EASTERN PACIFIC EXPEDITIONS OF THE NEW YORK ZOOLOGICAL SOCIETY. XLV. NON-INTERTIDAL BRACHYGNATHOUS CRABS FROM THE WEST COAST OF TROPICAL AMERICA. PART 2: BRACHYGNATHA BRACHYRHYNCHA

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To Fenner A. Chace Jr.
with sincere regards
John S. Garth

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Eastern Pacific Expeditions of the New York Zoological Society. XLV. Non-intertidal Brachygnathous Crabs from the West Coast of Tropical America. Part 2: Brachygnatha Brachyrhyncha[1,2]

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(Plate I; Text-figures 1 & 2)

[This is the forty-fifth of a series of papers dealing with the collections of the Eastern Pacific Expeditions of the New York Zoological Society made under the direction of William Beebe. The present paper is concerned with specimens taken on the Templeton Crocker Expedition (1936) and the Eastern Pacific "Zaca" Expedition (1937-1938). For data on localities, dates, dredges, etc., refer to *Zoologica,* Vol. XXII, No. 2, pp. 33-46, and Vol. XXIII, No. 14, pp. 287-298.]

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[1]Contribution No. 1011, Department of Tropical Research, New York Zoological Society.

[2]Contribution No. 243, Allan Hancock Foundation, University of Southern California.

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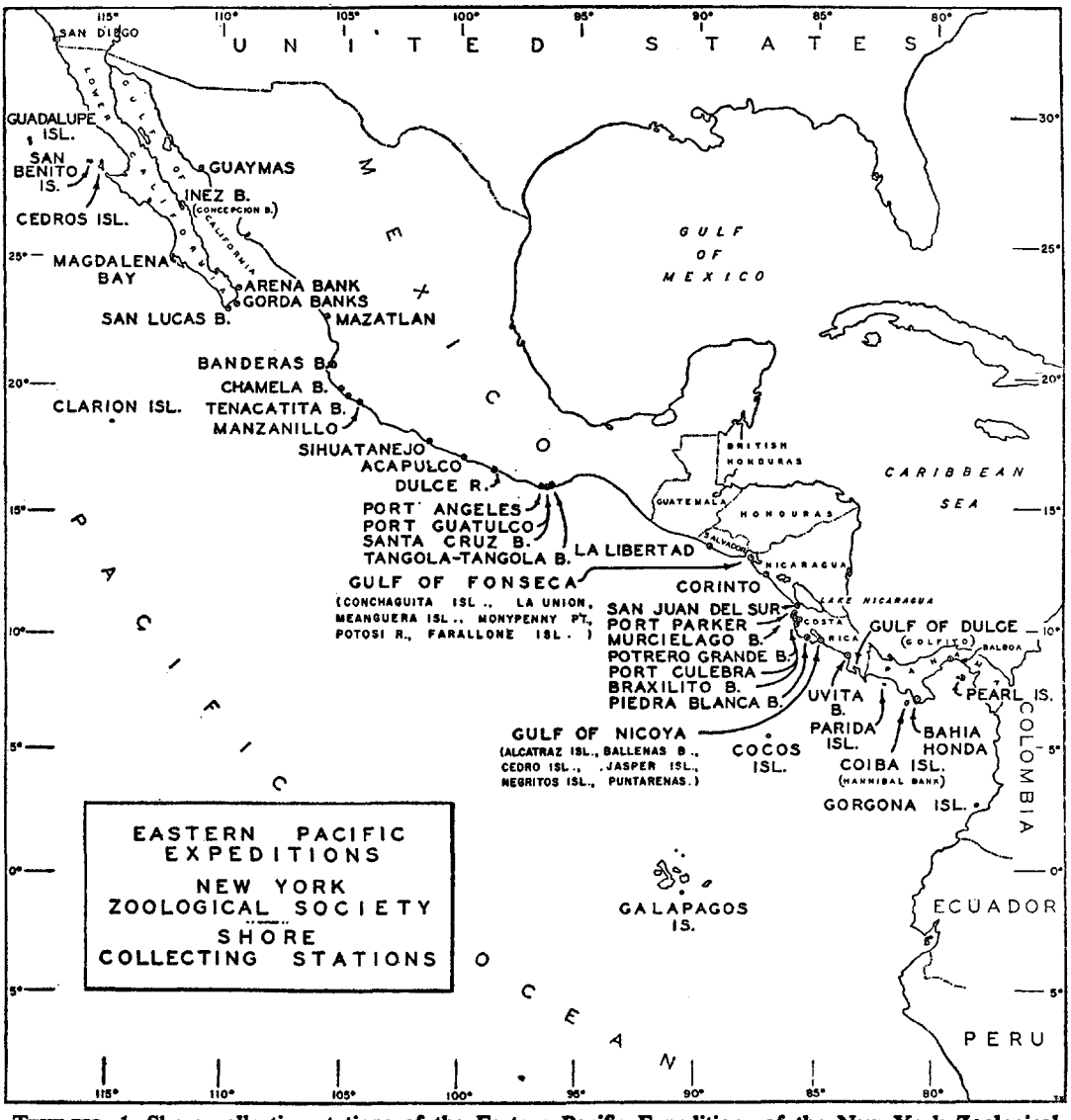
Introduction

THE brachygnathous crabs of the families Portunidae, Xanthidae, Goneplacidae and Cymopoliidae constitute the subject matter of the second part of this paper, the Majidae and Parthenopidae having been treated in part one. The Pinnotheridae are not included, since they present problems in identification not encountered in the other families, which for the area covered are much better known.

The general statements made in the introduction to part one apply equally to part two. Insofar as these were restricted to the Oxyrhyncha, however, they need supplementation for the



TEXT-FIG. 1. Shore collecting stations of the Eastern Pacific Expeditions of the New York Zoological Society. For exact locations of associated dredge stations, refer to *Zoologica*, vol. XXII, no. 2, and vol. XXIII, no. 14.

Brachyrhyncha. Of this group the cancroid or cyclometopous crabs were the subject of monographic treatment as recently as Rathbun (1930), while the grapsoid or catometopous crabs have received no comprehensive survey since Rathbun (1918). It is to be expected, therefore, that the largest number of new records will be found among the latter group.

Ecological Considerations

As in the earlier part of this report, the field notes on color, behavior and food habits provided by Miss Jocelyn Crane have been utilized freely and fully to supplement the routinely systematic portions of this paper. Of the 15 species of Portunidae, color in life is recorded for all but a few; these perhaps were not recognized as different in the field. Color notes on populations of the same species from widely separated localities are included in order to establish a basis for a future consideration of the geographical variation of color and pattern. Notes on behavior are given for *Portunus (Achelous) tuberculatus, Callinectes arcuatus* and *Cronius ruber.* The food habits of *Arenaeus mexicanus* are discussed, and the use of *Euphylax dovii* and *E. robustus* as food for the fish, *Caranx caninus,* is mentioned. Among the Xanthidae, color in life is recorded for but 9 of the 21 species, and usually from but a single locality. Color notes for the Goneplacidae and Cymopoliidae are not available.

The species that are duplicated from Crane's (1947) report on the intertidal forms are few in number. All come from her vertical zones 3 to 7, inclusive. Common to zone 3 (stones near low tide level) are *Xanthodius stimpsoni* and *Pilumnus pygmaeus.* Common to zone 4 (tidepools) are the above two plus *Menippe obtusa.* Common to zone 5 *(Pocillopora* coral) are *Medaeus spinulifer, Xanthodius stimpsoni* and *Micropanope xantusii.* Common to zones 6 and 7 (mangroves and mudflats, respectively) are *Panopeus purpureus* and *Eurytium tristani.* The fact that the *Pocillopora* coral zone is more properly subtidal or adtidal than intertidal, and that mangrove and mudflat biotopes continue below low-tide level, was discussed in the previous section of this report (Garth, 1959). Furthermore, since the specimens of *Menippe obtusa, Panopeus purpureus* and *Eurytium tristani* here reported carry no indication of depth, while *Micropanope xantusii* and *Pilumnus pygmaeus* were taken once each in a dead pearl oyster, also without indication of depth, it is possible that all five species were collected intertidally, but that lacking also evidence assigning them to a particular intertidal zone or habitat, they were set aside for later treatment with the non-intertidal material. Certainly, they form a marginal group when considered in this category.

Geographical Considerations

The present collection adds appreciably to our knowledge of distribution within the Panamic faunal province, broadly defined as extending from Lower California and the Gulf of California to southern Ecuador or northern Peru. (See Text-fig. 1).

Of species heretofore known to occur in the Gulf of California, the following may be reported as having ranges extended southward along the mainland, those marked with an asterisk having been reported previously from the Galapagos Islands (Garth, 1946) as well: *Euryplax polita* to southern Mexico, **Micropanope (?) maculatus, Speocarcinus granulimanus* and *S. californiensis* to Costa Rica, *Portunus (Achelous) iridescens* and **Micropanope polita* to Panama. Of species known to occur in Mexico south of Cape Corrientes, *Hexapanopeus orcutti* and *Pilumnus stimpsonii* may be reported southward to Costa Rica, while of species known to occur in Costa Rica, *Hexapanopeus nicaraguensis* and *H. costaricensis* may be reported southward to El Salvador and Panama, respectively.

Of species known to occur in Peru, *Speocarcinus ostrearicola* may be reported northward to Nicaragua; known to occur in Colombia, *Pseudorhombila xanthiformis* may be reported northward to Costa Rica; known from Panama, *Pilumnus limosus* and *Chasmophora macrophthalma* may be reported northward to west Mexico; while *Menippe obtusa* and *Pilumnus pygmaeus,* known from Nicaragua and Costa Rica, respectively, may be reported northward to southern Mexico. (See also Table I).

Three species, **Medaeus spinulifer, *Micropanope polita* and *Cymopolia lucasii,* are reported for the first time from Clarion Island, Mexico. An important Panama record for *Heteractaea peterseni* links the previous records from Colombia and the Gulf of California for that species. The southern record of *Arenaeus mexicanus* of Callao, Peru, is confirmed.

Systematic Considerations

The 45 species of Brachyrhyncha compare with the 44 species of Oxyrhyncha previously reported in part one of this paper. The number of species by families is as follows: Portunidae, 15; Xanthidae, 21; Goneplacidae, 8; Cymopoliidae, 1. While the total number of species for the eastern Pacific is not as readily available for the Brachyrhyncha as for the recently monographed Oxyrhyncha (Garth, 1958), it may be stated that of the Portunidae, largely a tropical

TABLE I. EXTENSIONS OF RANGE

	From	To
XANTHIDAE		
Medaeus spinulifer	Mainland	Clarion I.
Hexapanopeus costaricensis	Costa Rica	Panama
Hexapanopeus nicaraguensis	Costa Rica	El Salvador
Hexapanopeus orcutti	NW Mexico	Costa Rica
Micropanope polita	Gulf of California, Galapagos	Clarion I., Panama
Micropanope (?)maculatus	Gulf of California, Galapagos	Costa Rica
Menippe obtusa	Nicaragua	Mexico
Pilumnus pygmaeus	Costa Rica	Mexico
Pilumnus limosus	Panama	Mexico
Pilumnus stimpsonii	Mexico	Costa Rica
GONEPLACIDAE		
Pseudorhombila xanthiformis	Colombia	Costa Rica
Euryplax polita	Gulf of California	S Mexico
Chasmophora macrophthalma	Panama	Mexico
Speocarcinus granulimanus	Gulf of California	Costa Rica
Speocarcinus californiensis	Gulf of California	Costa Rica
Speocarcinus ostrearicola	Peru	Nicaragua
CYMOPOLIIDAE		
Cymopolia lucasii	Gulf of California, Galapagos	Clarion I.

family and exclusively estuarine or pelagic, the "Zaca" obtained a complete representation for the territory covered, lacking only the few endemics from Chile-Peru, the Galapagos, and the Gulf of California (the latter obtained by the "Zaca" in 1936 and reported by Crane in 1937) to complete the list of species known from the entire eastern Pacific.

Among the Xanthidae, a new species of *Hexapanopeus* is described from Corinto, Nicaragua, and the megalops of *Quadrella nitida* is described and figured for the first time. The depth range is increased for several species, among them *Pilumnus stimpsonii* and *P. limosus*. *Panopeus convexus* Bott (not A. Milne Edwards) is considered a synonym of *Eurytium tristani* Rathbun, the subspecies *minor* Bott (1955) as belonging to that species also, hence a new combination.

It is among the Goneplacidae, however, that the greatest number of "firsts" has been established. The first specimens since the types may be reported for *Pseudorhombila xanthiformis* Garth, *Speocarcinus ostrearicola* Rathbun and *Hexapus williamsi* Glassell. Moreover, each was known from but a single specimen, and the opposite sex of each is now made known, *i.e.*, the male of *Pseudorhombila*, the female of the other two.

RESTRICTION OF SYNONYMIES

In keeping with the format established in the earlier section of this report, synonymies are restricted to the original description, the first use of the name in its current combination, and the citation placing it in the territory covered, if not included in the above two. Reference is also made to the appropriate monograph of Rathbun, either the cancroid (1930) or the grapsoid (1918) volume, and to all reported occurrences of the species in the eastern tropical Pacific since then.

MEASUREMENTS

To the total length of the largest and smallest specimen examined in each class, male, female and ovigerous female, as given for the Oxyrhyncha, a second measurement, that of total width including spines, if any, has been added. In the Portunidae, where length of lateral spine is frequently a diagnostic character, a third measurement, width excluding spines, is given. Thus the figures 14.5 × 29.5 (21.5) imply length and breadth with (and without) lateral spines. The figures 29.5 – 21.5 divided by 2 will give the length of the lateral spine, in this case, 4 mm.

ACKNOWLEDGMENT

In addition to those to whom gratitude was expressed in the earlier part of this study, the writer wishes to thank Dr. Jens W. Knudsen, Pacific Lutheran College, Tacoma, Washington, an authority on larval development of the Xanthidae, for the illustration of the magalops of *Quadrella nitida* that appears as Text-fig. 2.

Systematic Discussion

Tribe Brachyura
Subtribe Brachygnatha
Superfamily Brachyrhyncha
Family Portunidae

Portunus (Portunus) xantusii (Stimpson)

Achelous xantusii Stimpson, 1860, p. 222.

Portunus (Portunus) xantusii, Rathbun, 1923, p. 620 (part); 1930, p. 50, pl. 18. Glassell, 1935, p. 105.

Not *Portunus (Portunus) xantusi,* Boone, 1930, p. 163, pl. 56, figs. A, B.

Range. – From Santa Barbara, California (Glassell), to Cape San Lucas, Lower California; Gulf of California at Agua Verde and Concepción bays. (Rathbun, 1930).

Material Examined. – San Benito Islands, west coast of Lower California, Mexico, November 9, 1937, Station 178, L-1 (night light), 8 males, 2 females.

Measurements.—Male specimen, 15.6 × 31.2 (22.6) mm., female specimen, 14.5 × 29.5 (21.5) mm.

Habitat.—Pelagic.

Color in Life.—Exceedingly variable: dullest specimen grayish speckled with black and white, pepper-and-salt fashion. Tips of legs, including chelae, pinkish; ambulatories banded white and brown. Brightest specimen pinkish pepper-and-salt with entire gastric region raspberry red. Others pinkish pepper-and-salt with anterolateral margin and that of front ringed, well inside spines, with black. One with carapace and chelae mottled brown, on the carapace a Y of brown, the prongs extending from the inner margins of the eyes to gastric region, the base along midline through cardiac and intestinal regions to posterior edge of carapace. Gastric and frontal regions between forks of Y rosy pink. Chelae with pinkish chestnut band across base and another across tips. Ambulatories overcast with pink above and below. (J. Crane, field notes).

Remarks.—A megalops possibly of this species was taken at the same time as the adults; it is translucent with large black spots.

Portunus (Portunus) acuminatus (Stimpson)

Achelous acuminatus Stimpson, 1871, p. 112.

Portunus (Portunus) acuminatus, Garth, 1940, p. 73, pl. 19, figs. 1-3; 1948, p. 33. Not Rathbun, 1930, p. 56, pl. 19.

Range.—From Isabel Island, Mexico, to La Libertad, Ecuador. 2-50 fathoms. (Garth, 1948).

Material Examined.—88 specimens from 12 stations:

Mexico

Manzanillo, November 22, 1937, Station 184, D-2, 30 fathoms, 29 males, 26 females (8 ovigerous).

17 mi. SE × E of Acapulco, November 29, 1937, Station 189, D-1, 20 fathoms, 1 male.

4 mi. SSW of Maldonado Point, November 30, 1937, Station 192, D-1, D-2, 26-33 fathoms, 2 males.

Port Guatulco, Station 195, December 4, 1937, D-2, 3 fathoms, 2 young; December 6, 1937, D-11, 5 fathoms, 1 young; D-12, 6 fathoms, 1 young; December 7, 1937, D-19, 17 fathoms, 2 young.

Tangola-Tangola Bay, Station 196, December 9, 1937, D-6, D-7, 7-6 fathoms, 2 young; December 12, 1937, D-14, D-15, 5 fathoms, 3 young; December 13, 1937, D-16, 16 fathoms, 2 young.

Nicaragua

Corinto, January 7, 1938, Station 200, D-27 to D-30, 3 fathoms, 2 young males.

Costa Rica

Port Parker, Station 203, January 20, 1938, D-1 to D-3, 10-15 fathoms, 2 males, 2 females (1 ovigerous); January 22, 1938, D-11, 2-4 fathoms, 1 male.

Port Culebra, January 30, 1938, Station 206, D-2, 14 fathoms, 1 female, 1 young.

Cedro Island, Gulf of Nicoya, February 13, 1938, Station 213, D-1 to D-10, 4-10 fathoms, 1 young.

14 mi. S × E of Judas Point, March 1, 1938, Station 214, D-2, D-3, 43-50 fathoms, 1 male.

Golfito, Gulf of Dulce, March 9, 1938, Station 218, D-4, D-5, 6 fathoms, 1 young male.

Panama

Bahia Honda, March 18, 1938, Station 222, D-1 to D-3, D-5, 3-11 fathoms, 3 young.

Measurements. – Males from 9.3 × 18.5 (14.3) to 16.0 × 41.9 (27.2) mm., females from 8.0 × 16.4 (12.1) to 16.2 × 37.7 (26.8) mm., ovigerous females from 8.0 × 16.4 (12.1) to 15.3 × 36.2 (26.0) mm., young from 5.0 × 9.0 (7.3) mm.

Habitat.—Shelly mud, shelly sand; gravelly mud, gravelly sand; sandy mud; crushed shell; mangrove leaves; rock; dead coral.

Color in Life.—Of an Acapulco, Mexico, specimen: Chestnut mottled with darker. Of Manzanillo, Mexico, specimens: "Plain" and "orange branchialed"; eggs raspberry. Gastric spot present or absent as in *Portunus (Achelous) affinis.* (J. Crane, field notes.)

Remarks.—The identification of this and the following two species of *Portunus (Portunus)* occurring widely throughout the Panamic Province has been facilitated by a prior study (Garth, 1940, p. 73) based on Hancock Expedition material in which the true *P. (P.) acuminatus* (Stimpson) was recognized and a neotype established. The result was to accord equal and full specific rank to *acuminatus* (Stimpson), *panamensis* (Stimpson), and *asper* (A. Milne Edwards) [= *transversus* (Stimpson)], rather than to consider them members of the so-called "*acuminatus-asper-panamensis* group" (Rathbun, 1930, p. 53). The acuminate lateral spine and the slender, almost filiform chelae are diagnostic, now that ample material is available to show these distinctive features.

Portunus (Portunus) asper (A. Milne Edwards)

Neptunus asper A. Milne Edwards, 1861, p. 325, pl. 30, figs. 3-3c.

Portunus (Portunus) asper, Rathbun, 1930, p. 56, pl. 20, figs. 2, 3, pl. 21, pl. 22, figs. 1, 2. Garth, 1948, p. 33; 1957, p. 36, synonymy.

Range. — From Mazatlan, Mexico, to Chile. To 16 fathoms. (Garth, 1957).

Material Examined.—33 specimens from 10 stations:

Mexico

17 mi. SE × E of Acapulco, November 29, 1937, Station 189, D-1 to D-3, 13-20 fathoms, 2 males, 1 ovigerous female.

Mouth of Dulce River, November 30, 1937, Station 191, D-1, 8 fathoms, 1 male, 1 young.

Port Guatulco, December 6, 1937, Station 195, D-11, 5 fathoms, 1 young; D-12, 6 fathoms, 1 male.

Tangola-Tangola Bay, Station 196, December 9, 1937, D-1, D-2, D-5, 5-9 fathoms, 4 young; December 13, 1937, D-16, 16 fathoms, 2 males, 1 female, 1 young.

El Salvador

Meanguera Island, Gulf of Fonseca, December 23, 1937, Station 199, D-1, 16 fathoms, 1 male.

Costa Rica

Murcielago Bay, January 23, 1938, Station 204, D-1, D-2, D-4, 2-4 fathoms, 2 young.

Port Parker, January 30, 1938, Station ?, depth ?, 1 young male.

Piedra Blanca Bay, Station 208, February 1, 1938, L-1, surface at light, 1 male, 1 ovigerous female, 7 young; February 5, 1938, D-1 to D-3, D-6, D-7, D-9, 3-6 fathoms, 1 male, 2 young.

Cedro Island, Gulf of Nicoya, February 21, 1938, Station 213, L-1, surface at light, 1 male.

Golfito, Gulf of Dulce, March 7, 1938, Station ?, depth ?, 1 female without chelipeds.

Measurements. — Males from 10.2 × 22.0 (15.9) to 41.9 × 96.5 (69.3) mm., females from 14.7 × 32.8 (23.7) to 39.6 × 85 (65.2) mm., ovigerous females from 38.1 × 85.5 (61.7) mm., young from 5.2 × 9.3 (7.6) mm.

Habitat. — Sand, mud, sandy mud, gravelly sand, crushed shell, rocks, algae.

Color in Life.—Of Piedra Blanca, Costa Rica, specimens: 39 mm. ovigerous female and 20 mm. male olive buff above except for white-tipped spines. Carpus, manus and dactyls of ambulatories (but not of swimming legs) lilac. Swimming legs with posterior half of paddle only lilac. Middle of fixed finger with a band of brick red; tips of both dactyls white. Underparts white. Eggs bright orange. 11 mm. young lack the violet and are grayer, not buffy, with suggestions of red bar across fixed finger. (J. Crane, field notes).

Of Gulf of Fonseca, El Salvador, male: Carapace and all legs pale olive brown; a white spot on posterior lateral margin. Movable dactyl dull violet basally, distal part and fixed finger white; dactyls of ambulatories rose red, tips white, distal half of swimmerets violet red. (J. Crane, field notes).

Of Acapulco, Mexico, specimens: Carapace and chelipeds pale olive brown, ridges darker. Ambulatories and cheliped wine colored. Manus and dactyls of swimmerets white with two longitudinal stripes of dark brown or pale buff. One patch faintly visible on posterolateral region of large male; below this, on margin, a white spot. (J. Crane, field notes). Underside white.

Remarks. — The broad anterolateral arc and teeth that show little reduction are characters useful in separating this species from both *Portunus (P.) acuminatus* and *P. (P.) panamensis*, while the heavier cheliped will serve to separate this species from *P. (P.) acuminatus* even in the young, where the relative lengths of the lateral spines might not suffice.

Portunus (Portunus) panamensis (Stimpson)

Achelous panamensis Stimpson, 1871, p. 112.

Portunus (Portunus) panamensis, Rathbun, 1910, pp. 577, 610; 1930, p. 58, pl. 20, fig. 1, pl. 22, fig. 3, pls. 23, 24. Finnegan, 1931, p. 626, text-fig. 5. Garth, 1948, p. 34.

Range.—From Panama Bay to Bay of Sechura, Peru (from Angeles and Mulege Bays, Gulf of California, Mexico, only if Rathbun's synonymy of *Amphitrite paucispinis* Lockington be accepted). To 33 fathoms. (Garth, 1948).

Material Examined.—115 specimens from 6 stations:

Nicaragua

Corinto, January 5, 1938, Station 200, D-12 to D-19, 1-13 fathoms, 2 young.

Costa Rica

Port Parker, Station 203, January 20, 1938, D-1 to D-3, 10-15 fathoms, 29 males, 24 females (10 ovigerous), 1 young; January 22, 1938, D-4, 7 fathoms, 3 males, 3 females; D-6, 1 fathom, 1 young; D-7, 9-5 fathoms, 1 female; D-8, 9 fathoms, 1 female; D-9, 1.5-4 fathoms, 1 male, 1 female; D-11, 2-4 fathoms, 1 male, 1 ovigerous female; D-12, 2 fathoms, 1 male; D-15, 9-2 fathoms, 2 males, 2 females, 1 young.

?Golfito, Gulf of Dulce, March 9, 1938, Station 218, D-8, 6 fathoms, 1 male, 1 young.

Panama

Bahia Honda, March 18, 1938, Station 222, D-1 to D-3, D-5, 3 fathoms, 2 males, 3 females, 2 young.

Colombia

At sea near Gorgona Island, March 27, 1938, from mangrove seeds floating in tide rip, 5 young, questionably of this species.

Gorgona Island, March 31, 1938, Station 232, D-1, 2-8 fathoms, 1 male, 25 young.

Measurements.—Males from 4.4 × 6.7 (6.0) to 11.2 × 22.0 (17.6) mm., females from 4.5 × 7.3 (6.2) to 11.0 × 21.5 (16.8) mm., ovigerous females from 5.5 to 9.1 (7.8) to 8.6 × 15.6 (12.7) mm., young from 3.0 × 5.0 mm. All but the largest male came from the first Port Parker series.

Habitat.—Sandy and shelly mud, shelly sand, crushed shell, gravel, rocks, coral, algae, and mangrove leaves. (These all from Station 203).

Remarks.—A small species, as shown by the size of the ovigerous females, which would be in the size range of young in either the *Portunus (Portunus) asper* or *P. (P.) acuminatus* series. The young taken at sea off Gorgona Island, the largest of which is only 3.5 mm. in length by 5.6 mm. in width, may be of two species. The two larger specimens show the alternation of large and small anterolateral teeth expected in *P. (P.) panamensis;* the three smaller specimens have anterolateral teeth of equal size, as in *P. (P.) asper.* The species finds its optimum conditions in the shallow bays of Costa Rica and Panama, judging from the tremendous breeding population found by the "Zaca" at Port Parker, and occurs sparingly to the north and south.

Portunus (Achelous) brevimanus (Faxon)

Achelous spinimanus, Faxon, 1895, p. 23. Not *Portunus spinimanus* Latreille.

Achelous brevimanus Faxon, 1895, p. 23.

Portunus (Achelous) brevimanus, Rathbun, 1898, p. 593 (part: not the Galapagos specimens); 1930, p. 68, pls. 29, 30.

?Portunus (Achelous) spinimanus, Finnegan, 1931, p. 628. Not *Portunus spinimanus* Latreille.

Range.—Revilla Gigedo Islands, Mexico, and Cocos Island, Costa Rica. (Rathbun, 1930).

Material Examined. — 2 specimens from 2 Revilla Gigedo Islands stations: Sulphur Bay, Clarion Island, May 11, 1936, from night light, 1 male. 3 mi. off Pyramid Rock, Clarion Island, May 12, 1936, Station 136, D-2, 55 fathoms, 1 female.

Measurements. — Male 8.4 × 14.3 (11.3) mm., female 17.6 × 28.0 (23.8) mm.

Habitat.—Not given.

Remarks.—Aside from the suggestion by Glassell (1934, p. 454) that specimens from Perlas Islands, Panama, and Puntarenas, Costa Rica, attributed to *Portunus (Portunus) xantusii* (Stimpson) by Boone (1930, p. 163, pl. 56, figs. A, B), might instead represent Faxon's species, a suggestion questioned by this writer, *P. (Achelous) brevimanus* has not been reported from the Central or South American mainland, unless specimens from Gorgona Island attributed to the Atlantic *P. (Achelous) spinimanus* Latreille by Finnegan (1930) be of this species. Specimens from the Galapagos Islands earlier attributed to *P. (A.) brevimanus* by Rathbun (1898) were subsequently described by her (1902) as *P. (A.) stanfordi.*

Portunus (Achelous) pichilinquei Rathbun

Portunus (Achelous) pichilinquei Rathbun, 1930, p. 78, pl. 37. Crane, 1937, p. 67.

Range.—From Magdalena Bay, west coast of Lower California, and Cape Tepoca, Gulf of California, to Cape San Lucas. 0.5 to 33 fathoms. (Crane, 1937).

Material Examined.—San Lucas Bay, Lower California, Mexico, November 13, 1937, Station 135, D-27, 2-6 fathoms, 1 young male.

Measurements.—Young male, 6.0 × 9.8 (8.2) mm.

Habitat.—Sand bottom.

Color in Life.—Mottled olive and grayish and black. Legs grayish banded with black. Underside pure white. (J. Crane, field notes).

Remarks.—The single specimen was taken in the same dredge haul with *Arenaeus mexicanus.*

Portunus (Achelous) affinis (Faxon)

Achelous affinis Faxon, 1893, p. 155 (part: not the Guaymas, Mexico, specimens); 1895, p. 23.

Portunus (Achelous) affinis, Rathbun, 1898, p. 595; 1930, p. 80, pls. 38, 39.

Portunus affinis, Coventry, 1944, p. 538.

Range.—From Cape San Lucas, Lower California, Mexico, to Ecuador. (Rathbun, 1930).

Material Examined. — 59 specimens from 5 stations:

Mexico

Tenacatita Bay, November 21, 1937, Station 183, D-2, D-3, 30-40 fathoms, 4 males, 6 females.

Manzanillo, November 22, 1937, Station 184, D-2, 30 fathoms, 7 males, 7 females (5 ovigerous).

Port Guatulco, Station 195, December 3-5, 1937, light, 1 male; December 6, 1937, D-13, 8 fathoms, 2 young; D-16, 10 fathoms, 1 male, 7 young; December 7, 1937, D-17, 6 fathoms, 1 young; D-19, 17 fathoms, 1 young male; D-20, 23 fathoms, 2 males; D-21, 18 fathoms, 1 young male.

Tangola-Tangola Bay, Station 196, December 9, 1937, D-1, D-2, D-5, 5 fathoms, 3 young; D-6, D-7, 7-6 fathoms, 1 young; December 13, 1937, D-16, 16 fathoms, 1 young; D-17, 23 fathoms, 13 young.

Colombia

Gorgona Island, March 31, 1938, Station 232, D-1, 2-8 fathoms, 1 young.

Measurements. — Males from 8.0 × 12.5 (11.2) to 25.4 × 44.6 (38.4) mm., females from 14.8 × 25.1 (22.0) to 21.1 × 36.8 (30.9) mm., ovigerous females from 16.0 × 27.3 (24.0) to 21.1 × 36.8 (30.9) mm., young from 4.0 × 5.9 mm.

Habitat. — Sand, mud, sandy mud; gravelly sand, gravelly mud; crushed shell.

Color in Life.—Of Tenacatita Bay specimens: Apricot buff, striations brown, chelipeds and ambulatories, especially inner sides of manus and dactylus, streaked with violet. A constant white spot in middle of posterolateral margin.

Of Manzanillo specimens: White spot on gastric region and spot above base of swimming legs on abdomen may be present, absent, or faint. Posterolateral spot, however, constant. Eggs raspberry. (J. Crane, field notes).

Remarks.—This species is at once separated from the *Portunus (Portunus)* species of the Panamic Province with which it ranges coextensively by its short lateral spine and spinulous merus of the fourth ambulatory (or natatory) leg. In the latter respect it resembles *P. (P.) xantusii* of southern California – west coast of Lower California.

Portunus (Achelous) tuberculatus (Stimpson)

Achelous tuberculatus Stimpson, 1860, p. 223.

Portunus (Achelous) tuberculatus, Rathbun, 1898, p. 596; 1930, p. 90, pl. 44. Finnegan, 1931, p. 629. Crane, 1937, p. 68. Garth, 1946, p. 421, pl. 71, fig. 2; 1948, p. 34.

Range.—From Cape San Lucas, Lower California, Mexico, to off Ecuador. Galapagos Islands. 3-70 fathoms. (Garth, 1948).

Material Examined.—200 specimens from 6 stations:

Mexico

Chamela Bay, November 17, 1937, Station 182, D-4, 16 fathoms, 1 female.

Port Guatulco, Station 195, December 4, 1937, D-3, 3.5 fathoms, 1 female; December 5, 1937, D-8, D-9, 6-7 fathoms, 4 males, 6 females; December 7, 1937, D-16, 10 fathoms, 2 males, 11 young; D-17, 6 fathoms, 1 male, 2 females, 4 young; D-18, 6 fathoms, 8 males, 6 females.

Tangola-Tangola Bay, Station 196, December 9, 1937, D-1, D-2, D-5, 5-9 fathoms, 1 female, 3 young; D-6, D-7, 6-7 fathoms, 2 males, 2 females (1 ovigerous), 26 young; D-8, 9 fathoms, 4 males, 2 females, 43 young; December 12, 1937, D-9 to D-12, 4.5 to 7.5 fathoms, 3 young; D-13, 10 fathoms, 1 male, 4 young; D-14, D-15, 5 fathoms, 3 males, 3 females (2 ovigerous), 27 young; December 13, 1937, D-16, 16 fathoms, 1 young.

Costa Rica

Port Parker, Arriba rocks, January 16-17, 1938, 2 males; Station 203, January 22, 1938, D-11, 2-4 fathoms, 1 female.

Piedra Blanca Bay, February 5, 1938, D-1 to D-3, D-6, D-7, D-9, 3-6 fathoms, 1 male, 1 young.

Colombia

Gorgona Island, March 31, 1938, Station 232, D-1, 2-8 fathoms, 1 male, 1 female, 22 young.

Measurements. — Males from 6.0 × 11.6 (8.6) to 11.3 × 26.4 (18.3) mm., females from 6.9 × 14.4 (10.5) to 10.2 × 22.9 (16.0) mm., ovigerous females from 7.8 × 15.1 (11.2) to 9.0 × 18.5 (13.7) mm., young from 4.6 × 7.3 (6.3) mm.

Habitat. — Predominantly sand, often with crushed shell or algae; occasionally rock; rarely mud.

Color in Life. — Of Chamela Bay, Mexico, female: General color light brown marbled with black; base of lateral spines tinged with crimson. Legs barred cream and brown. Underparts white (J. Crane, field notes).

Behavior. – Kept alive in aquarium in 2½ inches of water on native sand (coarse sandy bottom with tiny shells). Much more responsive to light than *Cycloes* and more nervous and active; continually changing position, burrowing quickly in sand, hind end first. Digs with ambulatories, kicking sand out forward to chelipeds. Sinks all of self except front and eyes. (J. Crane, field notes).

Remarks. – Of small size but distinctively ornamented with tubercles, and bearing a spine at the posterolateral angles of the carapace, as well as a long, straight lateral spine, *Portunus* (*Achelous*) *tuberculatus* is easily segregated from the several other species of *Portunus* with which it customarily occurs, often in the same dredge hauls.

Portunus (Achelous) iridescens (Rathbun)

Neptunus (*Hellenus*) *iridescens* Rathbun, 1893, p. 240.

Portunus (*Achelous*) *iridescens*, Rathbun, 1930, p. 93, pl. 46. Crane, 1937, p. 66.

Portunus (*Achelous*) *spinicarpus*, Finnegan, 1931, p. 628. Not *Achelous spinicarpus* Stimpson.

Range.—From off Santa Margarita Island, west coast of Lower California, and from off Diggs Point to off La Paz Bay, Gulf of California, Mexico. 18-112 fathoms. (Rathbun, 1930). Gorgona Island. (Finnegan).

Material Examined.—31 specimens from 2 stations:

Costa Rica

14 mi. S × E of Judas Point, March 1, 1938, Station 214, D-2, D-3, 50 fathoms, 13 males, 13 females (6 ovigerous).

Panama

Gulf of Chiriqui, March 13, 1938, Station 221, D-3 to D-5, 35-40 fathoms, 2 males, 3 females.

Measurements.—Males from 14.4 × 29.3 (21.5) to 24.7 × 48.0 (36.5) mm., females from 16.2 × 31.0 (24.9) to 25.3 × 48.5 (37.4), ovigerous females from 17.0 × 36.3 (25.6) to 21.1 × 42.7 (31.3) mm.

Habitat.—Mud; sandy mud.

Color in Life—Not recorded.

Remarks.—Distinguished from all other Pacific Portunidae by the long inner carpal spine, a character shared with the Atlantic *Portunus* (*Achelous*) *spinicarpus* (Stimpson). The Costa Rican and Panamanian localities above would represent the first records for the species from the Bay of Panama, were it not for the previous report of the "St. George" from Gorgona Island, Finnegan (1931) attributing it to the Atlantic species.

Callinectes arcuatus Ordway

Callinectes arcuatus Ordway, 1863, p. 578. Rathbun, 1930, p. 121, pl. 52. Garth, 1948, p. 35; 1957, p. 36, synonymy. Holthuis, 1954, p. 27. Bott, 1955, p. 56.

Range.—From Anaheim Slough, California, to ? south Chile. (Garth, 1957).

Material Examined.—100 specimens from 13 stations:

Mexico

Chamela Bay, North Lagoon, November 17, 1937, 1 male, 3 females (2 ovigerous).

Acapulco Beach, November 26-28, 1937, 1 male.

Honduras

Cutuco and Potosi Lights, Gulf of Fonseca, December 20, 1937, 4 males, 6 females, 3 young.

El Salvador

La Union, Gulf of Fonseca, December 27, 1937, Station 199, D-8 to D-16, 5-6 fathoms, 1 female.

Nicaragua

Corinto, December 29, 1937, Station 200, D-7, 2 fathoms, 1 young; January 7, 1938, D-20 to D-26, 1.5-6.5 fathoms, 2 young. Castenones Lagoon and mid-harbor, January 6, 1938, 4 males, 4 females.

Costa Rica

Port Parker, January 13, 1938, shore, 1 male, 3 females (1 ovigerous), 4 young; January 22, 1938, Station 203, D-9, 1.5-4 fathoms, coral, 1 young.

Port Culebra, January 26, 1938, 8 males, 3 females, 2 young; January 30, 1938, 1 young male.

Piedra Blanca, February 6, 1938, 2 males, 2 females.

Cedro Island, Gulf of Nicoya, February 12, 1938, 1 male.

Golfito, Gulf of Dulce, March 5, 1938, 1 male, 1 female, 4 young; March 9, 1938, Station 218, D-4, D-5, 6 fathoms, 3 young; D-8, 6 fathoms, 2 young; same date, mudflats, 1 young.

Panama

Bahia Honda, March 16, 1938, 3 males, poor condition; March 19, 1938, tidepool, 1 male, lacks chelipeds.

Bella Vista, Panama City, 1944, 5 males.

Canal Zone

Balboa, April, 1938, night light, 3 males, 2 females, 8 young; 1940, 3 males, 5 young.

Ecuador

Puerto Bolivar, April, 1944, 1 male.

Measurements.—Males from 17.0 × 39.6 (29.2) to 42.8 × 98 (75.2) mm., females from 16.0 × 35.2 (26.4) to 51.8 × 102.8 (85.7), ovigerous females from 24.7 × 52 (42) to 51.8 × 102.8 (85.7) mm., young from 5.7 × 12.9 (10.5) mm.

Habitat.—Mud, shells, mangrove leaves; frequently taken in mudflats or shallow lagoons, at Gulf of Dulce "mostly salt, slightly brackish." Came often to shipside light at night. One coral station.

Color in Life.—Of Port Parker male: Carapace dull olive gray-green. Chelipeds olive green dorsally, whitish ventrally, washed with bluish-violet and chelae tipped with pale yellow-brown. Legs turquoise washed with olive; hairs straw gold; swimming legs olive green with suggestion of turquoise, paddles washed with black; hairs straw; tubercles at leg joints golden orange; eyes straw with brownish streaks; underparts pure white. (J. Crane, field notes).

Of Chamela Bay females: Carapace in general blue with olive pile: central portion (without pile) blue-violet; anterolateral margins deep purplish-vinaceous. Base of merus of cheliped olive, inner margin of manus blue-violet, rest of cheliped purplish. Spines of cheliped and tips of anterolateral spines white. Chelae varied, fixed finger usually tipped with white; both fingers barred with purple. Ambulatories Italian blue, hairs olive; swimming legs same with tubercles at joints and all margins narrowly violet; swimming feet sometimes turquoise green. Abdomen violet, joints white; plastron white; under sides of legs, however, colored like upper sides. (J. Crane, field notes).

Behavior.—Of Chamela Bay females: 8 large females [were seen] near the mouth of the lagoon, all with buffy eggs. [Each was] swimming singly, at least 25 feet away from the nearest other one. [There were] no males in the vicinity, nor were there [any] small females. (J. Crane, field notes).

Remarks.—In view of the overlapping ranges of this and the following species, it was considered more than likely that some of the young listed above would prove to be *Callinectes toxotes,* to which only two large males are referred. Specimens from Acapulco Beach, Mexico, Golfito, Costa Rica (Sta. 218, D-8), and Puerto Bolivar, Ecuador, all of which showed blunted or rounded frontal teeth, were compared with specimens of like size in the Hancock collections determined by M. J. Rathbun as *C. toxotes.* Not only did the "Zaca" young fail to show the narrow intramedial area, but they proved dissimilar from *C. toxotes* in other characters as well. It was concluded, therefore, that all young *Callinectes* obtained by the "Zaca" were *C. arcuatus.* (See also *Remarks* under the following *C. toxotes*).

Callinectes toxotes Ordway

Callinectes toxotes Ordway, 1863, p. 576. Rathbun, 1930, p. 127, pl. 54. Garth, 1948, p. 35; 1957, p. 37, synonymy. Holthuis, 1954, p. 27. Bott, 1955, p. 56.

Range.—From Cape San Lucas, Lower California, Mexico, to mouth of River Tumbes, Peru. Juan Fernandez Island, Chile. (Garth, 1957).

Material Examined.—2 specimens from as many stations:

Costa Rica

Piedra Blanca, February 6, 1938, 1 large male.

Golfito, Gulf of Dulce, March 6, 1938, 1 large male.

Measurements.—The two males measured 46.5 × 89.2 (76.4) and 52.8 × 101.3 (87.5) mm., respectively.

Habitat.—Not stipulated, but presumably as in the preceding species.

Color in Life.—Not noted.

Remarks.—A more granulate species than *Callinectes arcuatus, C. toxotes* is further characterized by having the frontal teeth rounded, the middle pair equally advanced with the outer pair in the young. The intramedial area, that portion of the gastric region behind the posterior of the gastric carinae, is as long as its posterior width. These characters are all apparent in young from Costa Rica from among Hancock collections determined for the writer prior to 1935 by the late Mary J. Rathbun. The absence of young, and of mature females, from the "Zaca" series would indicate that *C. toxotes* is much less abundant, and that it may have narrower ecological tolerances than *C. arcuatus.*

Arenaeus mexicanus (Gerstaecker)

Euctenota mexicana Gerstaecker, 1857, p. 131, pl. 5, figs. 3, 4.

Arenaeus mexicanus, Faxon, 1895, p. 22. Rathbun, 1930, p. 137, pl. 58, fig. 1, pl. 61. Garth, 1948, p. 35. Holthuis, 1954, p. 28.

Range.—From Ballenas Bay, Lower California, and Carmen Island, Gulf of California, Mexico, to Ancon, Peru. (Garth, 1948).

Material Examined.—101 specimens from 18 localities:

Mexico

San Lucas Bay, Lower California, November

13, 1937, Station 135, D-27, 2-6 fathoms, 1 male, 3 young.

Chamela Bay, lagoon shore, November 17, 1937, 2 males. Passavera Island, November 19, 1937, 1 male, 3 females (1 ovigerous).

Acapulco beach, November 26-28, 1937, 1 male.

Port Guatulco, December 3-5, Station 195, L-1 to L-3 (light), 2 females.

Tangola-Tangola Bay, Station 196, December 9, 1937, D-1, D-2, D-5, 5-9 fathoms, 9 young; December 12, 1937, D-9 to D-12, 7.5-4 fathoms, 8 young.

Nicaragua

Corinto, Station 200, January 5, 1938, D-12 to D-19, 3-13 fathoms, 1 male, 6 young; January 7, 1938, D-20 to D-26, 1.5-6.5 fathoms, 12 young.

San Juan del Sur, January 9, 1938, 1 carapace.

Costa Rica

Potrero Grande Bay, January 20, 1938, 1 male, 2 ovigerous females.

Murcielago Bay, January 23, 1938, Station 204, D-1, D-2, D-4, 2-4 fathoms, 9 young.

Piedra Blanca Bay, February 5, 1938, Station 208, D-1 to D-3, D-6, D-7, D-9, 3-6 fathoms, 1 young; February 6, 1938, 1 male.

Cedro Island, Gulf of Nicoya, February 12, 1938, 1 male, 3 females, 3 young.

Ballenas Bay, Gulf of Nicoya, [February 25, 1938], 1 male, found dead in mangroves.

Uvita Bay, March 3, 1938, seine, 6 males, 2 females.

Panama

Isla Parida, Gulf of Chiriqui, March 12, 1938, 1 male.

Bahia Honda, March 14, 1938, 1 male.

Pacheca Island, Pearl Islands, July 4, 1933, tidepools, "Antares," 1 male.

Colombia

Gorgona Island, March 28, 1938, 2 males; March 31, 1938, Station 232, D-1, 2-8 fathoms, 7 young.

Peru

Immediately S of Callao, 1941, 9 males, caught by natives, gift of Mrs. Sherman P. Haight.

Measurements. – Males from 8.1 × 19.1 (13.8) to 35.0 × 80.3 (60.1) mm., females from 12.4 × 31.0 (21.0) to 29.0 × 65.5 (47.4) mm., ovigerous females from 17.6 × 39.0 (30.0) to 29.0 × 65.5 (47.4) mm., young from 4.0 × 7.5 (6.0) mm.

Habitat.—Sand, rarely with mangrove leaves, rocks, or algae.

Food.—Four stomachs: amphipods (2), sand, algae, and iridescent, fine nacre shell (very thin, inner layers only apparently) (2). (J. Crane, of 15 to 33 mm. specimens seined at Piedra Blanca).

Color in Life.—Of San Lucas Bay specimens: All mottled, gray and black, spotted with white. Underside of legs and carapace, except abdomen, speckled with black. Chelipeds and legs grayish spotted with black. Two conspicuous black spots on carapace, one on each side of mid-gastric region. (J. Crane, field notes).

Of Chamela Bay specimens: Olive-tinged pepper-and-salt with bright white spot in middle of posterior gastric region and another on intestinal region. (J. Crane, field notes).

Of Passavera, Chamela Bay, specimens: Olive spotted finely with white. Eggs bright orange. Distal segments of legs pale gray. (J. Crane, field notes).

Remarks.—The Haight specimens, included here for convenience although not of "Zaca" collecting, confirm the southern limit of range for the species, Callao, Peru, being just a few miles south of Ancon, where a single specimen was obtained by R. E. Coker (Rathbun, 1930).

Cronius ruber (Lamarck)

Portunus ruber Lamarck, 1818, p. 260.

Cronius ruber, Stimpson, 1860, p. 225. Rathbun, 1930, p. 139, pls. 62, 63. Finnegan, 1931, p. 630. Garth, 1946, p. 422, pl. 72, figs. 3, 4; 1948, p. 36. Holthuis, 1954, p. 28, text-fig. 10.

Range.—From Point San Bartolome, Lower California, Mexico, to Paita, Peru. Galapagos Islands. 4-20 fathoms. Occurs also in the Atlantic. (Garth, 1948).

Material Examined.—48 specimens from 12 stations or localities:

Mexico

Chamela Bay, November 17, 1937, Station 182, D-1, 8 fathoms, 1 young.

Manzanillo, November 22, 1937, Station 184, D-1, 25 fathoms, 1 young.

Port Guatulco, Station 195, December 5, 1937, D-5, D-7, 2-4.5 fathoms, 2 males, 1 female, 3 young; D-8, D-9, 6-7 fathoms, 1 female, 7 young; D-8, D-9, 6-7 fathoms, 1 female; December 6, 1937, D-14, 4 fathoms, 1 female; December 7, 1937, D-18, 6 fathoms, 1 young.

Tangola-Tangola Bay, December 9, 1937, Station 196, D-6, D-7, 7-6 fathoms, 1 male, 1 young; December 12, 1937, D-14, D-15, 5 fathoms, 2 young.

Honduras

Cutuco and Potosi Lights, Gulf of Fonseca, December 20, 1937, 1 male.

Gulf of Fonseca, date?, fumarole, 1 young, 1 ovigerous female.

Costa Rica

Port Parker, Arriba rocks, January 15-18, 1938, 1 male, 1 female.

Port Culebra, January 30, 1938, 1 male, broken.

Piedra Blanca, February 2, 1938, 1 female; same locality, February 5, 1938, Station 208, D-1, D-2, D-3, D-6, D-7, D-9, 5 fathoms, 6 young.

Panama

Bahia Honda, Station 222, March 18, 1938, D-1, D-2, D-3, D-5, 3-11 fathoms, 2 young.

Colombia

Gorgona Island, March 30, 1938, 1 male; from coral, 1 ovigerous female; same date?, 2 males.

Gorgonilla Island, April 2, 1938, 1 male, 1 female, 3 young.

Measurements. — Males from 10.9 × 16.8 (14.9) mm. to 23.9 × 39.3 (35.0) mm., females from 9.0 × 13.0 (11.9) mm., ovigerous females from 15.3 × 24.3 (21.9) mm. to 44.2 × 68.0 (59.7) mm. The largest specimen, a male from Port Culebra, is in damaged condition. It measures aproximately 47 × 72 mm. in length and breadth.

Habitat. — Off Mexico and Costa Rica, from sand bottom with algae, rocks, or crushed shell; coral. Off Panama, from mud bottom with rocks, dead coral, shell, and leaves. "Under stone completely out of water and in upper tidal zone; alive and all right."

Color in Life. — Of Chamela Bay young female: Dark brownish-black streaked with gray. Paddle legs chestnut brown. (J. Crane, field notes).

Of Piedra Blanca female: Carapace olive brown speckled finely with cream. Transverse ridges blue-black. A prominent oval cream spot on middle of posterolateral margin. Anterolateral spines violet tipped with reddish-brown. Chelipeds like carapace, both as to background, ridges, and spines, above, but ridges definitely dark blue or green. Lower (outer) half of chelipeds creamy white. Chelae purple, tips buffy white, a greenish spot in middle of movable dactyls above. Ambulatories mottled dark green and white. Dactyls reddish-brown. Swimming feet pumpkin orange. Underside of carapace and maxillipeds and anterior edge of sternum orange streaked with white. Rest of sternum, abdomen, and under side of merus of ambulatories white. A purple line down middle of abdomen. Carpus to dactylus of ambulatories like upper side. (J. Crane, field notes).

Of Gulf of Fonseca ovigerous female: Dark purplish-black; pile dark buff; ridges and carapace and legs purplish-red and purplish-blue. Same color on abdominal crests. Swimmerets rusty orange. Chelae dark purple. Under side white with buffy pile, except carpus, manus, and dactylus of legs, which are like upper parts of same. Eggs buffy orange. (J. Crane, field notes).

Behavior.—Threatens. (J. Crane, field note).

Remarks. — The young of this species were frequently included in mixed lots of *Portunus* species, which they resemble greatly. The alternation of large and small anterolateral teeth and narrow carapace even suggests the subgenus *Achelous*. The presence of four spines on the manus, however, serves at once to distinguish them from all other eastern Pacific Portunidae.

Euphylax dovii Stimpson

Euphylax dovii Stimpson, 1860, p. 226, pl. 5, figs. 5, 5a. Rathbun, 1930, p. 147, pl. 65. Boone, 1930, p. 190, pl. 65. Garth, 1946, p. 423, pl. 72, figs. 1, 2. Coventry, 1944, p. 539.

Euphylax dowi, Garth, 1957, p. 38.

Range.—West coast of Mexico? Panama to Talcahuano, Chile. Galapagos Islands.

Material Examined. — Identifiable material from 3 stations, as follows:

Panama

Bahia Honda, March 15, 1938, fragments, food of *Caranx caninus* Günther.*

Hannibal Bank, March 20, 1938, Station 224, D-2, D-3, 35 fathoms, 3 chelae.

22 mi. ESE of Jicaron Island, March 20, 1938, Station 226, L-1 (night light), 1 female.

Measurements. — Female specimen, length 23.4 mm., width 37.8 mm.

Habitat.—Pelagic. Frequently comes to light at night.

Color in Life.—Carapace and merus of all legs deep purple; other segments of legs wine red. Underside of carapace, meri of legs, and maxillipeds blue; sternum white; abdomen brownish; undersides of rest of ambulatories wine red. (J. Crane, field notes).

Remarks. — The three chelae from Hannibal Bank were taken in a dredge from a bottom of either rocks, mud, and dead coral or sand, shells,

*The fish *Caranx caninus* Günther is considered by some authors to be a synonym of the Atlantic *C. hippos* (Linnaeus).

and algae. A specimen was seen by John Tee-Van swimming at the surface in daylight, on the same day, above Hannibal Bank. (J. Crane, field notes). This corresponds with the experience of the "Velero III," which encountered the crabs in numbers at Cocos Island, Costa Rica, (Garth, 1946), and of the "Askoy," which encountered them at Malpelo Island, Colombia. The observations of Dr. R. C. Murphy are recorded in Garth (1948, p. 9).

Euphylax robustus A. Milne Edwards

Euphylax robustus A. Milne Edwards, 1874, p. 249; 1879, p. 205, pl. 37. Rathbun, 1930, p. 148, pls. 66, 67. Coventry, 1944, p. 540. Garth, 1948, p. 37.

Range.—From Isabel Island, Mexico (Coventry), to Octavia Bay, Colombia (Garth).

Material Examined.—9 specimens from 5 stations:

Mexico

17 mi. SE × E of Acapulco, November 29, 1937, Station 189, D-1, 20 fathoms, 1 female.

Tangola-Tangola Bay, Station 196, December 12, 1937, D-9 to D-12, 7.5-4 fathoms, 1 young; December 13, 1937, D-17, 23 fathoms, 2 young.

Costa Rica

Port Culebra, January 30, 1938, Station 206, D-3, 14 fathoms, 2 young females.

Panama

Parida Island, Gulf of Chiriqui, March 12, 1938, 1 damaged specimen, food of *Caranx caninus.*

Bahia Honda, March 18, 1938, Station 222, D-5, 11 fathoms, 2 young.

Colombia

At sea near Gorgona Island, March 27, 1938, from mangrove seeds floating in tide rip, 1 young.

Measurements.—Large female, length 60 mm., width 96 mm., exorbital width 84.2 mm., frontal width 15 mm., cheliped 130 mm., chela 74 mm., dactyl 44.2 mm., height of palm 30 mm., first walking leg 116.5 mm. Young from 3.5 mm. length.

Habitat.—Sand, mud, sandy mud; with shell, leaves, or algae.

Color in Life.—Carapace and legs above gray blue-green. Chelipeds gray blue-green except olive brown manus and dactyls. Ridges and dactyls tinged with pink. Tubercles on chelipeds white. Eyestalks bright violet. Swimmerets pale horn. Abdomen barred with violet and white. Legs barred with violet and white below. Eggs pale salmon. (J. Crane, field notes).

Remarks.—While credit for the rediscovery of A. Milne Edwards's lost species rightfully belongs to the Fifth George Vanderbilt Expedition (Coventry, 1944), "Zaca" scientists may consider as one of their more significant contributions the finding of a specimen of the opposite sex and of a size comparable to the 56 × 90 mm. holotype of *Euphylax robustus.* This 60 × 96 mm. female, dredged on sandy mud bottom near Acapulco, Mexico, by its detailed resemblance to A. Milne Edwards's unique male, upholds the writer's conviction, based upon the examination of immature specimens only (Garth, 1948, p. 37), that "[*E.*] *robustus* is a valid species and not conspecific with [*E.*] *dovii,* as suggested by Rathbun (1930, p. 148)." That specimens of this large and distinctive species have not escaped the eyes of discriminating collectors, but have merely failed to be reported in the literature, is attested by a pair of comparable size from Peru sent the writer by Dr. Albert Panning of the Hamburg Museum. A redescription based on this new material, together with photographs, will appear in a subsequent monograph.

Family XANTHIDAE

Medaeus lobipes Rathbun

Medaeus lobipes Rathbun, 1898, p. 583, pl. 44, fig. 1; 1930, p. 275, text-fig. 44, pl. 114. Crane, 1937, p. 70. Garth, 1946, p. 442, pl. 77, fig. 2; 1948, p. 39.

Range.—From Santa Inez Bay, Gulf of California, Mexico, to Guayabo Chiquito, Panama. Galapagos Islands. 5.5-150 fathoms. (Garth, 1948).

Material Examined.—35 specimens from 4 stations:

Mexico

Manzanillo, November 22, 1937, Station 184, D-1, 25 fathoms, 1 young male; D-2, 30 fathoms, 15 males, 13 females (1 ovigerous).

Costa Rica

Port Parker, January 20, 1938, Station 203, D-1 to D-3, 10-15 fathoms, 2 males, 1 female.

Port Culebra, January 30, 1938, Station 206, D-1, D-3, 14 fathoms, 1 male.

Golfito, Gulf of Dulce, March 9, 1938, Station 218, D-4 to D-7, 4-6 fathoms, 1 female, 1 young.

Measurements. — Males from 4.9 × 6.9 to 18.6 × 28.1 mm., females from 5.7 × 8.1 to 16.4 × 24.2 mm., ovigerous female 11.6 × 17.1 mm., young from 3.0 × 4.0 mm.

Habitat.—Sand, gravelly sand; sandy mud and crushed shell; mangrove leaves, mud, and shell.

Color in Life.—Of Manzanillo specimens: At least half had orange carapace of varying degrees of brightness with dark brown median longitudinal band and same brown on anterolateral angles. In the rest the orange was replaced by light brown or white. Chelipeds orange or light brown externally, white internally and on distal part of manus. Underparts white sprinkled posteriorly with brown. (J. Crane, field notes).

Breeding.—Mexico in late November.

Remarks.—The Port Culebra male, a young specimen, is granulate to the point of spinulosity.

Medaeus spinulifer (Rathbun)

Pilumnus spinulifer Rathbun, 1898, p. 585, pl. 42, figs. 6-8. Finnegan, 1931, p. 643.

Medaeus spinulifer, Rathbun, 1930, 276, text-fig. 45. Garth, 1946, p. 443, pl. 75, figs. 5, 6; 1948, p. 40. Crane, 1947, p. 75.

Range.—From Cape San Lucas, Lower California, Mexico, to Utria Bay, Colombia. Galapagos Islands. Shore to 73 fathoms. (Garth, 1948).

Material Examined. — 3 specimens from 2 stations:

Mexico

3 mi. off Pyramid Rock, Clarion Island, May 12, 1936, Station 163, D-3, D-4, 50 fathoms, 1 female.

Manzanillo, November 22, 1937, Station 184, D-2, 30 fathoms, 1 male, 1 young.

Measurements.—Male specimen 9.0 × 13.3 mm., female specimen 7.0 × 10.1 mm., young specimen 2.6 × 3.3 mm.

Habitat.—Gravelly sand.

Color in Life.—Not noted.

Remarks.—The Manzanillo specimens were sorted out from among a large number of *Medaeus lobipes* Rathbun. The species is now recorded from the Revilla Gigedo Islands.

Xanthodius stimpsoni (A. Milne Edwards)

Xantho stimpsoni A. Milne Edwards, 1879, p. 252, pl. 46, figs. 2-2b. Finnegan, 1931, p. 631. Buitendijk, 1950, p. 277.

Xanthodius stimpsoni, Rathbun, 1930, p. 315, pl. 143, figs. 5-7. Crane, 1947, p. 77. Garth, 1948, p. 41.

Daira ecuadorensis Rathbun, 1935, p. 49.

Range.—From Cape San Lucas, Lower California, Mexico, to Santa Elena Bay, Ecuador. 7-27 meters. (Garth).

Material Examined. — 15 specimens from 3 stations:

Mexico

Banderas Bay, November 16, 1937, from oyster-bearing rocks, 3 young.

Port Guatulco, Station 195, December 4, 1937, D-3, 3.5 fathoms, 1 male, 1 young; D-4, 4.5 fathoms, 1 male, 2 ovigerous females, 1 young; December 5, 1937, D-5, 2 fathoms, 2 males, 2 females (1 ovigerous), 1 young.

Nicaragua

Corinto, January 5, 1938, Station 200, D-15, 1 fathom, 1 young.

Measurements.—Males from 4.9 × 7.2 to 6.2 × 9.3 mm., females from 5.0 × 7.2 to 6.0 × 9.0 mm., ovigerous females from 5.0 × 7.3 to 6.0 × 9.0 mm., young from 2.8 × 3.7 mm.

Habitat.—Sand, with algae or crushed shell; mangrove leaves.

Color in Life.—Of Port Guatulco specimens: Carapace white speckled with violet; chelipeds bright orange; legs dark brown except last (white). (J. Crane, field notes). Marked with shades of white and dark red. (*Idem.*).

Breeding.—Mexico in early December.

Remarks. — Since depth is not mentioned in Rathbun (1930), the "Askoy" records of 6-10 feet and 7-27 meters and the "Zaca" records of 1-4.5 fathoms aid materially in defining the bathymetric range.

Hexapanopeus costaricensis Garth

Hexapanopeus costaricensis Garth, 1940, p. 79, pl. 21, figs. 1-4.

Range.—From Port Parker and Puerto Culebra, Costa Rica. 3-10 fathoms. (Garth).

Material Examined. — 14 specimens from 2 stations:

Costa Rica

Port Parker, January 20, 1938, Station 203, D-1 to D-3, 10-15 fathoms, 5 males, 3 females (1 ovigerous); January 22, 1938, D-7, 5-9 fathoms, 1 male, 1 female; D-8, 9 fathoms, 1 male.

Panama

Bahia Honda, March 18, 1938, Station 222, D-1 to D-3, D-5, 3-11 fathoms, 2 males; D-3, 8 fathoms, 1 male.

Measurements.—Males from 4.1 × 5.3 to 6.0 × 7.7 mm., non-ovigerous females from 4.0 × 5.5 to 4.6 × 6.0 mm., ovigerous female 3.5 × 4.9 mm.

Habitat. — Sandy mud, crushed shell; shelly sand, algae; shelly mud; dead coral.

Color in Life.—Not noted.

Breeding.—Costa Rica in late January.

Remarks.—The "Zaca" records confirm those of the "Velero III" from Port Parker, the type locality, and extend the range of the species south from Costa Rica to northern Panama.

Hexapanopeus nicaraguensis (Rathbun)

Lophopanopeus nicaraguensis Rathbun, 1904b, p. 162.

Hexapanopeus nicaraguensis, Rathbun, 1930, p. 395, text-fig. 61.

Range.—Known only from the type locality, Realejo [Corinto], Nicaragua.

Material Examined.—4 specimens from 2 stations:

El Salvador

La Libertad, December 16, 1937, Station 198, D-1, 13 fathoms, 1 male.

Nicaragua

Corinto, Station 200, December 29, 1937, D-1, D-3, D-8, 2-6.6 fathoms, 1 male, 1 ovigerous female; January 7, 1938, D-27 to D-30, 3 fathoms, 1 male.

Measurements.—Males from 4.7 × 6.9 to 7.3 × 10.6 mm., ovigerous female 5.4 × 7.7 mm.

Habitat.—Mud, mangrove leaves.

Color in Life.—Not noted.

Breeding.—Nicaragua in late December.

Remarks.—The above specimens are smaller than would be suggested by the unique male holotype, an 8.7 × 13 mm. specimen. Their presence at the original locality is confirmed, Realejo being the classic locality, Corinto its modern counterpart. A fine specimen from La Libertad, which is widest opposite the last marginal tooth, extends the known range a full degree of latitude north to El Salvador.

Hexapanopeus orcutti Rathbun

Hexapanopeus orcutti Rathbun, 1930, p. 397, pl. 170, figs. 3, 4.

Range.—Known only from the type locality, near Modesto, Sinaloa, Mexico.

Material Examined. — 32 specimens from 6 stations comprising 8 separate localities:

Mexico

Banderas Bay, November 16, 1937, from oyster-bearing rocks, 1 male, 5 young.

Chamela Bay, November 17, 1937, Station 182, D-3, 15 fathoms, 1 ovigerous female.

Port Guatulco, Station 195, December 4, 1937, D-1, 2.5 fathoms, 1 male; D-2, 3 fathoms, 1 male, 1 young; December 6, 1937, D-10, 4 fathoms, 1 ovigerous female.

Nicaragua

Monypenny Point, Gulf of Fonseca, December 24, 1937, Station 199, D-2, 5 fathoms, 1 male; D-5, D-6, 4-7 fathoms, 2 females (1 ovigerous).

El Salvador

La Union, Gulf of Fonseca, December 27, 1937, Station 199, D-8, 6 fathoms, 6 males, 4 females (2 ovigerous); D-17, D-21, 3-4 fathoms, 2 males, 1 female.

Costa Rica

Port Parker, January 22, 1938, Station 203, D-4, 7 fathoms, 1 female, 1 young; D-10, 2.5-6 fathoms, 1 male, 4 females (2 ovigerous).

Golfito, Gulf of Dulce, March 9, 1938, D-4 to D-7, 4-6 fathoms, 1 male, 1 female.

Measurements.—Males from 3.0 × 4.0 to 6.0 × 8.3 mm., females from 3.0 × 3.9 to 3.7 × 5.1 mm., ovigerous female 3.7 × 5.0 mm., young from 2.2 × 2.8 mm., Gulf of Fonseca specimens: males from 4.1 × 5.2 to 9.5 × 12.6 mm., females from 4.0 × 5.3 to 7.0 × 9.2 mm., ovigerous females 4.6 × 6.0 to 5.5 × 7.2 mm., young not present.

Color in Life. — Of Chamela Bay, Mexico, specimens: Black all over except ambulatories, which are barred with black and cream. Chelae tipped with cream; abdomen pale buffy. (J. Crane, field notes).

Of Port Guatulco, Mexico, specimens: Gray marked with white. (J. Crane, field notes).

Habitat.—Sand, algae; gravelly sand, crushed shell, dead coral; mud, mangrove leaves; gravel, algae.

Breeding.—Mexico in mid-November and early December; Nicaragua in late December.

Remarks.—As will be noted under *Measurements* above, the Gulf of Fonseca specimens (Monypenny Point, La Union) represent a giant race as compared to Mexican and Costa Rican specimens. They appear also to have longer legs and somewhat different chelae, and should perhaps on this account be segregated from the above series. It is clear, however, that the range of the species should be extended from northwest Mexico all the way to the Gulf of Dulce, Costa Rica, the depth to 15 fathoms. The Port Guatulco male has two minor chelae, possibly the result of regeneration.

Hexapanopeus sinaloensis Rathbun

Hexapanopeus sinaloensis Rathbun, 1930, p. 398, pl. 170, figs. 1, 2. Garth, 1948, p. 41.

Hexapanopeus setipalpus Finnegan, 1931, p. 641.

Range.—From Boca Tecapan, Sinaloa, Mex-