting label.

OVIGEROUS FEMALES.—Occur in October, December through March, May, and July (Haig, 1960, 1968), and possibly the year around.

DISTRIBUTION.—Baja and Gulf of California to the Bay of Panama; littoral to 100 m.

### *Porcellana sayana?* (Leach, 1820)

*Porcellana sayana*.—Coêlho and Ramos, 1972:175.—Werding, 1977:174, 176, 212, fig. 29.

MATERIAL EXAMINED.—PANAMA, Atlantic, *Limón Bay*, Fort Sherman, Devil's Beach (sta 127-1), 1 cheliped.

REMARKS.—The single cheliped lacks marginal hairs, but there is a small, acute lobe proximally on the merus, a character applicable to *P. sayana*. The chela hairs normally present along the outer margin of the manus might have rubbed off during collection or preservation. No cephalo-

thorax was in the jar, so identification remains provisional.

This species is another that is commensal with hermit crabs. Haig (1966) stated that it was found with *Paguristes* and *Pagurus*, although the material she was reporting on was all apparently free-living. Werding (1977), citing data from Hildebrand (1954), noted that the species is commensal with the majid crab *Stenocionops furcata*. He also reported a more rare association between up to 10 individuals of this crab and the holothurian *Astichopus multfidus* (Sluiter, 1910) in Colombian waters. Telford and Daxboeck (1978) provided notes on the association with hermit crabs living in *Strombus gigas* shells.

OVIGEROUS FEMALES.—Recorded all year long (Williams, 1965; Haig, 1966).

DISTRIBUTION.—Cape Hatteras, North Carolina to near the Brazilian-Uruguayan border; littoral to 92 m, and doubtfully to 713 m off Puerto Rico (Haig, 1956, 1966; Williams, 1965).

### Discussion

The porcellanid crab fauna in the West Indian and Eastern Pacific faunal regions is becoming increasingly well known. Prior to this report, 35 species in 11 genera were recognized in the West Indian region, an area extending from about Cape Hatteras, North Carolina, to the northern coast of South America. As was noted, *Petrolisthes cessacii* (A. Milne-Edwards, 1878), was erroneously thought to occur in the Caribbean Sea (e.g., Gore, 1974), but individuals previously assigned to that taxon belong instead to *Petrolisthes marginatus* Stimpson, 1859 (Manning, in litt.). The specimens previously attributed by many authors to *P. marginatus* are now recognized to constitute a new species. An additional eight species, most of which have been recently described, occur in several faunal provinces along the eastern coast of South America southward to Brazil (see, e.g., Rodrigues da Costa, 1968). With the exception of *Pisidia brasiliensis* Haig, 1968, which was reported from Caribbean Colombia by Werding (1978b), the remaining seven have not been collected to

date in Caribbean or West Indian waters. The total number of species in the western Atlantic now stands at 44, including the as yet undescribed new species. In addition, I have seen material of what probably is yet another new species of *Petrolisthes*.

At present, 65 species in 13 genera have been recorded in the eastern Pacific within the Panamic Province, extending from the Gulf of California and outer Baja Peninsula southward to about Guayaquil, Ecuador. Here, too, one new species will be described (Haig, in litt.), so that 66 species are known within the Panamic Province. Of the 89 species in 15 genera found in the eastern Pacific region, five species in two genera are presently considered to be conspecific across the Middle American land mass, with another species based on a questionable record of a juvenile specimen of an otherwise Atlantic form allegedly occurring off Ecuador.

The porcellanid fauna is exceptionally rich in the waters adjacent to the Republic of Panama, undoubtedly reflecting intense collecting efforts. Prior to this report, 43 species in 12 genera were recorded from Panamanian Pacific waters, with another five species having ranges encompassing the Pacific coast of Panama from north to south (Gore and Abele, 1976). The present study has confirmed the presence of *Megalobrachium festae* in Panama, previously recorded from north and south of the country, and established *Polyonyx confinis* as a new member of the Panamanian component. Thus, 45 species are known to occur within the Pacific waters of the Republic of Panama.

Similarly, 21 species in eight genera have been collected from Caribbean Panama, and the present study added two species recently described from Colombia, *Petrolisthes magdalenensis* and *P. rosariensis*, as well as confirming *P. marginatus*, previously misidentified as *P. cessacii*. These totals include four of the five known species presently considered conspecific across the isthmus. The only trans-Panamanian conspecific not yet recorded from that country is *Petrolisthes tonsorius*,

an eastern Pacific species with representatives found in Colombian waters (Werdning, 1977). Thus, the 24 species now recorded from Caribbean Panama, plus the 45 species from Pacific Panama (including the conspecifics), bring the total porcellanid crab fauna to 64 species in 12 genera for this country. Regrettably, collecting efforts for other central American countries are not so complete, so little can be said at this time in regard to comparison of Pacific and Atlantic faunas.

Two Panamic species, *Pachycheles trichotus* and *Petrolisthes artifrons*, were of particular interest. The former is an extremely rare form previously known from four specimens, and the latter (although known from a large type series) had not been recollected since its original description by Haig in 1960. These two forms reaffirm the fact that, although our knowledge of the Middle American porcellanids is extensive (see, e.g., Carvacho, 1980), it remains incomplete. It should also be pointed out that several genera known to occur along the Pacific coast were not represented in the collections reported herein. These included *Euceramus*, *Minyocerus*, and *Orthochela*, all cryptic, burrowing, or commensal forms that could be easily overlooked during the sampling periods. And though the porcellanid fauna from Pacific Mexican waters is reasonably well known (van der Heiden and Hendrickx, 1979; Carvacho, 1980), that of the Atlantic side is not. Nor are the faunas of other Central American areas. Collections are especially needed along the Pacific coasts of El Salvador, Honduras, Nicaragua and, Costa Rica, and in the Atlantic from the Yucatan Peninsula southward to the northern coast of Colombia. The numerous offshore islands and the extensive barrier reef system off Honduras may well harbor many new and interesting species. Much of the aforementioned area is extremely rugged terrain, sparsely populated and with difficult access. But as civilization continues to encroach on these regions, further collections may yet be facilitated, particularly (it is hoped) before total development and concomitant habitat destruction occurs.

# Appendix

## Station List

(Stations by country, and species listings of porcellanid crabs collected)

### MEXICO

1548. Sonora; Playas Arenosas near Cholla Bay, 31°19'30"N, 113°39'00"W; shallow rock tidepools, sand substrate, some algae, including *Padina* sp.; 0-0.7 m; 30°C, 36‰; 11 July 1972; Dawson and Child, coll.  
*Megalobrachium tuberculipes*  
*Pachycheles calcosus*  
*Petrolisthes sanfelipensis*
1551. Sonora; Los Algodones, N of Guaymas, about 1.0 km N of airstrip; rock and pebble beach grading to sand; low flood tide; 0-0.6 m; 30°C, 35‰; 14 July 1972; Dawson and Child, coll.  
*Petrolisthes hirtipes*
1554. Sinaloa; Tobolobampo Harbor, Isla Santa Maria, just north of bridge; fine sand, some rock; flood tide; 0-1.0 m; 16 July 1972; Dawson and Child, coll.  
*Petrolisthes armatus*
1555. Sinaloa; Mazatlan, NE shore of Isla Venado; sand beach and rock shore, some algae; flood tide; 0-1.0 m; 18 July 1972; Dawson and Child, coll.  
*Petrolisthes nobilii*  
*Petrolisthes* sp.
1557. Nayarit; Chacala, N end of beach; rock and sand bottom; flood tide; 0-1.3 m; 33°C, 35‰; 21 July 1972; Dawson and Child, coll.  
*Petrolisthes agassizii*  
*Petrolisthes* sp.
1558. Nayarit; NE beach of Isla Jaltimba, off Rincon de los Guayabitos; rock and coral sand beach; flood tide; 0-1.3 m; 22 July 1972; Dawson and Child, coll.  
*Petrolisthes agassizii*  
*Petrolisthes edwardsii*  
*Petrolisthes nobilii*
1559. Jalisco; Bahía Cuastecomate, N of Barra Navidad; fine sand, rock; flood tide; 0-0.1 m; 32°C; 25 July 1972; Dawson and Child, coll.  
*Clastocheilus diffractus*  
*Petrolisthes armatus*  
*Petrolisthes edwardsii*  
*Petrolisthes galapagensis?*  
*Petrolisthes haigae*  
*Petrolisthes lewisi lewisi*  
*Petrolisthes nobilii*

### *Petrolisthes tonsorius*

### *Petrolisthes* sp.

1235. Jalisco; east side of Tenacatita Bay, approximately 19°16'45"N, 104°48'37"W; among rocks; 0-10 ft [0-3 m] 19 August 1967; C. E. Dawson and natives, coll.

### *Petrolisthes edwardsii*

### EL SALVADOR

1295. La Unión; W of Punta Mala near entrance to Golfo de Fonesca; approximately 13°08'55"N, 87°55'40"W; rock and sand tidepools; ebb tide; to 4 ft [1.2 m]; 5 July 1968; C. E. Dawson, coll.  
*Petrolisthes armatus*
1466. La Unión; Los Maquilis, W of Punta Amapala; 13°08'55"N, 87°55'40"W; sand, pebbles, rocks, 0-200 yds [182 m] offshore; ebb low tide; 0-4 ft [0-1.2 m]; 33°C, 30.2‰; 16 June 1971; Dawson and Dawson, coll.  
*Petrolisthes armatus*
1564. La Unión; same data as above; rock, sand, tidepools; low flood tide; 0-0.6 m; 8 August 1972; Dawson and Child, coll.  
*Pachycheles calcosus*  
*Petrolisthes armatus*  
*Petrolisthes holotrichus*

### HONDURAS

1468. Valle; Golfo de Fonesca, Isla Zacate Grande; 13°18'30"N, 87°36'30"W; mud, pebbles, small rocks; low ebb tide, 0-30 ft [0-9 m] offshore; 0-2 ft [0-0.6 m]; 17 June 1971; Dawson and Dawson, coll.  
*Petrolisthes armatus*

### NICARAGUA

1565. Managua; Playas Masachapa, off end of Nicaragua Rt. 8; beach rock tidepools, sparse sand, *Padina*; low flood tide; 0-1 m; 9 August 1972; Dawson and Child, coll.  
*Petrolisthes armatus*  
*Petrolisthes nobilii*

### COSTA RICA

1566. Guanacaste; Playa del Coco, first beach S of town; rock, sand beach, tidepools; ebb-flood tide; 0-1.0 m;



- Petrolisthes agassizii*  
*Petrolisthes armatus*  
*Petrolisthes galathinus*  
*Petrolisthes* sp.  
*Pisidia magdalenensis*
- 111(1,4). Same; (1) in rocks about half-way to island along sand-rock spit; (4) equals C. E. Dawson station no. 1589; 28.8°C, 29‰; 5 November 1972; Jones, Dawson, Brown, and Kaufman, coll.
- Pachycheles calcosus*  
*Petrolisthes agassizii*  
*Petrolisthes armatus*  
*Petrolisthes galathinus*
- 132(1B,C,D,E). Same; sand spit; substations B,C,D,E equal low, mid-, and high-rocky areas and tide pools, respectively; 0–1 m; 28.7°C, 34‰; 4 April 1973; Newman, Newman, Dawson, Jones, Millard, and Mahler, coll.
- Pachycheles panamensis*  
*Pachycheles trichotus*  
*Petrolisthes agassizii*  
*Petrolisthes armatus*  
*Petrolisthes galathinus*  
*Petrolisthes tridentatus*  
*Pisidia magdalenensis*
- 56(1). Canal Zone; Farfan; rocky area and muddy sand flats N end, out to dredged canal channel; (1) fauna associated with rocks; low flood tide; 30°C, 25‰; 5 November 1971; Dawson, Rosewater, Pawson, and Jones, coll.
- Pachycheles calcosus*  
*Petrolisthes armatus*  
*Petrolisthes galathinus*
- 85(2,8,9). Same; muddy sand, coarse sand and rock; (2) rocky area near shore; (8) under rocks about 2 ft [0.6 m] above beach; (9) under rocks on W side of beach; intertidal; 26.5°C, 30‰; 14 April 1972; Dawson, Byas, and Jones, coll.
- Petrolisthes armatus*  
*Pisidia magdalenensis*
- 113(1,2). Same; rocky area near shore; intertidal; 7 November 1972; Dawson, Brown, Kaufman, and Millard, coll.
- Petrolisthes armatus*
- 134(1D). Same; in tidepools on beach; 0–2 m; 27.6°C, 32‰; 6 April 1973; Newman, Newman, Dawson, Millard, and Jones, coll.
- Petrolisthes armatus*
1496. Canal Zone; Diablo Heights; boat dock, open beach; soft brown mud, some small rocks; ebb-low tide; 0–1 ft [0–0.3 m]; 29.2°C, 20.2‰; 8 July 1971; Dawson, Dawson, and McCosker, coll.
- Petrolisthes lindae*
1524. Canal Zone; Miraflores Locks; upper E chamber; collections from middle sump and E sump of drained locks; 20.2‰; 17 January 1972; C. E. Dawson, Jones, Glynn, Rubinoff, and others, coll.
- Petrolisthes* sp.
1525. Same; lower E chamber; collections from E sump (first sump W of sea gate); 17 January 1972; Dawson, Jones, Glynn, and others, coll.
- Petrolisthes lindae*  
*Petrolisthes robsonae*
- 110(1). Same; pool below spillway, rocks and sand; 0–0.5 m; 29.2°C, 10‰; 4 November 1972; Dawson, Kaufman, Brown, and Jones, coll.
- Petrolisthes lindae*
- 130(2B,3). Same; spillway, (2B) tidepools; (3) 5–6 ft [1.5–1.8 m] above standing water; 27.5°C, 13–18‰; 2 April 1973; Dawson party, coll. [= C. E. Dawson station No. 1603].
- Petrolisthes lindae*  
*Petrolisthes robsonae*  
*Petrolisthes zacae*  
*Petrolisthes* sp.
1718. Same; E lane, lower sump of upper chamber, during dewatering; 25 August 1974; Dawson and party, coll.
- Petrolisthes lindae*
1720. Same; sump, lower chamber during dewatering; 26 August 1974; Dawson party, coll.
- Petrolisthes lindae*
1324. Canal Zone; Pedro Miguel Locks; drainage ditch; small rocks, sand and silt bottom; 29°C, 9.7‰; to 2 ft [0.6 m] depth at low flood tide; 6 August 1968; C. E. Dawson, coll.
- Petrolisthes lindae*  
*Petrolisthes robsonae*
1483. Canal Zone; Fort Amador; NE end of causeway to Naos Island (STRI); 8°56'07"N, 79°32'47"W; sand, pebbles, tidepools, and rills; low ebb tide; 0–3 in [0–7.6 cm]; 29.5‰; 30 June 1971; Dawson and Dawson, coll.
- Petrolisthes armatus*
1521. Same; small rocks, silt to gravel bottom tidepool; ebb low tide; 0–6 in [0–15.2 cm]; 29.5°C, 28‰; 15 January 1972; C. E. Dawson, coll.
- Petrolisthes armatus*
1531. Same; gravel and sand bottom; ebb-low tide; 0–6 cm; 24.5°C, 33.5‰; 12 April 1972; C. E. Dawson, coll.
- Petrolisthes armatus*
1604. Same; 0–6 cm; 32.0°C; 2 April 1973; Dawson party, coll.
- Petrolisthes armatus*
1605. Same; rockpile on E side of Naos Island causeway; sand, sandy marl, small rocks; low flood tide; 0–1 m; 3 April 1973; Dawson and party, coll.



- 29(1). *Petrolisthes galathinus*  
Same; sand beach on city side (E) of Naos Island; 8°55.15'N, 79°32.1'W; seiving up beach following (low flood) tide, 0–9 in [0–22.9 cm] into sand; 28 April 1971; R. B. Manning, M. L. Jones, and C. A. Child, coll.  
*Pachycheles calcosus*  
*Petrolisthes holotrichus*
- 46(1). Same; Naos Island; 8°55.15'N, 79°32.25'W; mud-sand beach between Naos and Pilot Vessel pier off causeway; intertidal rocks at about mid-tide level; 29 April 1971; M. L. Jones, coll.  
*Petrolisthes tridentatus*
50. Same; beach running approximately N from NE end of Ft. Amador causeway to Naos Island; about 500 yd [450 m] from causeway, cobble and coarse sand, shallow tidepools; low flood tide; 0–4 ins [0–10.1 cm]; 2 November 1971; C. E. Dawson, coll.  
*Petrolisthes armatus*
105. Same; Naos Island; Pilot Bay near island; rocky, cobbles; intertidal; 27.8°C, 26.2‰; 1 November 1972; Kaufman and Jones, coll.  
*Petrolisthes armatus*  
*Petrolisthes tridentatus*
106. Same; in front of STRI laboratory; rocky bottom; 0–1 m; 28.0°C, 29‰; 1 November 1972; Brown and C. E. Dawson, coll.  
*Megalobrachium pacificum*  
*Petrolisthes armatus*  
*Petrolisthes platymerus*  
*Petrolisthes tridentatus*  
*Petrolisthes* sp.
- 22(3). Canal Zone; Fort Amador; Culebra Island; 8°54.8'N, 79°31.9'W; on sand beach and among intertidal rocks at NW end of island; halfway flood tide; 24 April 1971; R. B. Manning, M. L. Jones, J. Rosewater, C. A. Child, and A. Dahl, coll.  
*Petrolisthes armatus*  
*Petrolisthes artifrons*  
*Petrolisthes holotrichus*  
*Petrolisthes lewisi austrinus*  
*Petrolisthes nobilii*  
*Petrolisthes platymerus*  
*Porcellana* sp.
- 28(1,2). Same; ebb, low, flood tide; 28 April 1971, Manning, Jones Rosewater, Child, Dahl, Del Rosario, and Cebellos, coll.  
*Megalobrachium festae*  
*Megalobrachium pacificum*  
*Pachycheles calcosus*  
*Pachycheles panamensis*  
*Pachycheles trichotus*  
*Petrolisthes agassizii*  
*Petrolisthes armatus*
- Petrolisthes galathinus*  
*Petrolisthes haigae*  
*Petrolisthes hians*  
*Petrolisthes holotrichus*  
*Petrolisthes lewisi austrinus*  
*Petrolisthes nobilii*  
*Petrolisthes platymerus*  
*Petrolisthes tridentatus*  
*Petrolisthes* spp.  
*Pisidia magdalenensis*
- 26(3). Canal Zone; Fort Amador; Isla Perico; 8°54.9'N, 79°31.5'W; SE side, in coarse sandy mud; intertidal; ebb to low tide; 31°C, 32‰; 27 April 1971; R. B. Manning and M. L. Jones, coll.  
*Petrolisthes agassizii*
- 82(A,B,C). Same; rocky intertidal, large boulders, cobbles, rotten outcrops; (A) crevices in rotten rock; (B) tide pools, low tide and under rocks; (C) under rocks, about 3 ft [0.9 m] above low tide; 12 April 1972; Pawson and Byas, coll.  
*Megalobrachium pacificum*  
*Petrolisthes agassizii*  
*Petrolisthes artifrons*  
*Petrolisthes galathinus*  
*Petrolisthes lewisi austrinus*  
*Petrolisthes nobilii*  
*Pisidia magdalenensis*
- 131(1A). Canal Zone; Fort Amador; Naos Island, "Scout" Island; tide pools; intertidal; 28°C, 30‰; 3 April 1973; Newman, Jones, Dawson, and Millard, coll.  
*Petrolisthes armatus*
1711. Same; rock and fine sand; low-flood tide; 0–1 m; 29°C, 24‰; 18 August 1974; Dawson and party, coll.  
*Petrolisthes agassizii*  
*Petrolisthes galathinus*
2003. Panama City; Punta Paitilla; approximately 8°58'N, 79°31'06"W; among rocky tidepools; 0–5 ft [0–1.5 m]; 27 November 1966; Dawson and F. Ponce coll.  
*Petrolisthes armatus*
2004. Same; Bay W of Punta Paitilla; approximately 8°58'15"N, 79°31'30"W; in tidal pools and among rocks; 0–3 ft [0–0.9 m]; 4 December 1966; C. E. Dawson, coll.  
*Petrolisthes armatus*
- 25(1,2,3). Same; Paitilla Beach, E side of Punta Paitilla, off Union Club; 8°58.5'N, 79°30.8'W; rocky intertidal with pools and sand gutters, some algal scum on rocks, few *Caulerpa* tide pools; (1) in bryozoans and hydroids, low tidal area; (2) at highest tidal sand line above cobbles; (3) tide pools; 92–96°F [33.3–35.5°C], 25–26.5‰; 26 April, 1971; R. B. Manning, M. L. Jones, et al., coll.  
*Petrolisthes armatus*

- Pisidia magdalenensis*
- 52(1). Same; just E of Punta Paitilla; cobbles overlain with soft mud and/or shell hash, plus associated rocks at low water; 29.8°C, 28‰; 3 November 1971; M. Jones, coll.
- Pachycheles calculosus*  
*Petrolisthes galathinus*
53. Same; Punta Paitilla; rock platform with shallow pools, down to low water mark; 3 November 1971; J. Rosewater, D. Pawson, and C. E. Dawson, coll.
- Pachycheles panamensis*  
*Petrolisthes agassizii*  
*Petrolisthes edwardsii*  
*Petrolisthes galathinus*
- 84(B,E). Same; (B) general collection from pools approximately 1–2 ft [0.3–0.6 m] above low tide level; (E) rock fauna in embayment to E of Point; intertidal; 26.2°C, 34‰; 13 April 1972; Jones, Byas, and Pawson, coll.
- Petrolisthes armatus*  
*Petrolisthes edwardsii*  
*Petrolisthes galathinus*  
*Petrolisthes platymerus*  
*Petrolisthes tridentatus*
- 107(1). Same; rocky intertidal and sandy mud; 27.8°C, 30‰; 2 November 1972; Dawson, Brown, Kaufman, and Jones, coll.
- Megalobrachium pacificum*  
*Pachycheles calculosus*  
*Pachycheles* sp.  
*Petrolisthes armatus*  
*Petrolisthes hians*  
*Petrolisthes platymerus*  
*Petrolisthes tridentatus*  
*Petrolisthes* sp.
- 129(1A,2B). Same; rock channels and tidepools, some fine silt; intertidal; ebb-low tide; 34°C, 27‰; 1 April 1973; Newman, Newman, Dawson, Millard, and Jones, coll. [= C. E. Dawson station No. 1602].
- Petrolisthes armatus*  
*Petrolisthes galathinus*  
*Petrolisthes lindae*  
*Petrolisthes nobilii*  
*Petrolisthes robsonae*  
*Petrolisthes* sp.
1499. Panama City; Panama Reef off old French Fort; 8°56'40"N, 79°31'45"W; rock reef, sand, shell, and pebbles; ebb low tide; 0–3 ft [0–0.9 m]; 33°C, 30‰; 10 July 1971; Dawson, Dawson, and McCosker, coll.
- Petrolisthes armatus*
- 58(4). Same; under and around rocks, low tide; 32.2°C, 26‰; 6 November 1971; J. Rosewater, C. E. Dawson, D. Dawson, and M. Jones, coll.
- Megalobrachium festae*
- Pachycheles panamensis*  
*Petrolisthes agassizii*  
*Petrolisthes armatus*  
*Petrolisthes edwardsii*  
*Petrolisthes galathinus*  
*Petrolisthes magdalenensis*
- 92(1,4,5). Panama City; Recife de Casa de Putas [off old French Fort, 8°57'04"N, 79°31'38"W]; hard rock, cobbles, sand, rocky; (1) associated with hard substrate at about level of low water of the day; (4) under rocks at low water levels to about 2 ft [0.6 m] above low water; (5) pools; 0–1 m; 28°C, 34‰; 18 April 1972; Dawson, Pawson, Byas, and Jones, coll.
- Pachycheles panamensis*  
*Petrolisthes agassizii*  
*Petrolisthes armatus*  
*Petrolisthes galathinus*  
*Pisidia magdalenensis*
- 133(5A,B). Same; (5A) under rocks; (5B) tidepools; 0–1 m; 30.2°C, 33‰; 5 April 1973; Newman, Newman, Dawson, Millard, and Jones, coll.
- Pachycheles calculosus*  
*Petrolisthes armatus*
- 166(1,3). Same; 0–1 m; 27.5°C, 24‰; 13 November 1973; C. E. Dawson, coll.
- Pachycheles panamensis*  
*Pachycheles* sp.  
*Petrolisthes galathinus*  
*Pisidia magdalenensis*  
*Porcellana paguriconviva*

## OFFSHORE STATIONS

- Uva. Panama, Pacific Ocean, Gulf of Chiriqui; Uva Island; reef; 22 January 1976; P. Glynn, coll.
- Petrolisthes* sp.  
*Pisidia magdalenensis*
59. Panama, Bay of Panama; Taboguilla Island; N shore, eastern beach area; 0–2 ft [0–0.6 m]; 28.8°C, 27.5‰; 7 November 1971; J. Rosewater, C. E. Dawson, D. L. Pawson, M. L. Jones, coll.
- Megalobrachium pacificum*  
*Petrolisthes agassizii*  
*Petrolisthes haigae*  
*Pisidia magdalenensis*
- 150 (B,C,D). Panama Canal Zone; E of canal channel; (B) 8°53'03"N, 79°34'07"W; 14 ft [4.3 m]; trawl; (C) 8°52'40"N, 79°35'02"W; 15 ft [4.3 m]; dredge; (D) 8°51'50"N, 79°33'43"W; 21 ft [6.4 m]; trawl; 19 April 1973, Dawson, Millard, Bryan, and Jones, coll.
- Pisidia magdalenensis*  
*Porcellana cancrisocialis*
- 160(1,3). Canal Zone; west of canal channel; (1) 8°53'47"N, 79°32'30"W; 6–7 fm [11.0–12.8 m]; (3) 8°51'35"N,

- 79°32'58"W; 6–7 fm [11.0–12.8 m]; dredge and trawl stations; 8 November 1973; Dawson and party, coll.  
*Pisidia magdalenensis*
- 161(2). Same; 8°53'49"N, 79°33'48"W; SE of Batele Point; "probably 2–4 fm" [3.7–7.3 m] (Jones, field notes); dredge and trawl stations; 9 November 1973; Jones and party, coll.  
*Pisidia magdalenensis*
- 162(6). Bay of Panama; off Panama City and Fort Amador; 8°54'50"N, 79°31'13"W; just offshore and NE of Flamenco Island; trawl and dredge station; depth unrecorded; 9 November 1973; Dawson and party, coll.  
*Pisidia magdalenensis*
32. Bay of Panama; Perlas Islands; Pedro Gonzales Island; 8°22.7'N, 79°06.2'W; W side, near SW tip, anchorage and off point; rocky areas with sand and rock flats with sparse coral; 15 ft [4.57 m]; SCUBA; 30 April 1971; P. Glynn, A. Dahl, C. A. Child, and A. Velarde, coll.  
*Pachycheles biocellatus*  
*Pachycheles crassus*  
*Pachycheles spinidactylus*  
*Pachycheles* sp.  
*Petrolisthes agassizii*  
*Petrolisthes armatus*  
*Petrolisthes edwardsii*  
*Petrolisthes galathinus*  
*Petrolisthes haigae*  
*Petrolisthes hians*  
*Petrolisthes* spp.  
*Pisidia magdalenensis*
- 33(3). Same; SW shore, cove N of SW point; 8°22.8'N, 75°05.9'W; fine sand beach and intertidal rocks; 29°C, 30‰; 30 April 1971; R. B. Manning, M. L. Jones, J. Rosewater, Del Rosario, et al., coll.  
*Petrolisthes armatus*  
*Petrolisthes edwardsii*  
*Petrolisthes galathinus*  
*Petrolisthes holotrichus*  
*Petrolisthes lewisi austrinus*
- 36(3). Same; E side; unnamed cove N of easternmost point, anchorage; 8°24.1'N, 79°05.1'W; gallon jar trap on bottom all night; ca. 3 fm [5.5 m]; 30 April 1971; R. B. Manning, M. L. Jones, et al., coll.  
*Porcellana paguriconviva*
37. Bay of Panama; Perlas Islands; Isla Chaperera; E side, small cove N of E point; 8°35.6'N, 79°01.3'W; 15–30 ft [7.6–9.1 m]; SCUBA on large *Pocillopora* reef; 1 May 1971; P. Glynn, C. A. Child, A. Dahl, K. Sandved, coll.  
*Pachycheles biocellatus*  
*Petrolisthes haigae*  
*Petrolisthes* sp.
- 38(1). Same; sandy shore beach and rock outcrops; 1 May 1971; R. B. Manning, M. L. Jones, J. Rosewater, J. Del Rosario, et al., coll.  
*Petrolisthes armatus*  
*Petrolisthes nobilii*  
*Petrolisthes platymerus*  
*Petrolisthes tridentatus*
39. Same; data as for station 37, but 200–300 yd [182.9–274.3 m] N at 10–15 ft [3.0–4.6 m] depth.  
*Pachycheles biocellatus*  
*Petrolisthes haigae*
40. Same; data as for station 38 but in intertidal zone, ebb to low water.  
*Petrolisthes nobilii*  
*Petrolisthes tridentatus*
42. Bay of Panama; Perlas Islands; Isla Pajaros; NE cove, behind E point, little island in cove; 8°34.6'N, 79°01.3'W; 1–10 ft [0.3–3.0 m]; SCUBA/snorkel; 1 May 1971; P. Glynn, A. Dahl, J. Del Rosario, K. Sandved, et al., coll.  
*Megalobrachium erosum*  
*Petrolisthes edwardsii*  
*Petrolisthes haigae*

## PANAMA, Atlantic Coast

- 81(1,2,4,9). Canal Zone; Gatun Locks, lower W chamber; (1) walls of outer platform; (2) floor of outer platform and wooden log at edges; (4) outer sill; (9) chamber floor; main collections from sumps behind sea gate and cofferdam; 28‰; 20 March 1972; Jones and Dawson, coll. [= C. E. Dawson station No. 1530].  
*Petrolisthes armatus*  
*Petrolisthes galathinus*
1687. Same; E lane of lower chamber during dewatering, from sump and sill at sea gate, and from middle sump; 5 March 1974; Dawson and party, coll.  
*Petrolisthes armatus*
- 14(2). Limón Bay; Fort Sherman, Shimmey Beach, scrapings of algae, sponges, tunicates, and hydroids from shark fence steel girders, 0–5 yd [0–45.7 m] offshore; 9°22'N, 79°56'W; 0–8 ft [0–2.4 m]; 21 April 1971; Jones, Child, Martinez, and Sarmiento, coll.  
*Megalobrachium roseum*  
*Pachycheles cristobalensis*  
*Pachycheles serratus*  
*Petrolisthes* sp.
- 127(1). Same; Devil's Beach, in rocks and coral; 0–0.5 m; 29°C, 32‰; 16 November 1972, Dawson, Jones, Brown, and Kaufman, coll.  
*Megalobrachium poeyi*  
*Megalobrachium roseum*  
*Pachycheles serratus*  
*Petrolisthes galathinus*  
*Petrolisthes rosariensis*

- Porcellana sayana*
62. Limón Bay; Fort Sherman area, just outside Fort Sherman gate; rocky bottom, dead reef, sand and marl; low flood tide depth; 29.5°C, 30‰; 10 November 1971; Del Rosario, Dawson, and Rosewater, coll.
- Petrolisthes armatus*
- 122(1,2). Same; near entrance to Fort Sherman, in rocks and dead coral near shore; 0–3 m; 29.0°C, 26‰; 13 November 1972; Dawson, Brown, and Kaufman, coll.
- Pachycheles serratus*  
*Petrolisthes armatus*
144. Same; rocky area about 1/2 mile [0.81 km] S of Fort Sherman gate; in fauna and algae; 0–1 m; 13 April 1973; Millard and Dawson, coll.
- Megalobrachium roseum*  
*Pachycheles cristobalensis*  
*Pachycheles serratus*  
*Petrolisthes armatus*
11. Limón Bay; Shelter Cove; W side of Bay, scrapings from pilings under cement vessel dock, W side of Cove; 9°22.25'N, 79°57.2'W; 0–6 ft [0–1.8 m]; 20 April 1971; Manning and Jones, Coll.
- Petrolisthes* sp.
- 145(3,6). Limón Bay; Fort Randolph; near base of E jetty, fauna on seawall; 0–1 m; 29.5°C, 34‰; 14 April 1973; Dawson, Millard, and Jones, coll. [Note: equals Dawson station No. 1616].
- Petrolisthes armatus*  
*Petrolisthes* sp.
- 153(1,4). Same; (1) sieved from *Thalassia*, substrate with occasional coral rock; (4) mud-rock at outer edge of isolated deep pool; 0–1.5 m; 29°C, 30‰; 3 November 1973; Jones and Dawson, coll.
- Megalobrachium mortenseni*  
*Petrolisthes armatus*
- 10(5,8). Same; Toro Point; W shore along base of west jetty, to 100 yd [91.44 m] S of jetty on inside of point; (5) in *Thalassia* bed; (8) on coral head; 1–4 ft [0.3–1.2 m]; 87–92°F [30.5–33°C], 20–22‰; 20 April 1971; Manning, Jones, Rosewater, Child, Sarmiento, and Martinez, coll.
- Petrolisthes galathinus*  
*Petrolisthes* sp.
- 125(1). Same; rocks and coral; 0.1–1 m; 30.3°C, 28‰; 15 November 1972; Dawson, Jones, Brown, and Kaufman, coll.
- Megalobrachium roseum*  
*Pachycheles serratus*  
*Petrolisthes armatus*
- 147(3). Same; in fauna from coral colonies; 0–1 m; 29.8°C, 30‰; 16 April 1973; Dawson, Millard, and Jones, coll.
- Megalobrachium roseum*
- Pachycheles cristobalensis*  
*Pachycheles serratus*  
*Petrolisthes galathinus*  
*Petrolisthes* sp.
- 63(1). Galeta Island; on reef flat, infauna from limestone rock near reef face; intertidal; 28.5°C, 33.5‰; 10 November 1971; M. Jones, coll.
- Pachycheles chacei*  
*Pachycheles serratus*  
*Petrolisthes jugosus*
- 128(1). Same; reef flat 1/4 mile [0.40 km] S of Galeta [STRI] lab, in rocks and coral; 0–0.5 m; 29.0°C, 32‰; 17 November 1972; Brown, Kaufman, Dawson, and Jones, coll.
- Megalobrachium roseum*  
*Pachycheles serratus*  
*Pachycheles susanae*  
*Petrolisthes galathinus*
- 123(1). Colon; 5 miles [8.05 km] E of Maria Chiquita off Portobelo road (Marco Antonio); in rocks and coral; 0–1 m; 28.3°C, 32‰; 14 November 1972; Dawson, Jones, Brown, and Kaufman, coll.
- Petrolisthes armatus*
- “Portobelo.” Portobelo; on large holothurians; April 1912, August Busck, coll. [No other data on label]; USNM 184918.
- Petrolisthes magdalenensis*
- 8(1). Portobelo; third cove SW of Buenaventura Cove; 09°31.5'N, 79°41.4'W; cobble beach with occasional coral heads and tide pools; intertidal; 87–86°F [30–30.5°C], 30.6‰; 19 April 1971; Manning, Jones, Rosewater, Child, Sarmiento, and Martinez, coll.
- Petrolisthes galathinus*
- 93(4). Golfo de San Blas; Pico Feo; associated with loggerhead sponge; 0–1 m; 27°C, 34‰; 19 April 1972; Dawson, Byas, and Jones, coll.
- Pachycheles ackleianus*
- 115(3). Same; Pico Feo N shore; 09°33'07"N, 78°58'33"W; mud, sand, rocks at breakwater; 0–0.7 m; 28.8°C, 32‰; 8 November 1972; Brown, Kaufman, Dawson, and Jones, coll.
- Petrolisthes armatus*
- 117(1). Same; Pico Feo; rocks and coral by breakwater; 0–1 m; 28.5°C, 31‰; 9 November 1972; Kaufman, Jones, Brown, and Dawson, coll.
- Petrolisthes jugosus*
- 135(4). Same; Pico Feo; *Thalassia* flat on S end of island; 0–1 m; 29.2°C, 35‰; 7 April 1973; Newman, Newman, Dawson, Millard, Jones, Mahler, coll.
- Petrolisthes marginatus*
- 94(3). Same; Isla Mira; mangrove island with coarse sand beach, drifted logs, much *Thalassia*, in coral shoal area to the NE; 0–1.5 m; 27.4°C, 34‰; 20 April 1972; Jones, Byas, and Dawson, coll.

*Petrolisthes galathinus**Petrolisthes jugosus*

116(1). Same; 09°32'58"N, 78°54'14"W; beneath rocks and coral; 0-1 m; 27.5°C, 32‰; 9 November 1972; Kaufman, Jones, Brown, and Dawson, coll.

*Petrolisthes armatus**Petrolisthes* sp.

136(1A,B,3). Same; (1A) *Thalassia* bed; (1B) reef; from loggerhead sponge; 0-1 m; 30.8°C, 35‰; 8 April 1973; Newman, Newman, Dawson, Jones, Millard, and Mahler, coll.

*Pachycheles ackleianus**Petrolisthes galathinus**Petrolisthes* sp.

## OTHER STATIONS

*Pacific*

LGA 68-30. Canal Zone; Fort Amador; E shore of Panama Canal, across the street from the Officer's Club, about 1 mile [1.61 km] from Inter-American Bridge; intertidal; 30 December 1968; L. G. Abele, coll.

*Petrolisthes tridentatus*

LGA 69-14. Canal Zone; Fort Amador, below Customs Pilot House; intertidal mud with volcanic sand; 16 January 1969; L. G. Abele, coll.

*Petrolisthes armatus**Petrolisthes tridentatus*

LGA 69-70. Bay of Panama; Taboguilla Island, W side, in *Pocillopora* coral; sand bottom; 2 m; 7 April 1969; L. G. Abele, coll.

*Petrolisthes hians**Atlantic*

Meek and Hild., No location; 22 March 1912; Meek and Hildebrand, coll.

*Petrolisthes armatus**Unknown Location*

Biffar and Abele, 28 January 1971; no further data

*Petrolisthes armatus**Petrolisthes* sp.

Fox Bay, area and region unknown

*Petrolisthes* sp.

LGA 1969. No data

*Petrolisthes armatus**Petrolisthes tridentatus*

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