ON A COLLECTION OF DECAPOD CRUSTACEA FROM THE REPUBLIC OF EL SALVADOR (CENTRAL AMERICA)

by

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For about half a year (February-July, 1953) Dr. M. Boeseman, curator of Fishes of the Rijksmuseum van Natuurlijke Historie, was the guest of the Instituto Tropical de Investigaciones Científicas at San Salvador. During this time Dr. Boeseman made extensive collections in numerous localities throughout the Republic of El Salvador and, though his main attention was directed towards the fishes, an interesting collection of Decapod Crustacea was collected and sent home to Leiden. This collection forms the main subject of the present paper. As Dr. G. Kruseman, curator of Insects of the Zoological Museum at Amsterdam, collected some Decapoda in the same region during his stay in El Salvador in the summer of 1952, this material also is included in the present report.

The number of species of Decapoda dealt with here is not very large and probably represents only a small portion of the actual number of species inhabiting the territory of El Salvador. Nevertheless it seems worth while to publish the present notes since the carcinological fauna of El Salvador is very poorly known, most of the species being recorded here for the first time as belonging to that fauna. Furthermore the collections contain some species which until now were insufficiently known, and the systematic status of which could be elucidated.

I am very thankful to Dr. Boeseman for the interest shown in my work and for the many informations received. Furthermore I am much indebted to the authorities of the Zoological Museum at Amsterdam for their permission to study the material collected by Dr. Kruseman.

The collector's numbers mentioned in the enumeration of the material are Dr. Boeseman's, unless stated otherwise. The abbreviations cb. and cl. have been used for "carapace breadth" and "carapace length" respectively.

Textfigures 4-9, 12, 13, and 15 have been made by Mr. H. Heijn, the photographs of the plates by Mr. H. F. Roman.

MACRURA

PENAEIDAE

Penaeus stylirostris Stimpson

Penaeus stylirostris Stimpson, 1871, Ann. Lyc. nat. Hist. New York, vol. 19, p. 134.

Río Opulujapa near Las Salinas, Sonsonate; a stream of about 3 to 4 m broad,

shallow, muddy, moderately fast flowing, with few aquatic plants; February 15, 1953; no. 10. — 1 juvenile, 27 mm.

The specimen is very young and therefore the identity is not fully certain. The rostrum reaches about to the end of the antennular peduncle. The upper margin bears 8 teeth, 3 of which are placed behind the orbit. The ultimate $^1/_3$ of the upper margin is unarmed. The lower margin bears 4 teeth. The lateral carina of the rostrum continues as far as the posterior dorsal tooth.

The specimen was found together with *Macrobrachium tenellum* in fresh water at a considerable distance from the sea.

Penaeus stylirostris is known from the west coast of America, from the Gulf of California to N. Peru. The species has not been reported from the Republic of El Salvador before.

ATYIDAE

Potimirim nov. gen.

Bouvier (1925, p. 262) included in the genus *Ortmannia* Rathbun two groups of species: (1) the "formes indo-pacifiques ... peu stables" and (2) the "formes américaines, très stables et peu variables". The first group contains the species *O. henshawi* Rathbun (the type of the genus), *O. alluaudi* Bouvier, and *O. edwardsi* Bouvier. In the second group Bouvier placed the species *O. americana* (Guérin Méneville), *O. mexicana* (De Saussure), and *O. serrei* Bouvier. The Indo-West Pacific species according to Bouvier are remarkable by that they are able to mutate to species of *Atya* or *Caridina*. So *O. henshawi* may produce young which cannot be distinguished from *Atya bisulcata* (Randall), and from the eggs of *Ortmannia alluaudi* young of *Atya serrata* Bate may be reared. As to *Ortmannia edwardsi*, this form is found among the young produced by *Caridina richtersi* Thallwitz. There has been much criticism of Bouvier's theory of mutation and on his observations. Edmondson (1929) and Radir (1930, p. 351) showed that without the slightest doubt *Ortmannia henshawi* and *Atya bisulcata* are one species that possesses a sexual dimorphism. About 90 % of the *Ortmannia henshawi* specimens namely are males and about 90 % of the *Atya bisulcata* specimens are females. Radir (1930) pointed out that though the second pleopods of a specimen show it to be a male, it may carry eggs as well as metamorphosed sperm, and that thus a certain degree of hermaphroditism occurs in the species. This may explain why one finds a few males in the *Atya* form and a few females in the *Ortmannia* form. It is evident that *Ortmannia henshawi* cannot be maintained as an independent species and that it must be considered a synonym of *Atya bisulcata*. Similarly *Ortmannia alluaudi* will show to be identical with *Atya serrata* Bate; the situation

here being exactly similar to that of *Atya bisulcata* and *Ortmannia henshawi*. It is probable that the same is true for *Caridina richtersi* and *Ortmannia edwardsi*, but more experiments are needed here, since a different genus (*Caridina*) is involved.

Bouvier's second group of the genus *Ortmannia* is a natural one, quite distinct from the Indo-West Pacific group and not suffering from "evolutionary mutation". It certainly forms a good genus distinct from the other Atyid genera; it is surprising that these American species have so long been considered congeneric with the Indo-West Pacific "mutating" forms. After the elimination of the latter forms, the genus may be kept for the American species. The name *Ortmannia*, however, cannot be maintained for it, since when erecting the genus in 1902, Rathbun (1902, p. 120, footnote) expressly indicated *Ortmannia henshawi* Rathbun (1902) as the type. As shown above *Ortmannia henshawi* is identical with *Atya bisulcata*, and thus *Ortmannia* Rathbun, 1902, becomes a synonym of *Atya* Leach, 1816. The generic name *Atyoida* Randall, 1839, often has been used for the American species, but as Rathbun (1902, p. 120, footnote) pointed out the type of Randall's genus is *Atya bisulcata* (Randall), and thus *Atyoida* also is a junior synonym of *Atya* Leach, 1816. As no name is available for the present genus, I propose to name it *Potimirim* nov. gen. As the type species I designate *Caridina mexicana* De Saussure (1857, Rev. Mag. Zool., ser. 2 vol. 9, p. 505). The name "potimirim" is the Brazilian native name for the type species of the new genus, which species was described as new by Müller (1881, p. 117) under the name *Atyoida potimirim*. The generic name *Potimirim* should be considered to be of the feminine gender.

The diagnosis of the present genus is as follows: Atyid shrimps with the rostrum rather short, unarmed above, with teeth below. Supraorbital spines absent, antennal and pterygostomian spines often present. Eyes with the cornea not strongly expanded. No exopods at the bases of the pereiopods, an arthrobranch only at the base of the first pereiopods. Epipods at the bases of the first three or four legs. Chelae slender with long tufts of hairs on the tips of the fingers. Palm present, though extremely small. Carpus of first pereiopods excavate anteriorly. Carpus of second legs longer than broad, more slender than that of the first legs. Appendix of the first pleopod of the males differentiated. Inhabiting fresh water.

One species of this genus is represented in the present collection.

Potimirim glabra (Kingsley)(fig. 1)

Atyoida glabra Kingsley, 1878, Proc. Acad. nat. Sci. Phila., 1878, p. 93.

Rio Jiboa, near the bridge of the highway San Salvador-Zacatecoluca, La Paz; near the shore of the river in clear fast flowing water, between rocks and boulders, sandy

bottom, depth less than 0.50 m, no vegetation in or near the water; March 15, 1953; no. 72. — 1 specimen, 19 mm.

Kingsley's original description of *Atyoida glabra* is short and omits several important details. Later authors seem not to have met with Kingsley's species again and do not give it the recognition it deserves. Ortmann (1895, p. 410) ranges it among the doubtful species and two years later the same author (Ortmann, 1897a, p. 183) stated that it is "talvez uma *Atya* de

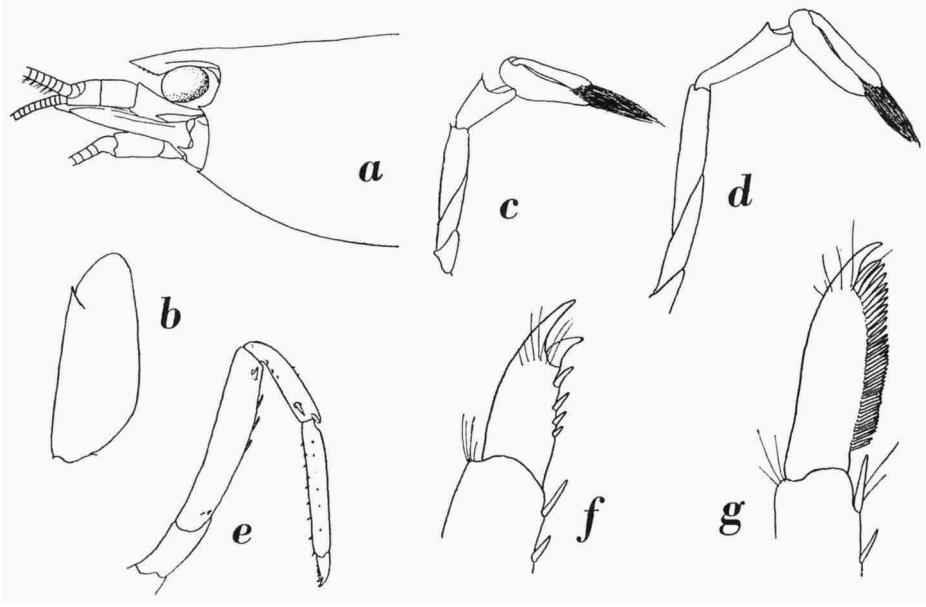

Fig. 1. *Potimirim glabra* (Kingsley), specimen from Río Jiboa (Boeseman, no. 72). a, anterior part of body in lateral view; b, scaphocerite; c, first pereiopod; d, second pereiopod; e, third pereiopod; f, dactylus of third pereiopod; g, dactylus of fifth pereiopod. a, × 9; b-e, × 12; f, g, × 60.

edade juvenil". Bouvier (1925, p. 287) remarks: "Cet auteur [i.e. Ortmann, 1897a] observe justement qu'il faut sans doute rapporter à la même espèce [*Atyoida potimirim* = *Potimirim mexicana*] une forme de Nicaragua décrite par Kingsley sous le nom d'*Atyoida glabra*". However, I cannot find any such statement by Ortmann and suspect that Bouvier is mistaken here. Bouvier's supposition that *Atyoida glabra* is specifically identical with *Potimirim mexicana* is not far beside the truth. The two species though being distinct, are closely related. *Potimirim glabra* may be considered to be the representative in the Pacific slope of the American continent of the eastern *Potimirim mexicana*.

My specimen of *Potimirim glabra* is a female, which probably recently

had been ovigerous. The rostrum is short, reaching slightly beyond the end of the first segment of the antennular peduncle. When seen from above it is narrowly triangular, regularly tapering towards the tip. The upper margin is unarmed and about straight, the lower possesses five extremely small teeth in the ultimate third of its length. The rostrum is highest at about the level of the posterior ventral tooth, it narrows slightly posteriorly and very rapidly anteriorly. The lower orbital angle ends in a sharp antennal spine, the pterygostomian angle also bears a spine.

The abdominal segments have the pleurae rounded. The sixth segment is slightly longer than the fifth, and its posterolateral angle ends in a sharp point. The telson is broad, it is slightly longer than the sixth abdominal segment. The upper surface bears 5 pairs of spines, which are placed in the posterior half. The posterior margin of the telson is broad and rounded, with a minute tooth in the middle. At both lateral ends of the margin a short immovable tooth is present; to the inner side of each of these two lateral teeth there is one short outer and one long inner, movable spine. Between the two inner spines 10 long feathered hairs are visible.

The eyes are short, they are narrower than in my specimen of *Potimirim mexicana*. The cornea is distinct and rounded, it is provided with pigment.

The antennulae are less slender than in my *P. mexicana* specimen. The basal segment is longest, with a sharply pointed stylocerite. The second and third segments are short.

The scaphocerite reaches slightly beyond the antennular peduncle. It is about 2.5 times as long as broad. The lamella distinctly overreaches the final tooth. The antennal peduncle reaches slightly beyond the middle of the scaphocerite.

The first four pereiopods have a distinct epipod at their bases. The chelipeds have the palm very small, the fingers are long and slender. The carpus of the first leg is distinctly shorter than the chela, it is strongly hollowed at the top. The carpus of the second leg is about as long as the chela, it is far more slender than the carpus of the first leg; the top of the carpus, like that of the first leg, is distinctly hollowed. The dactylus of the third leg ends in a strong claw, while about 5 strong spinules are placed on the posterior margin. The propodus is about four times as long as the dactylus, it bears a double row of spinules on the posterior margin, and one longitudinal row on each of the lateral surfaces. The carpus is $^3/_4$ as long as the propodus, it bears a strong spine in the distal part of the external surface, while some small spinules are visible in the proximal part of that surface. The merus is about twice as long as the carpus, it also bears a strong spine in the extreme distal part of the outer surface. Furthermore

three spines are placed on the posterior margin of the merus. The fourth leg is similar to the third. So is the fifth but for the shape of the dactylus and the fact that the merus bears only two posterior spines. The dactylus of the fifth leg is about $^1/_3$ of the length of the propodus and has about 38 comb-like arranged spinules on its posterior margin.

The protopod of the uropods postero-dorsally ends in a sharp point. The exopod has the outer margin ending in a small tooth. A row of many closely placed small denticles is present on the diaeresis of the exopod; the external of these spinules is stronger than the rest and far overreaches the final tooth of the outer margin of the exopod. The preanal carina ends in a sharp point.

In life the species has the dorsal surface of an orange colour with a distinct yellow median longitudinal line. The rest of the body is so perfectly transparent, that the shrimps at first were not recognized as such by Dr. Boeseman; they strongly resembled short sticks floating in the water. Several specimens were seen, but only one was captured.

The present species shows a very close resemblance to *Potimirim mexicana* (De Saussure), but may immediately be distinguished by the presence of an epipod at the base of the fourth pereiopod. Furthermore the antennae and antennulae are less slender in the western form. It is possible that the two species show some differences in the structure of the last three legs; I could not ascertain this, since I only had one specimen of *P. mexicana* (from Hector Creek, Belize, British Honduras) at my disposal and this specimen lacks the last three pairs of legs.

The only previous record of the present species is that by Kingsley (1878), who reported it from Polvon and Corcuera, two localities in western Nicaragua.

PALAEMONIDAE

Macrobrachium tenellum (Smith) (fig. 2)

Palaemon tenellus Smith, 1871, Rep. Peabody Acad. Sci., 1869, p. 98.

Río Zunzal, slightly west of Río Coyol, Sonsonate; April 8, 1953; no. 139. — 36 specimens (including 4 ovigerous females, 44-53 mm, and 2 bopyrized specimens, 39 and 47 mm), 13-57 mm.

Río Coyol, slightly west of Río San Pedro, Sonsonate; April 8, 1953; no. 138. — 8 specimens, 47-90 mm.

Río Banderas, south of Sonsonate, near the road between Sonsonate and Las Salinas, Sonsonate; March 25, 1953; no. 106. — 14 specimens, 41-67 mm.

Río Mandinga, near the road between Sonsonate and Las Salinas, Sonsonate; March 25, 1953; no. 110. — 87 specimens (including 1 ovigerous female, 60 mm), 17-80 mm.

Río Opulujapa near Las Salinas, Sonsonate; a stream of about 3 to 4 m broad, shallow, muddy, moderately fast flowing, with few aquatic plants; February 15, 1953; no. 10. — 7 specimens, 23-50 mm.

Río Conchalió near its mouth, near La Libertad, La Libertad; a stream of about 2 m broad, up to 1 m deep, water not very clear, bottom mud and rocks, shore with overhanging trees; March 21, 1953; no. 93. — 12 specimens (including 2 bopyrized specimens, 40 and 61 mm), 27-61 mm.

Río Jiboa, near the bridge of the highway San Salvador-Zacatecoluca, La Paz; March 15, 1953; no. 74. — 1 damaged specimen, about 48 mm.

Posa Los Tres Amates, a few km west of San Nicolás Lempa, San Vicente; April 21, 1953; no. 171. — 5 specimens, 32-79 mm.

Western shore of Río Lempa near San Nicolás Lempa, San Vicente; April 21, 1953; no. 170. — 6 specimens, 48-110 mm.

Small stream in virgin forest south of the Panamerican Highway, km 80-81, due east of San Vicente, San Vicente; May 27-28, 1953; no. 254. — 2 specimens, 71 and 73 mm.

Small stream near Lomas de la Coyotera, slightly west of Santa Rosa de Lima, La Unión; April 16, 1953; no. 166. — 2 specimens, 43 and 48 mm.

Río Sirama, north of Bahia de la Unión, La Unión; April 16, 1953; no. 167. — 20 specimens, 29-95 mm.

Paso de la Conchagua, along the highway La Unión-Santa Rosa de Lima, La Unión; April 17, 1953; no. 168. — 2 specimens, 44 and 49 mm.

In the larger part of the specimens the original colour pattern is still visible. Through the action of the preservation liquid the animals, which are glassy transparent in life, are now coloured opaquely pale yellowish brown, and the dark brown or orange brown lines and bands seen in the living specimens now have become bright orange. In several specimens this orange pigment has already dissolved in the alcohol, the animals becoming plain pale yellowish brown all over; this ultimately will be the fate of the entire material. The pattern formed by the dark pigment is the following:

On each half of the carapace there are three conspicuous broad and dark bands. The first of these runs from the antennal spine across the hepatic spine backwards and has the distal part directed obliquely downwards, it stops in about the middle of the length of the carapace. Behind this band there is a second which is ┐ -shaped. The third band lies behind the second, it runs almost vertically in the extreme posterior part of the carapace; towards the dorso-median line of the carapace it becomes very inconspicuous. A short and not very distinct band is visible below the ┐ -shaped band; this short band runs close to and parallel with the lateral margin of the carapace. An interrupted narrow longitudinal band extends from the orbit backwards; it is most distinct in its posterior part. A short, rather inconspicuous transverse band runs in the middle of the dorso-median region of the carapace and connects the two narrow postorbital bands. A few other, often inconspicuous dark lines and spots are visible on the carapace, one of these lines runs parallel with and close to the posterior margin. The abdomen is rather uniformly speckled with dark chromatophores, sometimes an indication of a dark band along the posterior margin of the segments is visible.

Furthermore a longitudinal line is seen extending over the bases of the pleurae from the posterior part of the fourth segment to the end of the sixth, being very faint in the sixth segment. The ovigerous females show a colour pattern on the pleurae of the first four abdominal segments, which I did not observe in the other specimens. The pleura of the first segment in the ovigerous females shows a roughly V-shaped band, the tip of which lies in the anterolateral part of the pleura. On the pleura of the second segment there is a figure resembling an underlined letter M, the two

Fig. 2. *Macrobrachium tenellum* (Smith), specimen from Río Zunzal (Boeseman, no. 139). Colour pattern of ovigerous female. × 3.

halves of the M not touching each other in the middle; the anterior part of the M forms more or less a continuation of the V of the first segment. In the anterolateral corner of the pleura of the third segment a ⌋-shaped band is visible, being a more or less distinct continuation of the posterior part of the M of the second segment. Some distance above the posterior part of the ⌋-shaped band a short longitudinal band is visible on the third pleura. The pleura of the fourth segment shows a ⌋-shaped band which is similar to that of the third.

Macrobrachium tenellum is known from fresh waters of the Pacific slope of America from Lower California to N. Peru. The only record of this species from El Salvador found in literature is that by Holthuis (1952, p. 55).

Macrobrachium digueti (Bouvier)

Palaemon Digueti Bouvier, 1895, Bull. Mus. Hist. nat. Paris, vol. 1, p. 159, fig. 2.

Río Zunzal, slightly west of Río Coyol, Sonsonate; April 8, 1953; no. 139. — 46 juveniles, 9-16 mm.

Río Coyol, slightly west of Río San Pedro, Sonsonate; April 8, 1953; no. 138. — 6 specimens, 20-42 mm.

Río Chimalapa, south of Sonsonate, near the road between Sonsonate and Las Salinas, Sonsonate; March 25, 1953; no. 104. — 7 specimens, 18-40 mm.

Río Banderas, south of Sonsonate, near the road between Sonsonate and Las Salinas, Sonsonate; March 25, 1953; no. 106. — 8 specimens (including 1 ovigerous female, 36 mm), 14-36 mm.

Río Mandinga, near the road between Sonsonate and Las Salinas, Sonsonate; March 25, 1953; no. 110. — 7 specimens, 17-55 mm.

Río Comasagua, slightly west of Río Conchalió, La Libertad; near the coast; March 21, 1953; no. 95. — 1 ovigerous female, 43 mm.

Río Comasagua, west of La Libertad, La Libertad; near the coast; February 27, 1953; no. 32. — 7 specimens, 11-29 mm.

Río Huiza, south of San Salvador, La Libertad; from the stomach of a bird; May 6-7, 1953; H. Felten, no. 232. — 1 specimen, 40 mm.

Río Jiboa, near the bridge of the highway San Salvador-Zacatecoluca, La Paz; March 15, 1953; no. 74. — 27 specimens (including 4 ovigerous females, 37-42 mm), 28-59 mm.

Western shore of Río Lempa near San Nicolás Lempa, San Vicente; April 21, 1953; no 170. — 2 juveniles, 12 and 17 mm.

Small stream in virgin forest, south of the Panamerican Highway, km 80-81, due east of San Vicente, San Vicente; May 27-28, 1953; no. 254. — 11 specimens, 16-45 mm.

Small stream near Lomas de la Coyotera, slightly west of Santa Rosa de Lima, La Unión; April 16, 1953; no. 166. — 33 specimens, 19-36 mm.

Río Sirama, north of Bahia de la Unión, La Unión; April 16, 1953; no. 167. — 3 specimens, 18-42 mm.

The specimens from Río Sirama have the chelipeds more slender than they usually are in the present species, and I am therefore not fully certain that they are correctly placed here. Since they are not yet fullgrown, however, it is impossible to identify them with certainty. Also the identity of the juveniles enumerated above is not entirely certain.

The present preserved specimens do not show any conspicuous colour pattern. The dark chromatophores are quite regularly distributed over the carapace and abdomen, even more so on the abdomen than on the carapace. The larger males have the tips of the fingers of the large chelae pale, while two dark bands are present on the fingers themselves. The specimens from Río Chimalapa were noted by Dr. Boeseman to be in life whitish transparent, with reddish brown spots and stripes, which on the carapace are especially distinct and of a more orange tinge; the small specimens being whitish and more or less transparent.

The species, which is known from fresh-water of the American Pacific slope from Lower California to Ecuador, now is reported for the first time from El Salvador.

Macrobrachium americanum Bate

Macrobrachium americanum Bate, 1868, Proc. zool. Soc. Lond., 1868, p. 363, pl. 30.

La Libertad, La Libertad; summer 1952; G. Kruseman. — 2 specimens (including 1 ovigerous female, 113 mm), 113 and 134 mm.

Río Huiza, La Libertad; from the stomach of a bird; May 6-7, 1953; H. Felten, no. 232. — 1 specimen, 65 mm.

Bought at the market of San Salvador, said to have been caught in Lago Ilopango, east of San Salvador; June, 1953; no. 306. — 1 specimen, 250 mm (dry).

Río Jiboa, near the bridge of the highway San Salvador-Zacatecoluca, La Paz; March 15, 1953; no. 74. — 2 specimens, 33 and 46 mm.

The spirit specimens probably show only part of their original colour pattern: a broad dark longitudinal band extending over the bases of the abdominal pleurae. In one specimen also a median longitudinal band is seen on the abdomen. The large dry specimen from the market of San Salvador has the posteromedian part of the carapace of a very dark colour, this dark area is roughly quadrangular in outline, with the long sides of the quadrangle parallel to the lateral margins of the carapace. Anteriorly the dark area continues as a dark band which runs over the median line of the carapace and stops somewhat before the posterior dorsal tooth of the rostrum. This dark band widens slightly near its anterior end. In the dark quadrangular area 5 parallel longitudinal whitish lines may be seen. Two of these lines run along the lateral margins of the area; of the other three, one runs over the medio-dorsal line, the remaining two lines are placed midway between the median and the lateral lines. The median line stops slightly before the anterior margin of the dark region. The coloration of the abdomen is striking. Like in the spirit specimens there is a dark band extending longitudinally over the bases of the pleurae, it is, however, not so conspicuous as in most spirit specimens. Very conspicuous in the dry specimen is a dark median longitudinal band that extends over the full length of the abdomen from the second to the sixth segment; the first segment shows only a faint median dark spot. The median band is very dark purplish brown, it is broadest at the articulation between the second and third abdominal segments, gradually narrowing anteriorly and posteriorly. The width of this band at the end of the sixth segment is about $^1/_4$ of its greatest width and about $^1/_3$ of the width at the anterior margin of the second segment. The telson too shows three longitudinal dark bands: one median and two lateral bands, which form the continuation of the bands of the abdomen. The colour pattern of the present material shows much resemblance to that of *Macrobrachium carcinus* (L.), a closely related species, occurring on the Atlantic side of the American continent and in the West Indies.

The large male purchased at the market of San Salvador, where it was offered for sale as a curio, is the largest specimen of this species so far recorded.

Macrobrachium americanum inhabits fresh waters of the Pacific slope of America and is known from Lower California in the north to N. Peru in the south. The only previous record from El Salvador is that by Holthuis (1952, p. 131).

PALINURIDAE

Panulirus gracilis Streets

Panulirus gracilis Streets, 1871, Proc. Acad. nat. Sci. Phila., 1871, p. 225, pl. 2 fig. 2.
Palinurus inflatus Bouvier, 1895, Bull. Mus. Hist. nat. Paris, vol. 1, p. 8.

Playa El Cuco, San Miguel; March 4-7, 1953; no. 58. — 4 juveniles, 30-39 mm.

None of these specimens possesses an exopod on the third maxilliped. Gruvel's (1911, p. 44) juvenile in which he found such an exopod, may have been still younger than my material. Unfortunately Gruvel does not give the measurements of his specimen.

The identity of Streets's *Panulirus gracilis* has been a subject of dispute. Some authors, like Gruvel (1911, p. 40), identified it with *Panulirus interruptus* (Randall), while others, notably Nobili (1901, pp. 10, 11), thought it to be conspecific with the only other West American species of *Panulirus*, *P. inflatus* (Bouvier). This confusion is caused by Streets's remarks in the original description: "abdomen smooth; the transverse sulci, except the last, interrupted in the middle". Now in *P. inflatus* the abdomen is smooth without grooves, while in *P. interruptus* segments 2-5 each bear a transverse interrupted groove. Streets's remark on the sulci seems to refer to such transverse grooves, and on this remark is based the conviction of the authors who consider *P. gracilis* a synonym of *P. interruptus*. But it proves that Streets's remark is either erroneous or does not refer to the transverse dorsal grooves of the abdominal segments. Streets's figure of *Panulirus gracilis*, namely, does not show the least trace of these grooves, while Ortmann (1897b, p. 261), who examined Streets's types, found their abdomen to be smooth ("ohne Querfurchen auf den Abdomensegmenten"). Ortmann's examination of the types definitely settles the question and there is not the least doubt that *Panulirus gracilis* Streets, 1871, and *Palinurus inflatus* Bouvier, 1895, are synonyms. The former name, being the older of the two, has priority and must be used.

Panulirus gracilis inhabits the American west coast and is reported from the Gulf of California to N. Peru. Until now the species has not been recorded from El Salvador.

CALLIANASSIDAE

Callianassa eiseni (Holmes) (fig. 3)

Lepidophthalmus Eiseni Holmes, 1904, Proc. Calif. Acad. Sci., ser. 3 vol. 3, p. 311, pl. 35 figs. 6-13.

Lagoon (estero) near Playa de los Floros near La Libertad, La Libertad; August 18, 1952; G. Kruseman. — 9 specimens (including 1 damaged ovigerous female), 30-73 mm.

The specimens agree well with Holmes's description, only a few minor differences are noted. The rostrum is more slender than in Holmes's figures; it sometimes is distinctly turned upwards, it sometimes points almost straight forwards. It reaches beyond the middle of the eyes but fails to reach their end. Between the base of the rostrum and the anterior end of the linea thalassinica the anterior margin of the carapace is convex or almost rectangularly rounded. Below the linea thalassinica the anterior margin curves forward and ends in the forwards produced rounded anterolateral angle of the carapace. The linea thalassinica is distinct throughout, and at the ventral side of its anterior part it is accompanied by a distinct carina, which projects slightly beyond the anterior margin of the carapace. This ridge is continued as a similar carina on the base of the antennal peduncle. The oval region in the anterodorsal part of the carapace is distinctly separated from the rest, except near the base of the rostrum. As already pointed out by Holmes, the carapace below the linea thalassinica shows an S-shaped ridge. I do not agree with Holmes, however, that this ridge delimits a calcified anterolateral area. The entire anterolateral region of the carapace is membranaceous, except for a narrow area lying between the anterior part of the linea thalassinica and the upper part of the S-shaped ridge. The region behind the S-shaped ridge also is membranaceous except for the extreme posterior part. The anterolateral half of the surface of the carapace behind the S-shaped ridge shows a honeycomb pattern of distinct, but low carinae. The posterior part of the margin of the carapace has been well described by Holmes.

The abdominal segments have the dorsal surface smooth and shining. In the first segment the pleura is separated from the tergum by a narrow membranaceous strip-like area. The lower surface of the first segment is membranaceous except for (a) a broad V-shaped calcified area in the anterior part, (b) two long calcified strips running backwards and inwards from the anterolateral corner to the middle of each half of the posterior margin of the tergum, these strips each bearing a strong longitudinal ridge, (c) two rather broad submedian longitudinal plates which in the males bear the pleopods, and (d) very small plates, sometimes provided with

small tubercles, scattered over the non-calcified areas. In the females strips (b) touch plates (c) and the pleopods are inserted in between. The second to sixth abdominal segments have the pleurae attached to the tergum; a

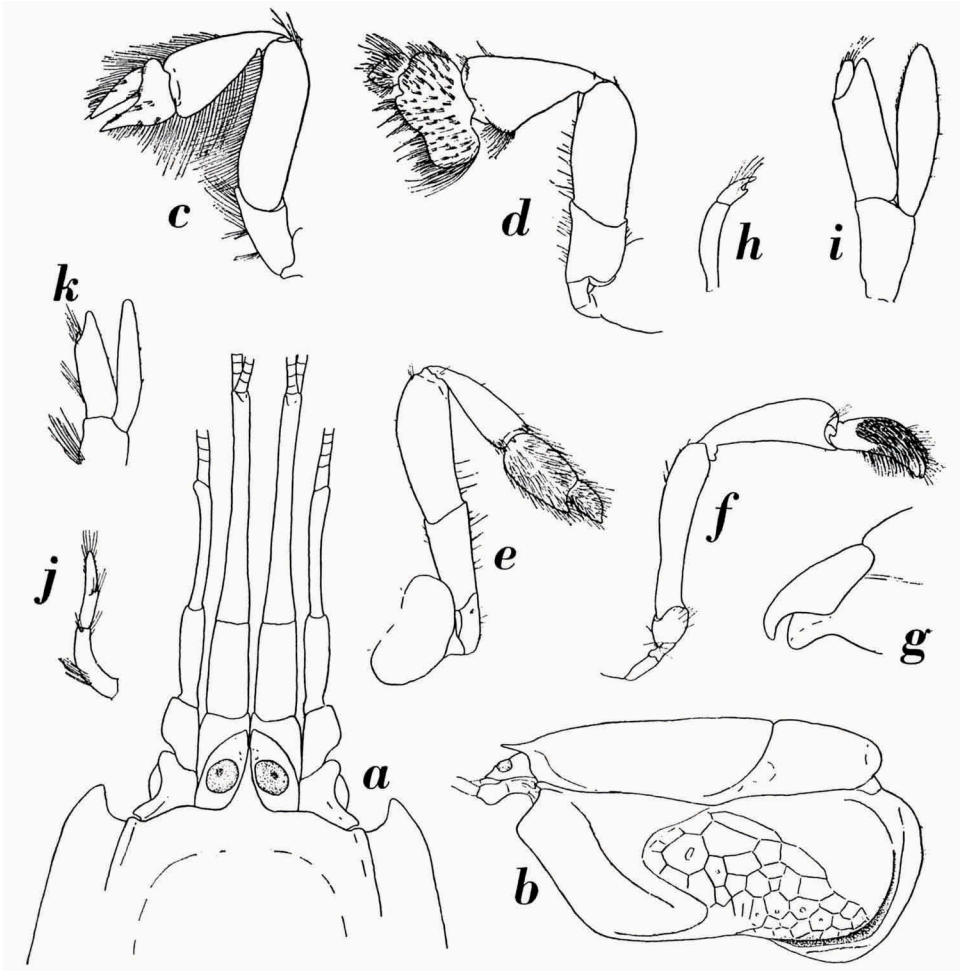

Fig. 3. *Callianassa eiseni* (Holmes), specimens from Playa de los Floros (leg. Kruseman). a, anterior part of body in dorsal view; b, carapace in lateral view; c, second leg; d, third leg; e, fourth leg; f, fifth leg; g, dactylus and distal part of propodus of fifth leg; h, first pleopod of male; i, second pleopod of male; j, first pleopod of female; k, second pleopod of female. a, × 8; b, h-k, × 4; c-f, × 3; g, × 10.

longitudinal groove runs forwards from the posterior end of the base of the pleura, it fails to reach the middle of this base. In the second segment a groove is visible that runs parallel with and close to the lateral margin of the pleura; a few inconspicuous hairs, some of which form a vertical row,

are present in the posterolateral corner. The pleurae of the third to fifth segments have no marginal groove and bear a large tuft of hairs in the posterolateral corner. In these segments too the sternum is partly non-calcified. The sixth segment shows a short vertical groove in the posterior half of the pleura running up from the lateral margin. The telson is half as long as the sixth segment, and its length is $^5/_7$ of its breadth. The lateral margins are convex, the posterior margin is distinctly three-lobed; the median lobe is somewhat broader than the lateral and reaches slightly farther backwards. These lobes are more distinct than in Holmes's figure.

The size of the cornea is variable, but it generally is smaller than figured by Holmes; in my material there always is some space between the cornea and the external margin of the peduncle.

The rim on the basal segment of the antennal peduncle described by Holmes is the ridge that forms the continuation of the carina below the distal part of the linea thalassinica described above.

The third maxillipeds and the first legs are as in Holmes's description and figures. The second legs have a perfect chela which, when closed, is triangular in shape, being very high at the base and tapering regularly towards the sharply pointed finger tips. The fingers are about twice as long as the palm. The carpus is about 1.5 times as long as the chela and narrows distinctly towards its base. The merus is as long as the carpus and half the chela combined. The ischium is rather short. The spines at the distal part of the posterior margin of the ischium in the second and third legs described by Holmes are absent in the present material; the distal part of the posterior margin is only slightly produced here. The dactylus of the third leg is broadly oval and has a pointed tip. The propodus is very broad and in its posterior part forms a large and broad lobe which reaches distinctly beyond the propodo-carpal articulation. The anterior margin of the propodus, just below the articulation with the dactylus, shows a small lobe. The carpus is about as long as the merus and narrows proximally. The fourth leg has the dactylus oval and pointed. The propodus is almost twice as long as the dactylus, in its postero-distal part it is produced beyond the base of the dactylus. The carpus is about as long as the propodus and dactylus together. The merus is longer than the carpus. As already remarked by Holmes, the coxae of this leg are enormously broadened. The dactylus of the last leg is flattened, has the tip curved, and articulates obliquely with the propodus, forming with the tip of the propodus a small but perfect chela. The fingers have about $^1/_3$ of the length of the palm. The propodus is extremely hairy on the external surface. The carpus is about 1.5 times

as long as the chela, it narrows proximally. The merus is slender, being distinctly longer than the carpus. The ischium is short.

The first pleopods in the males have the ultimate joint short, it is about half as long as the preceding joint, and it ends in two unequal teeth. In the female the last joint of the first pleopod is almost as long as the basal joint, it shows a blunt lobe in the middle of its length. The second pleopods have the endopod provided with an appendix interna, which bears minute curved hooks. In the females the appendix is extremely small, in the males it reaches to or even slightly beyond the tip of the endopod. The uropods have been well described and figured by Holmes.

Holmes's specimens were larger than those at hand, his largest female being 115 mm long, his largest male 110 mm.

Until now the species was known only from the original record. Holmes's material originated from San José del Cabo, Lower California, Mexico.

ANOMURA

PORCELLANIDAE

Petrolisthes armatus (Gibbes)

Porcellana armata Gibbes, 1850, Proc. Amer. Ass. Adv. Sci., vol. 3, p. 190.

Shore near La Unión, Bahia de la Unión, La Unión; April 18, 1953; no. 172. — 16 specimens (including 2 ovigerous females, cb. 7 and 8 mm), cb. 5-9 mm.

The species is known from both sides of the American continent, from Lower California to Peru and from Bermuda and Florida to Brazil. I do not know of any previous record of this species from El Salvador, but Smith (1871, p. 92) reported it from the Gulf of Fonseca.

ALBUNEIDAE

Lepidopa deamae Benedict (pl. I fig. 1)

Lepidopa deamae Benedict, 1903, Proc. U. S. Nat. Mus., vol. 26, p. 893, fig. 5.

Playa los Blancos, south of Zacatecoluca, La Paz; found dead on the beach; September 4, 1952; G. Kruseman. — 1 specimen, cl. 24 mm, cb. 27 mm.

The specimen is much damaged, lacking the abdomen and all the legs, but the shape of the eyes and of the front do not leave the least doubt as to its identity with *Lepidopa deamae.*

The species until now was only known from two localities: Salina Cruz, Gulf of Tehuantepec, S. W. Mexico (the type locality), and Punta Arenas, Costa Rica (see Gordon, 1938, p. 187).

HIPPIDAE

Emerita species

Shore near Las Salinas, Sonsonate; blackish sandy beach; March 25, 1953; no. 112. — 1 juvenile, cl. 3.5 mm.

This specimen is too young to permit of a specific identification.

COENOBITIDAE

Coenobita compressus H. Milne Edwards (fig. 4a, b)

Cenobita compressa H. Milne Edwards, 1837, Hist. nat. Crust., vol. 2, p. 241.
Coenobita compressa Guérin Méneville, 1838, Duperrey's Voy. Coquille, Zool., vol. 2 pt. 2 div. 1, p. 29.

Shore near Zunzal, near the mouth of Río Zunzal, west of Acajutla, Sonsonate; under rocks and vegetable debris on the sandy shore of a small fresh-water pool; March 21, 1953; no. 97. — 75 specimens, cl. 4-18 mm.
Shore near Las Salinas, Sonsonate; blackish sandy beach; March 25, 1953; no. 111. — 1 specimen, cl. 9 mm.
Shore west of La Libertad, near Río Tunco, La Libertad; February 27, 1953; no. 33. — 48 specimens, cl. 3-13 mm.
Río Comasagua, slightly west of Río Conchalió, La Libertad; near the coast; March 21, 1953; no. 96. — 1 specimen, cl. 5 mm.

Some authors consider *Coenobita compressus* a variety of the Indo-West Pacific *Coenobita rugosus* H. Milne Edwards. Though the species indeed are closely related, they show some differences that make it necessary to treat them as distinct species. The carapace of the two species is of the same general shape, though in my specimens of *C. compressus* it bears fewer tubercles than in *C. rugosus*. The left third pereiopod in *C. compressus* has the smooth outer surface of the propodus distinctly convex, while it is almost flat in *C. rugosus*. The external surface of the palm of the large chela of *C. rugosus*, especially in its lower part, is far more densely tuberculated than in *C. compressus*. The most conspicuous difference between the two species in my opinion is found in the shape of the dactylus of the right third leg. In *C. compressus* the upper surface of the dactylus, especially in its proximal part, is broadened to such an extent that the outer surface, which is convex and practically vertical in *C. rugosus* (fig. 4c, d), in *C. compressus* is almost horizontal and concave, the dactylus thereby obtaining a scoop-like shape (fig. 4a, b).

Also in the colour pattern there is some resemblance between the two species. Both have a broad and rather faint dark transverse band on the carapace slightly behind the anterior margin. Behind this band two rather large dark spots may often be seen on the carapace; these two spots sometimes are fused anteriorly and so form a horseshoe-shaped figure. In both

species the carpus of the first three legs shows a dark longitudinal band, while there is a dark spot on the palm of the larger cheliped close to the lower articulation with the carpus. Furthermore in both species the proximal part of the propodus and dactylus of the second and the third right legs

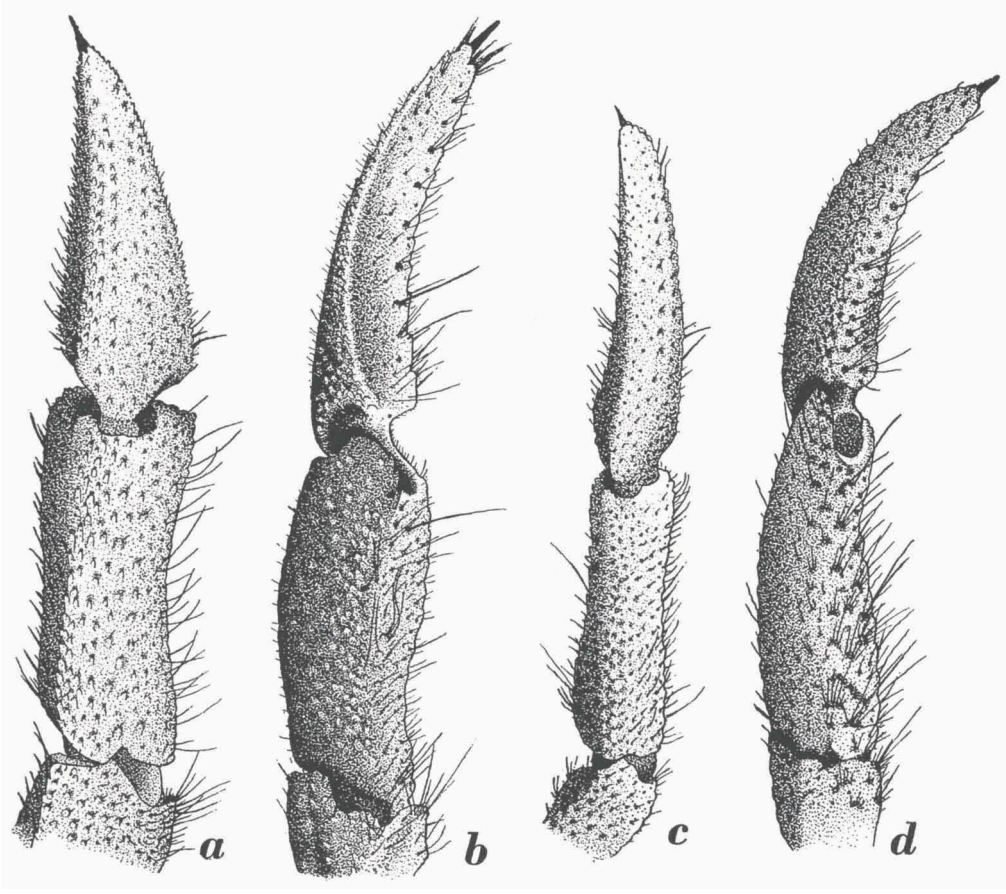

Fig. 4. *Coenobita compressus* H. Milne Edwards, specimen from near Zunzal (Boeseman, no. 97). a, dactylus and propodus of right third leg in dorsal view; b, the same in lateral view. × 5.

Coenobita rugosus H. Milne Edwards, specimen from Onotoa Atoll, Gilbert Islands (July 30, 1951, leg. P. E. Cloud). c, dactylus and propodus of right third leg in dorsal view; d, the same in lateral view. × 5.

usually are of a darker colour than the distal part. Since these colour notes are based on preserved material of both species it is well possible that in the living specimens differences in the colour pattern do exist.

The present material was found in the shells of the following gastropod

mollusks, which were kindly identified for me by Dr. C. O. van Regteren Altena: *Acanthina brevidentata* (W. Wood) (6 spec.), *A. cingulata* (Lam.) (1), *Cantharus gemmatus* (Rve.) (4), *C. insignis* (Rve.) (1), *C. sanguinolentus* (Ducl.) (2), *C.* spec. juv. (1), *Columbella* spec. juv. (1), *Littorina aspera* Phil. (1), *Nerita bernhardi* Récl. (17), *N. ornata* Sow. (1), *Neritina latissima* Brod. var. *intermedia* Sow. (6), *Planaxis planicostatus* Sow. (19), *Tegula ligulata* (Mke.) (2), *T. reticulata* (Wood) (1), *Thais biserialis* (Blv.) (8), *T. triangularis* (Blv.) (6), *T. triserialis* (Blv.) (3).

Coenobita rugosus wagneri Doflein probably is based on specimens of the present species. Doflein's (1900, p. 134) description is very short, but the characters mentioned by him apply well to *C. compressus*; especially Doflein's remark that the external surface of the left third pereiopod in *C. rugosus wagneri* is far less flattened than in the typical *C. rugosus* is significant.

Streets's (1871, p. 241) description of *Cenobita intermedia* also fits entirely for *C. compressus* and I have little doubt that the two species are synonymous. That *C. panamensis* Streets and *C. intermedia* Streets are but one species has already been pointed out by previous authors. The existence of more than one species of *Coenobita* on the West American coast therefore still has to be proved. Until now too little attention has been given to the West American *Coenobitas* and a comparison of a large material of this genus from various points of the West American coast is highly desirable. *Coenobita compressus* has been reported from the Gulf of California to Peru, the records of this species from the Indo-West Pacific area not to be trusted and probably are based on other forms.

Guérin Méneville usually is cited as the author of the present species. This is not correct, however, since H. Milne Edwards was the first to publish its description. This common error is caused by the fact that for a long time there was no certainty about the correct date of publication of Guérin's text on the Crustacea collected during the "Coquille" expedition (Duperrey, Voyage autour du monde ... Sur la Corvette ... La Coquille, Zool. vol. 2 pt. 2 div. 1, pp. 9-47, pls. 1-5). The dates generally given range from 1826 (cf. Gurney, 1939, p. 26) to 1839 (cf. Bequaert, 1926, p. 186), while usually the year 1830, printed on the title page of vol. 2 pt. 2 of the Zoology of the "Coquille", was accepted as correct. Sherborn & Woodward (1901, p. 392), who made a serious effort to find the correct dates of publication of Duperrey's work, gave that of the Crustacean text as 12 November 1831. However, five years later the same authors (Sherborn & Woodward, 1906, pp. 335, 336) had to admit that they had made an error, and came to the conclusion that the whole of vol. 2 pt. 2 of Duper-

rey's work (including the Crustacean text) was published between 15 November and 31 December 1838. Bequaert (1926, p. 186) also showed that the insect part could not have been published before 1838.

At first I was of the opinion that Sherborn & Woodward's (1906) evidence that all of vol. 2 pt. 2 has been published in 1838 is not entirely conclusive and that there might still be some loopholes in it. There is not the least doubt that Guérin's introduction to the Crustacea, Arachnida and Insecta, as well as the larger part of the Insect text (at least from p. 209 onward) indeed has been published in 1838, since the introduction is dated "ce 15 novembre 1838" and on p. 212 a reference to the year 1837 is made. My suspicion that the Crustacean text might have been published before 1838 was based on the following points:

1. In Guérin's publication fol. 1 is not present, the Crustacean text starting on p. 9 at the beginning of fol. 2. As explained in a footnote at the end of Guérin's introduction (p. xij) this is caused by that fol. 1 was intended to contain the introduction, but since the latter was so lengthy that it occupied two sheets, these sheets had been given the letters A and B, thereby making a fol. 1 superfluous. This procedure distinctly shows that the Crustacean text was printed before the introduction, otherwise these difficulties would not have arisen.

2. In his Crustacean text Guérin does not refer to works published after 1831, while he mentions on p. 26 "la méthode de M. Latreille, présentée tout récemment dans le premier volume de son cours d'Entomologie." Latreille's Cours d'Entomologie was published in 1831, a date which in 1838 hardly could have been called "tout récent".

3. On p. 14 of the Crustacean text Guérin states that H. Milne Edwards planned to resurrect the genus *Sesarma* Say, and that the characters used by Milne Edwards to distinguish the genus "seront publiés dans un ouvrage qu'il prépare et dont il a bien voulu nous montrer le manuscrit". The work of Milne Edwards referred to is his "Histoire naturelle des Crustacés", the first volume of which was published in 1834, the second (containing the description of *Sesarma*) in 1837. The fact that Guérin in his text did not cite, and thus evidently at that time did not know, the name of H. Milne Edwards's work, makes it certain that this text was written, and probably printed, before 1834 when the first volume of the "Histoire naturelle des Crustacés" was published.

It thus seems very probable that the text of Guérin's Crustacea was printed between 1831 and 1834. There is conclusive evidence, however, that this text was not published until 1838, so that Sherborn and Woodward's (1906) conclusions prove to be correct. This evidence is furnished by H.

Milne Edwards, who in his "Histoire naturelle des Crustacés" repeatedly refers to Guérin's "Coquille" plates, but never to the text of that work, while at several places in his vol. 2 (1837) Milne Edwards emphatically states that Guérin's crustacean text at that time had not yet been published: "L'OCYPODA URVILLII, de M. Guérin (Voyage de *la Coquille,* Crust. Pl. 1, fig. 1) ..... la description n'en pas encore été publiée" (p. 49), "La SQUILLA LESSONII, dont M. Guérin a donné une figure dans la partie zoologique du voyage du capitaine Duperrey; mais dont la description n'est pas encore publiée" (p. 527).

Now we confidently may accept that the whole of the text of vol. 2 pt. 2 div. 1 of Duperrey's "Voyage autour du monde ... sur ... la Coquille" was published in 1838, though part of it was printed long before that time. The plates belonging to Guérin's text have been published before the text; their dates of publication have been given by Guérin (1838, p. 271, footnote). For the five Crustacean plates these are: pl. 1 (1 September 1830), pl. 2 (29 November 1830), pl. 3 (7 March 1831), pl. 4 (25 July 1831), pl. 5 (15 June 1831).

PAGURIDAE

Calcinus obscurus Stimpson (figs. 5, 6)

Calcinus obscurus Stimpson, 1859, Ann. Lyc. nat. Hist. New York, vol. 7, p. 83.

Lagoon near La Libertad, La Libertad; summer, 1952; G. Kruseman. — 49 specimens (including 11 ovigerous females, cl. 7-11 mm), cl. 4-14 mm.

The rostrum is distinct and rather broadly triangular, it reaches slightly beyond the bases of the ophthalmic scales. The latter are triangular and end anteriorly in 1-3 teeth, the inner of which is longest. The scales are pale yellowish, often with a bluish tinge in the postero-median part. The eyestalks have a length which is equal to the anterior breadth of the carapace. In my spirit specimens they are of a pale orange colour and have a white or pale bluish ring just below the cornea. The cornea is black and measures about $^1/_6$ of the length of the eyestalk; in young specimens the eyestalks are relatively less slender.

The antennular peduncle in small specimens fails to reach the end of the eyes, in adult specimens it just overreaches them.

The scaphocerite reaches to the end of the penultimate segment of the antennal peduncle, it bears 2 to 4 (generally 3) teeth on the inner margin. The antennal peduncle fails to reach the base of the cornea.

Both chelipeds are smooth and unarmed; under a strong lens a minute granulation is visible. In adult specimens the left cheliped has the palm almost twice as high as the right. The chela is of a brownish orange colour

with white dots and olivaceous spots. The olivaceous colour lacks near the borders of the joints so that these seem to be margined with a lighter and brighter colour. The fingers are short with a few blunt teeth on the cutting edges; in juveniles the finger tips are hoof-shaped, in adults this is hardly visible anymore. The tips and the cutting edges of the fingers are white. The

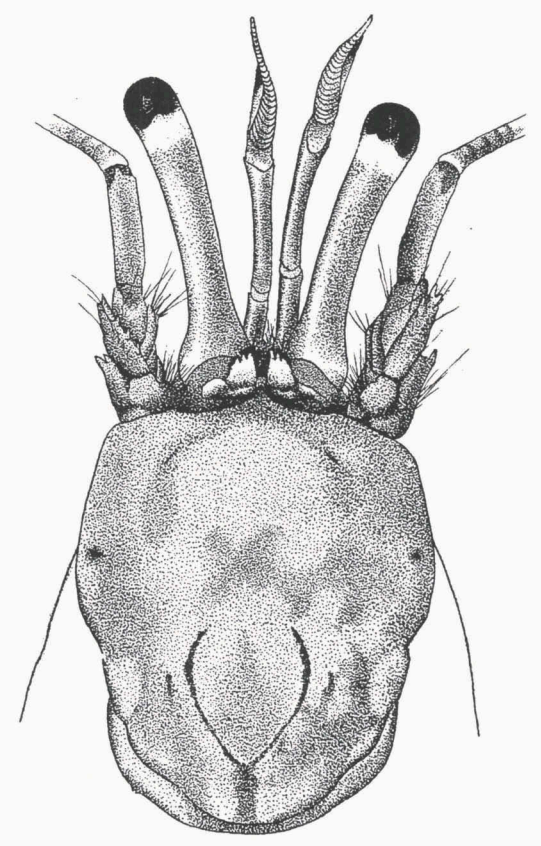

Fig. 5. *Calcinus obscurus* Stimpson, specimen from near La Libertad (leg. Kruseman). Anterior part of body in dorsal view. × 10.

outer surface of the carpus possesses a transverse tubercle near its base; behind this tubercle there is a shallow groove. The carpus shows the same colour as the chela. The merus has some olivaceous colour in the extreme distal part only, the rest is brownish orange. The external surface of the merus bears an inconspicuous antero-ventral tooth. The inner surface of the cheliped is of a more olivaceous colour than the outside. In the smaller chela the finger tips, or almost the entire fingers, are very distinctly hoof-shaped. The colour of the smaller chela is like that of the larger, only the fingers

generally have their base of a dark reddish colour. The carpus bears no tubercle. The second and third legs are conspicuous by having a far darker colour than the rest of the animal. These legs are of a dark purplish brown, which proximally of the middle of the merus becomes somewhat lighter. The dactylus bears two bright brownish orange bands, one in the basal part and one just before the black claw. The distal band is present in all the material examined. The proximal, however, often is inconspicuous in adult

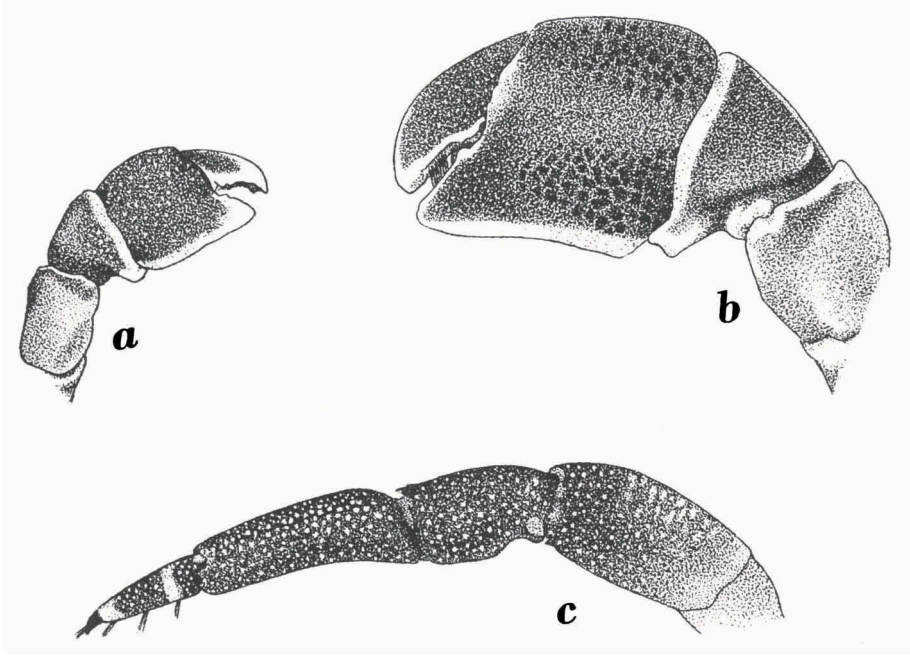

Fig. 6. *Calcinus obscurus* Stimpson, specimen from near La Libertad (leg. Kruseman). a, right cheliped; b, left cheliped; c, left third leg. a, b, × 4; c, × 5.

specimens, being longest visible in the lower part of the inner surface. In juveniles these two bands are very broad and sometimes occupy the larger part of the dactylus. There is hardly any difference in the shape and the size of the left and right walking legs. The propodus of the left third leg, however, is somewhat compressed and rugose in the upper part of the outer surface.

The species has been reported from the West American coast, from S. California to Ecuador, the type locality being Panama. The record from S. California cannot be fully trusted, since it may have been based on material of *C. californiensis* Bouvier. Boone (1930, p. 28) separated material from the Galapagos Islands as a new species, *C. explorator,* from the typical conti-

nental form. According to Schmitt (1939, pp. 25, 26), however, the specimens from the Galapagos belong to the typical *C. obscurus*.

Clibanarius panamensis Stimpson (figs. 7, 8)

Clibanarius panamensis Stimpson, 1859, Ann. Lyc. nat. Hist. New York, vol. 7, p. 84.

Shore of Estero de Jaltepeque, near Isla El Peñon, La Paz; March 15, 1953; no. 71. — 1 specimen, cl. 8 mm.

Shore of Isla Madresal near Mendez, in lagoon south-east of Puerto El Triunfo, Usulután; black sandy beach; April 9-11, 1953; no. 146. — 7 specimens (including 4 ovigerous females, cl. 11-13 mm), cl. 11-14 mm.

Shore near El Cuco, San Miguel; April 19, 1953; no. 156. — 1 specimen, cl. 12 mm.

Shore of Bahia de la Unión near La Unión, La Unión; April 17, 1953; no. 169. — 1 specimen, cl. 16 mm.

The rostrum is broadly triangular, it reaches slightly beyond the bases of the ophthalmic scales. These scales are narrow, placed rather close together, and end in two or three blunt teeth. The eyes are about of a length which is equal to the anterior breadth of the carapace. The cornea is small. The eyestalk is pale yellowish with a pale blue ring in the basal part.

The antennular peduncle almost reaches the end of the eyes. The antennal peduncle does not reach the base of the cornea. The antennal scale, which bears two or three teeth on its inner margin, does not attain the end of the penultimate joint of the antennal peduncle.

The chelipeds are equal. The fingers have black hoof-shaped tips. Behind the tips the cutting edges bear three or four sharp white teeth. The upper surface of the chelae bears strong spinous tubercles of a pale blue colour. The colour of the chelipeds is dark purplish to olivaceous brown with several pale yellowish longitudinal stripes. The upper surface of the palm shows about 5 of these stripes. The carpus has the same colour pattern as the chela. The anterior margin at the inner angle bears a strong spine, behind which there is sometimes a second spine. The merus has a distinct antero-lateral spine at the outer surface. In this segment the colour pattern is less distinct than in the carpus and the chela. The second and third legs are distinctly longer than the chelae. In both the right and the left third leg the dactylus is distinctly longer than the propodus. The legs are of a dark purplish to olivaceous brown, just like the chela, and also show longitudinal pale whitish or bluish lines. As a rule four such lines are visible on the outer surface of the legs, a fifth runs over the dorsal surface and three over the inner surface. The joints of the legs are smooth, except for a few pale blue and flat tubercles scattered over the outer surface of the merus and the carpus. Some scattered hairs are seen on the legs, which, however, nowhere are strongly pubescent.

The present specimens inhabited the shells of the gastropod molluscs *Cerithidea hegewischi* (Phil.) and *Thais kosquiformis* (Ducl.), for the iden-

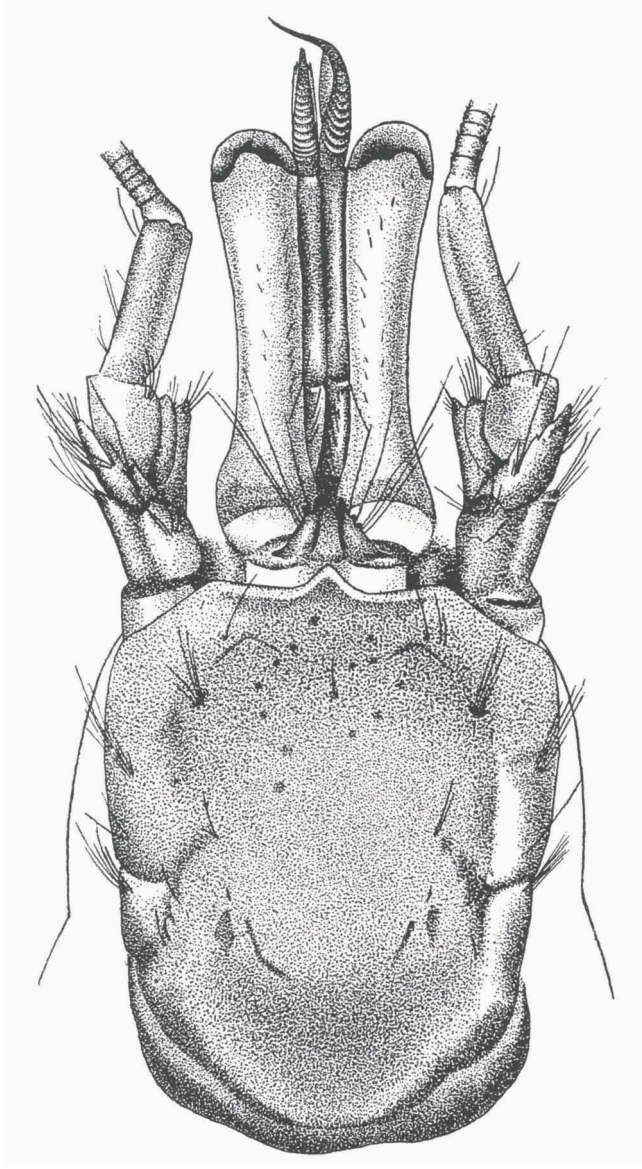

Fig. 7. *Clibanarius panamensis* Stimpson, specimen from near La Unión (Boeseman, no. 169). Anterior part of body in dorsal view. × 10.

tification of which I have to thank Dr. C. O. van Regteren Altena, curator of molluscs of the Rijksmuseum van Natuurlijke Historie.

Clibanarius panamensis has been reported from Lower California to Peru. As far as I know the present specimens are the first to be reported from El Salvador, though it is possible that Smith's (1871, p. 92) specimens,

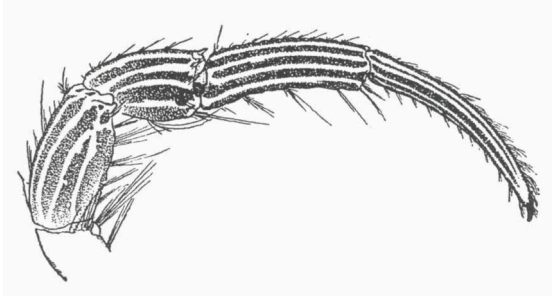

Fig. 8. *Clibanarius panamensis* Stimpson, specimen from near La Unión (Boeseman, no. 169). Right third leg. × 3.

originating from the Gulf of Fonseca, were collected within the territory of El Salvador.

Clibanarius albidigitus Nobili (fig. 9)

Clibanarius albidigitus Nobili, 1901, Boll. Mus. Zool. Anat. comp. Torino, vol. 16 n. 415, p. 24.

Lagoon near La Libertad, La Libertad; summer, 1952; G. Kruseman. — 27 specimens (including 5 ovigerous females, cl. 4-6 mm), cl. 3-9 mm.

The rostrum is small but distinct. The anterior margin is straight in its median part, the lateral parts of the margin run obliquely backwards to the antero-lateral angle of the carapace. The dorsal surface of the carapace bears some flat corneous tubercles in the anterior part; the colour of the carapace is yellowish white with pale orange markings. The eyes are elongate, their length being about equal to the anterior breadth of the carapace. The stalk is olivaceous brown, becoming more dark reddish brown in the basal part; a black ring is placed just below the cornea. The ophthalmic scales are about oval in outline and are placed close together, they end in some small teeth. The colour of the scales is the same as that of the basal part of the eyestalks.

The antennular peduncle is about as long as the eyes, its tip is of a bluish colour, the rest is dark olivaceous like the eyestalk. The antennal peduncle reaches to the base of the cornea, it has an orange brown colour. The scaphocerite fails to reach the base of the ultimate segment of the peduncle; its inner margin bears some 2 to 4 teeth.

The chelipeds are equal. In juvenile specimens they are orange brown, in the adults the colour is more olivaceous brown. White or pale bluish

tubercles are scattered over the chela and the carpus. These tubercles often are spinous, especially in the chela. The fingers are gaping and their black tips are hoof-shaped. In smaller specimens the distal part of the fingers

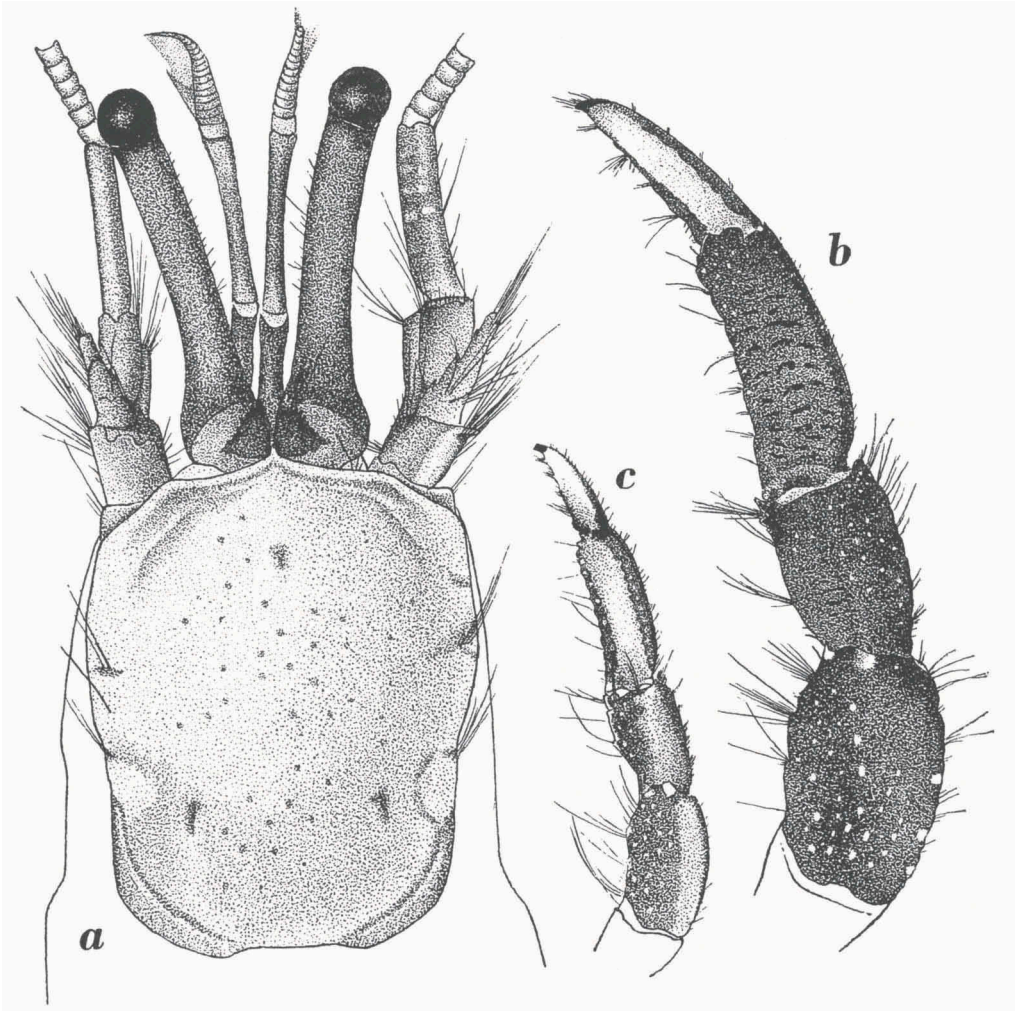

Fig. 9. *Clibanarius albidigitus* Nobili, specimens from near La Libertad (leg. Kruseman). a, anterior part of body in dorsal view; b, right third leg of large male; c, right third leg of ovigerous female. × 10.

is of a pale yellowish colour, in larger specimens this pale area becomes gradually smaller, till it is only a narrow strip along the base of the black tips. The merus is slightly lighter in colour than the carpus and the chela, but has a similar colour pattern. At the antero-ventral angle of the outer

surface of the merus two spinous tubercles are present, also on the inner lower margin some such tubercles may be seen. The second and third legs are distinctly longer than the chelipeds. There is not much difference in length between the left and right legs. The dactylus of the third leg is decidedly shorter than the propodus. The propodus of the left third leg possesses a rather distinct longitudinal carina in the upper part of the outer surface. This carina extends over the full length of the propodus. The colour pattern of the legs is very characteristic. They are of a reddish brown colour, in the large specimens with a more olivaceous, in the juveniles with a more orange tinge. On both lateral surfaces of the dactylus there is a bright white longitudinal band, which is so broad that it nearly occupies the whole of the lateral surfaces. The external band continues over the middle of the outer surface of the propodus and over the upper half of that of the carpus and the merus. In adult specimens the outer band of the merus, carpus, and propodus is not white but pale olivaceous, or even lacks entirely; in juveniles it is white, but not so bright as that on the dactylus. On the merus of the second leg the outer band generally is not visible. The inner surface of the propodus, carpus, and merus is practically entirely white or pale olivaceous.

The type locality is Santa Elena Bay, Ecuador. I do not know of any other record of this species in the literature.

BRACHYURA

PORTUNIDAE

Callinectes arcuatus Ordway

Callinectes arcuatus Ordway, 1863, Journ. Boston Soc. nat. Hist., vol. 7, p. 578.

West of Bocana Río Lempa, near Isla Tasajera, San Vicente; March 19, 1953; no. 88. — 3 males, cb. 36-55 mm.

Shore near El Cuco, San Miguel; April 19, 1953; no. 154. — 3 males, cb. 17-32 mm.

The species occurs along the west coast of America from southern California down to Chile. Rathbun (1930, p. 122) reports it from several localities in El Salvador.

Callinectes toxotes Ordway

Callinectes toxotes Ordway, 1863, Journ. Boston Soc. nat. Hist., vol. 7, p. 576.

La Herradura, La Paz; May, 1952; G. Kruseman. — 2 males, cb. 148 and 150 mm, 1 female, cb. 137 mm.

Callinectes toxotes is known from Lower California (Mexico) to the Juan Fernandez Islands (Chile). I do not know of any previous record of the species from El Salvador.

Arenaeus mexicanus (Gerstaecker)

Euctenota mexicana Gerstaecker, 1856, Arch. Naturgesch., vol. 22 pt. 1, p. 131, pl. 5 figs. 3, 4.

Shore near El Cuco, San Miguel; April 19, 1953; no. 154. — 1 male, cb. 32 mm, 2 females, cb. 35 and 59 mm.

The species is known from Lower California to Peru. As far as I know it has not previously been reported from El Salvador.

Cronius ruber (Lamarck) (fig. 10)

Portunus ruber Lamarck, 1818, Hist. nat. Anim. s. Vert., vol. 5, p. 260.

Shore near El Cuco, San Miguel; April 19, 1953; no. 154. — 1 male, cb. 29 mm.

The present juvenile male was compared with three large specimens from the western Atlantic, contained in the collection of the Rijksmuseum van Natuurlijke Historie. The Salvador specimen differs conspicuously from my Atlantic material and from most descriptions given in literature by

Fig. 10. *Cronius ruber* (Lam.), specimen from near El Cuco (Boeseman, no. 154). Anterior part of carapace in dorsal view. × 3.

having the teeth of the front not spiniform, but broadly rounded (fig. 10). This is obviously a juvenile character since Rathbun (1930, p. 142) states that in the young the front is less advanced with the median pair of teeth subtruncate, while specimens with a carapace breadth of 7 mm have the front arcuate and cut into shallow lobes.

The species has a wide distribution. It is known from the West American coast from Lower California to Peru, while it is also known from both sides of the Atlantic (South Carolina to S. Brazil, and Cape Verde Islands to Angola). Rathbun (1930, p. 141) reports the species from El Salvador.

XANTHIDAE

Xantho taboganus (Rathbun) (textfig. 11a, pl. I fig. 2)

Leptodius taboganus Rathbun, 1912, Smithson. misc. Coll., vol. 59, p. 3.

Shore near El Cuco, San Miguel; April 19, 1953; no. 154. — 1 male, cb. 25 mm.

The specimen agrees rather well with the description and figures given by Rathbun (1930, p. 304, pl. 140) of this species. The posterior antero-lateral tooth of the carapace, however, does not reach as distinctly outwards as in the specimen figured by Rathbun. Both chelipeds are missing in my specimen. The first pleopod of my male (fig. 11a) strongly resembles that

of a male of *Xantho occidentalis* (Stimpson) (cb. 33 mm) from Guaymas Bay, Mexico (fig. 11b). In my *X. taboganus* specimen, however, the pleopod is more slender, though the general shape essentially is the same. Since unfortunately I have only one specimen of each species at my disposal, nothing can be said about the variability of the characters of the pleopods.

Until now the species has been reported from the West American coast from Costa Rica to Ecuador. The present specimen thus extends the known range of the species to the north.

Metopocarcinus truncatus Stimpson (textfigs. 11c, d, 12, 13, pl. I fig. 3)

Metopocarcinus truncatus Stimpson, 1860, Ann. Lyc. nat. Hist. New York, vol. 7, p. 216, pl. 3 fig. 4.

Shore near El Cuco, San Miguel; April 19, 1953; no. 154. — 1 male, cb. 7 mm, cl. 6 mm.

The carapace is slightly broader than long. The anterior edge of the front is slightly more than $^1/_3$ of the breadth of the carapace; while the distance between the inner angles of the orbits is fully half the breadth of the carapace. The front is truncate, the anterior edge is almost straight, not double-edged and without a median incision. The inner margin of the orbit forms a blunt lobe just behind the lateral angle of the front. The posterior margin of the orbit shows two closed fissures, between which the margin is slightly convex. The antero-lateral margin of the carapace has the tooth at the outer angle of the orbit short, inconspicuous and sometimes completely fused with the next tooth. Three broad lobiform and quite distinct teeth are present on this margin, which at some distance behind the last tooth curves abruptly and angularly inward, continuing a short distance on the dorsal surface of the carapace. The postero-lateral margin of the carapace is almost straight and shows no sharp edge. The dorsal surface of the carapace is smooth, though slightly uneven. The frontal, orbital, and antero-lateral margins are raised, the surface of the raised margins is granular. A few scattered granules of a rather large size are placed symmetrically on the dorsal surface of the carapace, some of these granules are arranged into short transverse rows. A row of minute granules is visible on the posterior margin of the carapace.

The eyes are filling the orbits. The lower margin of the orbit is evenly concave, without any lobe. The inner suborbital tooth is long and blunt. The basal segment of the antennal peduncle distinctly fails to reach the end of this tooth. The merus of the outer maxillipeds is somewhat narrower than the ischium. Its distal edge is slightly oblique, its outer angle is rather sharp, but not produced.

The chelipeds are equal. The tips of the fingers are crossing, their cutting edges close over their full length. These cutting edges bear four or five shallow teeth, those of the dactylus nicely fitting between those of the fixed finger. No large backward pointing tooth is present on the cutting edge of either dactylus. The outer surface of the palm bears three very conspicuous longitudinal granular ridges over its full length. Below the

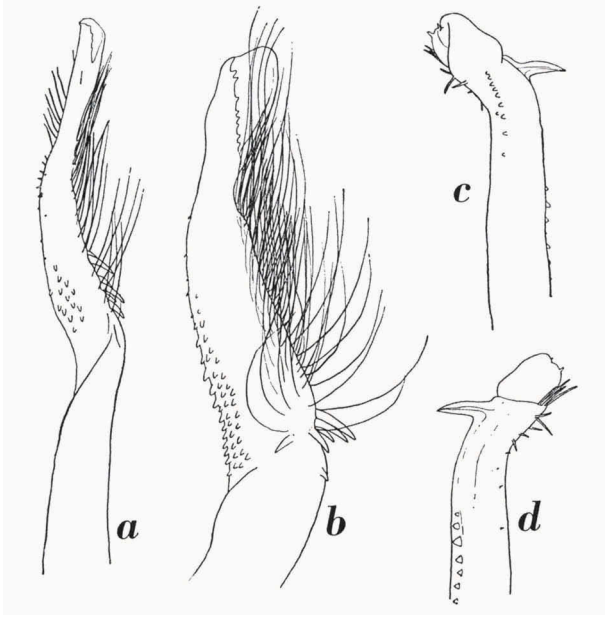

Fig. 11. *Xantho taboganus* (Rathbun), specimen from near El Cuco (Boeseman, no. 154). a, first pleopod of male. × 20.
Xantho occidentalis (Stimpson), specimen from Guaymas Bay, Mexico (leg. H. ten Kate). b, first pleopod of male. × 20.
Metopocarcinus truncatus Stimpson, specimen from near El Cuco (Boeseman, no. 154). c, first pleopod of male in ventral view; d, first pleopod of male in dorsal view. × 40.

lowest of these ridges there are some more but smaller granules. Small granules may also be seen on the fingers. The upper margin of the palm bears two granulated ridges. The inner surface of the chela is smooth. The upper surface of the carpus is bordered on the outside by an elevated ridge; the upper surface itself shows some irregular tubercles and some granules. On the inner angle a blunt tooth is present. All the legs show a row of hairs on the upper margin of the merus. The dactylus of the ambulatory legs is finely pubescent. Minute granules are present on the upper surface of the joints of the walking legs. The abdomen has the third to fifth segments fused. A figure of the first pleoped of the male is given here.

In my spirit specimen the carapace is of a purplish grey colour, the anterior part being paler than the posterior. A large whitish spot is present on each side of the cardiac region. The raised frontal, orbital, and antero-lateral margins as well as the dorsal granules are of a whitish colour and contrast against the rest of the carapace. The legs are whitish with very faint purplish grey markings. The fingers of the chelae, like in *M. concavatus* Crane, are dark brown with whitish tips. The dark colour of the immovable finger extends for a considerable distance on the palm.

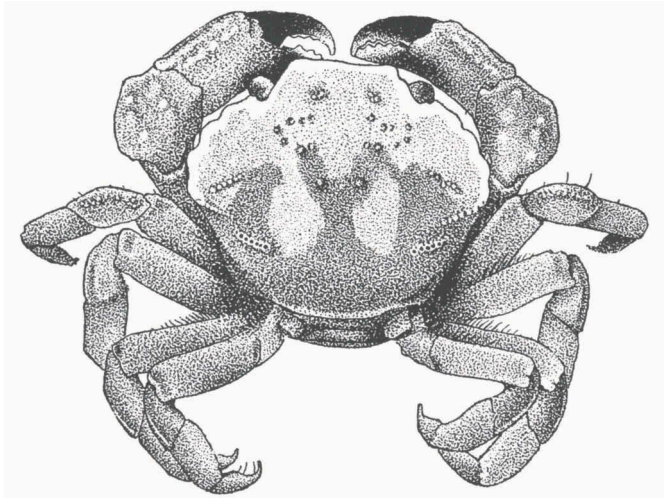

Fig. 12. *Metopocarcinus truncatus* Stimpson, specimen from near El Cuco (Boeseman, no. 154). × 6.

Of the present genus two species have been described: *Metopocarcinus truncatus* Stimpson, the type species of the genus, and *M. concavatus* Crane. In the original description of both these species the surface of the carapace and of the chelipeds is described as being smooth, differing thereby most conspicuously from the here described specimen. Furthermore the present specimen differs from Stimpson's description in having the front not double edged. From *M. concavatus* it is distinguished by having the front not concave and not incised in the middle, by the shape of the third maxilliped, and by having the dark colour of the immovable finger of the chela continued on the palm. From the Chilean female specimen brought by Rathbun (1930, p. 318) to *M. truncatus* the following differences are shown by the male specimen collected by Dr. Boeseman: (1) The front is not double edged and not incised or nicked in the middle, (2) the granules on the carapace seem to be more distinct, (3) no lobe is present on the lower orbital margin, (4) the basal article of the antenna does not reach as far forwards as the inner

suborbital tooth, (5) the chelipeds are not "sparingly finely granulate", and like the other legs they are not naked, (6) no large tooth is present on the cutting edge of the dactyli of the chelae. It is possible that all specimens of *Metopocarcinus* that are known at this time belong to one large variable species, but on the other hand it is equally well possible that Miss Crane's

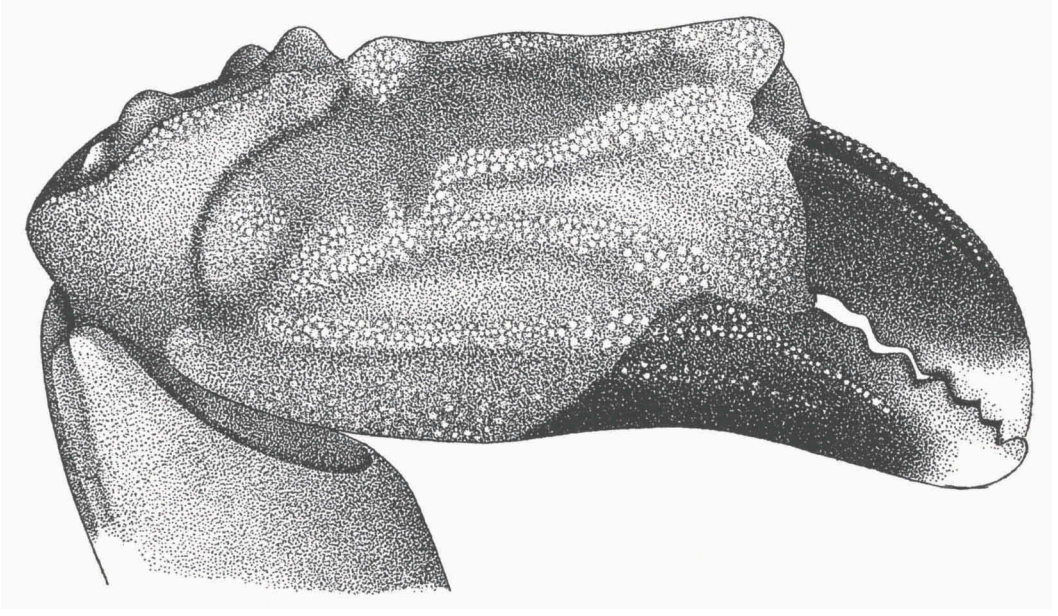

Fig. 13. *Metopocarcinus truncatus* Stimpson, specimen from near El Cuco (Boeseman, no. 154). Right chela. × 25.

(1947, p. 77) *M. concavatus,* Miss Rathbun's specimen from Chile, and the male described above represent three different species, that all three are specifically distinct from *M. truncatus.* This problem can only be solved by a large material from various parts of the range of *Metopocarcinus.* For the time being I identify my specimen with Stimpson's species. *Metopocarcinus truncatus* has been reported from Mexico and Chile, *M. concavatus* from El Salvador and Costa Rica.

Eurypanopeus transversus (Stimpson)

Panopeus transversus Stimpson, 1860, Ann. Lyc. nat. Hist. New York, vol. 7, p. 210.

Shore of Bahia de la Unión near La Unión, La Unión; April 18, 1953; no. 172. — 1 male, cb. 17 mm, 1 female, cb. 12 mm.

Rathbun (1930, p. 409) mentioned this species from El Salvador. Its range extends along the west coast of America from Mexico to Peru.

Eurypanopeus planus (Smith)

Panopeus planus Smith, 1869, Proc. Boston Soc. nat. Hist., vol. 12, p. 283.

Shore near El Cuco, San Miguel; April 19, 1953; no. 154. — 1 ovigerous female, cb. 20 mm, cl. 13 mm.

The specimens from Guaymas, Mexico, provisionally identified with the present species by A. M. Buitendijk (1950, p. 277) in my opinion are *Eurypanopeus ovatus* (Benedict & Rathbun).

Eurypanopeus planus inhabits the west coast of America and has been reported from Mexico to Ecuador. The species has not been reported from El Salvador before.

Eriphia squamata Stimpson

Eriphia squamata Stimpson, 1859, Ann. Lyc. nat. Hist. New York, vol. 7, p. 56.

Shore near El Cuco, San Miguel; April 19, 1953; no. 154. — 1 female, cb. 30 mm.

This species has been reported from the west coast of America from Mexico to Chile. I do not know of any previous record from El Salvador.

POTAMONIDAE

Pseudothelphusa magna Rathbun (textfig. 14, pl. I fig. 4, pl. II)

Pseudothelphusa magna Rathbun, 1895, Proc. U. S. Nat. Mus., vol. 18, p. 377, textfigs. 1, 2, pls. 29, 30 figs. 7-10.

Lago de Guija, Santa Ana; bought from fishermen; May 11, 1953; no. 266. — 3 males, cb. 60, 82, and 86 mm, cl. 39, 52, and 53 mm, 3 females, cb. 85, 89, and 91 mm, cl. 54, 56, and 58 mm.

Lago de Guija, Santa Ana; S. E. point, within 40 m off shore; smaller specimens found under rocks, the larger walking amongst the vegetation; June 10-15, 1953; no. 269. — 5 males, cb. 27, 28, 34, and 57 mm, cl. 18, 19, 23, and 36 mm.

Lago de Guija, Santa Ana; found on the shore; June 10, 1953; no. 275. — 1 male, cb. 57 mm, cl. 37 mm.

Lago de Guija, Santa Ana; June 10-11, 1953; no. 282. — 1 female, cb. 36 mm, cl. 24 mm.

Near Lago de Guija, Santa Ana; June 14, 1953; no. 289. — 1 female, cb. 30 mm, cl. 20 mm.

Lago de Guija, Santa Ana; summer 1952; G. Kruseman. — 1 female, cb. 47 mm, cl. 31 mm.

Río Amayo, near railway bridge, 3 km E. of Agua Caliente, S. of Texistepeque, Santa Ana; river of 2-7 m width, not very fast flowing, with little vegetation, water rather clear, bottom sand, mud and vegetable debris, with rocks; collected at depths of 0.10-0.50 m; April 1, 1953; no. 121. — 1 female, cb. 40 mm, cl. 28 mm.

Río Amayo, Santa Ana; same locality as no. 121; April 1, 1953; no. 128. — 6 juveniles, cb. 13, 13.5, 14.5, 15, 17, and 23 mm, cl. 9.5, 9.5, 10.5, 11, 12, and 16 mm.

Río Chimalapa, near the road between Sonsonate and Las Salinas, Sonsonate; river of up to 15 m width, fast flowing, with rapids, water clear, bottom sandy and locally muddy, with rocks, shores with a scanty vegetation; March 25, 1953; no. 115. — 1 male, cb. 32 mm, cl. 22 mm.

Since our knowledge of the fresh water crabs still is very fragmentary, the identification of such crabs is a difficult task. In the past too little attention has been given to the male pleopods, which certainly will furnish a character of the utmost importance to distinguish between the various species of this group. The present *Pseudothelphusa* material agrees very well with Miss Rathbun's (1895) description of *Pseudothelphusa magna* and therefore it is identified with that species. Fortunately in the original description Miss Rathbun figured the male pleopod, so that the identity of the present material could be made reasonably certain.

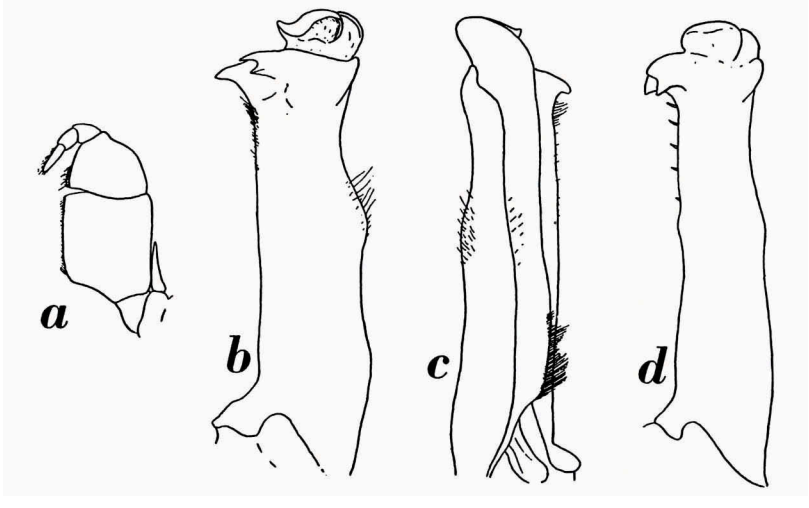

Fig. 14. *Pseudothelphusa magna* Rathbun, a-c, adult male, cb. 82 mm, from Lago de Guija (Boeseman, no. 266); d, juvenile male, cb. 34 mm, from Lago de Guija (Boeseman, no. 269). a, third maxilliped; b, d, first pleopod in external view; c, first pleopod in ventral view. a, × 1.25; b, c, × 4; d, × 10.

The upper frontal ridge is sharp, it is straight and smooth or somewhat tuberculate, and has a deep incision in the middle. Laterally it curves backwards and for some distance runs parallel with the orbital margin before joining it. The lower frontal ridge lies directly below or even somewhat behind the upper, it is granular and sinuous, sometimes its curves are more pronounced than in Rathbun's pl. 30 fig. 7. The carapace is flat with the branchial regions slightly swollen. It is 1.4 to 1.6 times as broad as long. The upper surface is covered by numerous closely placed flattened minute tubercles; in the anterior and lateral regions larger tubercles are visible among the smaller, these larger tubercles are also flattened. The smaller as well as the larger tubercles are so inconspicuous that at first view the carapace of adult specimens seems to be perfectly smooth. The larger tubercles

are relatively more distinct in younger specimens. A rather distinct transverse postfrontal ridge is placed at some distance behind the upper frontal ridge, the former also is interrupted in the middle. The cervical groove is sinuous, near the antero-lateral margin it becomes rather indistinct. Between the orbit and the incision of the cervical groove the antero-lateral margin of the carapace shows one distinct and 2 to 6 indistinct incisions, the latter often being hardly visible. Behind the cervical incision the margin shows 14 to 20 rather large teeth.

The shape of the third maxilliped is as that figured by Rathbun for the type, only the excavation in the antero-lateral margin of the merus is less deep in my material. The large cheliped agrees entirely with Rathbun's description. The tubercle at the base of the fingers is not as conspicuous as, e.g., in *Pseudothelphusa garmani* Rathbun, but it is visible in all my specimens. The shape of the male abdomen and that of the first pleopods of the male agree well with Rathbun's figures of these parts. In juvenile specimens the three dorsal teeth at the tip of the first pleopod of the male are broader and less conspicuous than in the adult specimens. For comparison the first pleopods of an adult and a juvenile male are figured here.

The colour agrees rather well with Rathbun's description. The carapace, however, is of a uniform dark olivaceous brown, and the large tubercles are not of a darker colour there. On the large chelipeds the larger tubercles indeed are of a much darker colour than the rest of the chela; the reticular colour-pattern which Miss Rathbun mentions, is present, though it is very indistinct. The teeth of the fingers sometimes are of a uniform brownish colour, sometimes the tips are lighter. The legs are of a dark reddish brown, becoming more dark olivaceous brown in old specimens.

In the large female from Río Amayo (no. 121) the upper frontal ridge shows a distinct incision somewhat to the outside of the middle of each half. It has the carapace slightly more flattened and a little less broad than in the specimens from Lago de Guija: in the latter the carapace generally is somewhat more than 1.5 times as broad as long, in the Río Amayo specimens the breadth usually is less than 1.5 times the length of the carapace. The legs are of the same olivaceous colour as the carapace. Some of the smaller specimens from the same locality (no. 128) also have one or both halves of the upper frontal ridge with an incision or an indication of an incision, though in most the ridge, except for the medan incision, is uninterrupted. These smaller specimens are of the same colour as the larger female. All of the males in this lot are too small to have the first pleopods developed to such a degree that important characters are visible.

This fresh water species was originally described from Costa Rica, later

it has been reported also from Guatemala. It is now reported for the first time from El Salvador.

PINNOTHERIDAE

Dissodactylus smithi Rioja

Dissodactylus smithi Rioja, 1944, An. Inst. Biol. Mex., vol. 15, p. 149, figs. 1-6, 11-15.

Shore near El Cuco, San Miguel; March 4-7, 1953; no. 58. — 2 males, cb. 2 and 4 mm.

Shore near El Cuco, San Miguel; April 19, 1953; no. 154. — 1 male, cb. 2 mm.

The specimens agree well with Rioja's description and figures. The length of the carapace is practically equal to the breadth. The surface is smooth, though in the largest specimen it is somewhat pitted. The front of my largest specimen is more distinctly concave than in Rioja's figure, while the lateral angles are more broadly rounded. In the juveniles, however, the frontal margin is almost straight.

The specimens were found in samples that also contained material of *Mellita longifissa* Mich., and it is therefore probable that they, like Rioja's specimens, lived commensally on these sea urchins. Until now the species was only known from the Pacific coast of Mexico.

GRAPSIDAE

Grapsus grapsus (L.)

Cancer Grapsus Linnaeus, 1758, Syst. Nat., ed. 10 vol. 1, p. 630.

Shore near El Cuco, San Miguel; April 19, 1953; no. 154. — 1 male, cb. 20 mm.

On the west coast of America the range of *Grapsus grapsus* extends from Lower California to Chile. It occurs also on the Atlantic coasts of America (from Bermuda and Florida to Brazil) and Africa. Miss Crane (1947, p. 85) reports the species from El Salvador.

Goniopsis pulchra (Lockington)

Goniograpsus pulcher Lockington, 1876, Proc. California Acad. Sci., vol. 7, p. 152.

Shore of Estero de Jaltepeque near La Herradura, La Paz; on stone wall of pier, in mangrove forest, water rather dirty; March 7, 1953; no. 70. — 2 males, cb. 11 and 20 mm, 5 females (including 1 ovigerous, cb. 25 mm), cb. 12-25 mm.

West of Bocana Río Lempa, near Isla Tasajera, San Vicente; March 19, 1953; no. 88. — 1 male, cb. 17 mm, 1 female, cb. 16 mm.

Goniopsis pulchra inhabits the west coast of America from Lower California (Mexico) to Peru. So far as I know it has not been reported before from El Salvador. Smith (1871, p. 91) reports from the Gulf of Fonseca specimens which he doubtfully refers to *Goniopsis cruentata* (Latr.), but which evidently are *Goniopsis pulchra*.

Pachygrapsus transversus (Gibbes)

Grapsus transversus Gibbes, 1850, Proc. Amer. Ass. Adv. Sci., vol. 3, p. 181.

West of Bocana Río Lempa near Isla Tasajera, San Vicente; March 19, 1953; no. 88. — 4 males, cb. 10-17 mm, 1 ovigerous female, cb. 16 mm.

Shore of Isla Madresal near Mendez, south-east of Puerto El Triunfo, Usulután; in lagoon; April 9-11, 1953; no. 146. — 1 female, cb. 12 mm.

Playa El Cuco, San Miguel; March 4-7, 1953; no. 58. — 1 ovigerous female, cb. 12 mm.

Shore near El Cuco, San Miguel; April 19, 1953; no. 154. — 4 males, cb. 6-18 mm, 4 females (including 2 ovigerous, cb. 14 and 15 mm), cb. 6-20 mm.

The species is practically circumtropic. On the west coast of America it has been reported from California to Peru. It has been mentioned from El Salvador by Stimpson (1871, p. 114, under the name *Pachygrapsus socius*) and by Crane (1947, p. 85).

Glyptograpsus impressus Smith (fig. 15)

Glyptograpsus impressus Smith, 1870, Trans. Connect. Acad. Arts Sci., vol. 2, p. 154.

Shore west of La Libertad near Río Comasagua, La Libertad; February 27, 1953; no. 28. — 2 males, cb. 16 and 19 mm, 1 female, cb. 14 mm.

Río Conchalió near its mouth, near La Libertad, La Libertad; a river of 2 m broad, up to 1 m deep, water not very clear, bottom muddy with rocks, shore with overhanging trees; March 21, 1953; no. 93. — 1 male, cb. 13 mm, 1 female, cb. 21 mm.

The specimens examined agree well with Rathbun's (1918, p. 276) description. Rathbun, however, does not mention that, though in the males the chelipeds are strongly unequal, in the females they are equal and short, being very similar in shape to the smaller cheliped of the male. Apart from the rather poor photographs given by Rathbun (1918, pl. 72 figs. 1, 2), no figures of the present species seem to have been published. Therefore the drawing of a male specimen is reproduced here.

The species originally was described from El Salvador (Acajutla). Later it was found also in Mexico and Panama.

Sesarma angustum Smith

Sesarma angusta Smith, 1870, Trans. Connect. Acad. Arts Sci., vol. 2, p. 159.

Río Zunzal, slightly west of Río Coyol, Sonsonate; about 1 km from the sea, a rather fast flowing river; April 8, 1953; no. 139. — 1 male, cb. 15 mm, 1 female, cb. 11 mm.

Río Banderas, south of Sonsonate, near the road between Sonsonate and Las Salinas, Sonsonate; about 10 km from the sea; March 25, 1953; no. 107. — 1 male, cb. 21 mm.

Shore west of La Libertad, near the mouh of Río Comasagua, La Libertad; about 1 or 2 km from the sea; February 27, 1953; no. 28. — 1 female, cb. 16 mm.

Río Conchalió near its mouth, near La Libertad, La Libertad; a stream of about 2 m broad, up to 1 m deep, 1 or 2 km from the sea, water not very clear, bottom muddy

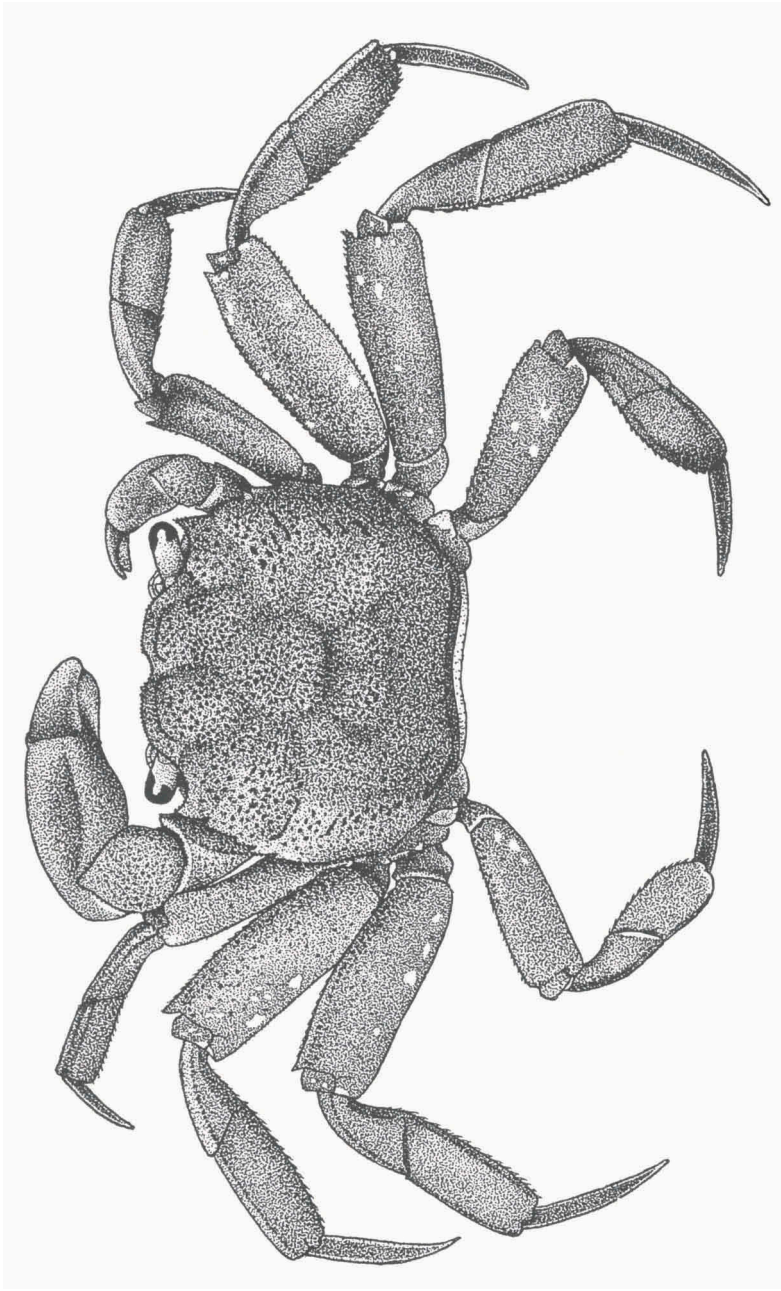

Fig. 15. *Glyptograpsus impressus* Smith. Male in dorsal view. × 2.5.

with rocks, shore with overhanging trees; March 21, 1953; no. 93. — 2 males; cb. 16 and 18 mm, 1 female, cb. 16 mm.

The specimens agree well with the descriptions and figures given in the literature of this species. Smith (1870) states that in the female the hand is about half as long as the breadth of the front, in my material I found it to be half as long as the breadth of the entire carapace. In the larger specimens two blunt lobes, that look like reduced teeth, are seen on the lateral margin of the carapace behind the antero-lateral tooth. In my male specimens the chelipeds are practically equal, though in some they are distinctly unequal. In the males the lower margin of the dactylus and the distal part of the propodus of the second and third legs show a heavy, short and dark pubescence, which lacks in the females.

The colour of the preserved specimens is a dark greenish or purplish grey. Rather large light circular spots are scattered over the carapace; these spots generally are surrounded by purple colour. The upper and lower margins of the meri of the ambulatory legs consist of alternating white and dark purple spots. In the males the fingers of the larger cheliped are bright brownish red, the palm is paler and of a more orange brownish tinge. In the smaller cheliped this colour is much less conspicuous, while in the female it is still less distinct, here only the tips of the fingers are of an orange colour, the palm being purplish green, palest in its lower part.

Sesarma angustum was known from the west coast of America from Costa Rica to Colombia. The present Salvador specimens show that the actual range of the species extends much farther north.

GECARCINIDAE

Cardisoma crassum Smith

Cardiosoma crassum Smith, 1870, Trans. Connect. Acad. Arts Sci., vol. 2, p. 144, pl. 5

Bought at the market of San Salvador; July 7, 1953; no. 308. — 2 males, cb. 86 and 94 mm.

As Dr. Boeseman asserted me, the colour of the specimens, after a preservation in spirit of about 4 months, has remained practically unchanged. The following colour description is based on the preserved specimens. The carapace is pale greyish blue almost all over. The frontal margin is paler than the rest, while the urogastric region is of a pale yellowish colour. The whole of the gastric region is slightly paler than the branchial and hepatic regions. Six small light spots are visible on the carapace: two each in a straight longitudinal line behind the orbit; the other two are placed between the two posterior of the postorbital spots, forming one transverse row with them. The large chelipeds are white, the basal segments becoming slightly

greyish. The blunt spines on this leg, and the cutting edges of the tips of the fingers are of a horn colour. The small chelipeds are very pale bluish grey, the tips of the fingers being lightest. The walking legs are bright orange red; this colour is brightest in the distal part of the legs, the basal part being paler and more greyish or yellowish. The abdomen is dark wine-red and so is the lateral part of the sternum near the bases of the legs. The ischium of the third maxilliped is pale greyish, the following segments are dark wine-red. A few reddish spots may be seen on the front between the eyes. The hairs on the legs are black, those on each side of the oral cavity dark brown.

The species is known from the West American coast from Mexico to Peru or Chile. So far as I know this species has not been reported from El Salvador before; the type material, however, was collected in the Gulf of Fonseca, no more exact indication of the locality being given.

OCYPODIDAE

Ocypode gaudichaudii H. Milne Edwards & Lucas

Ocypode Gaudichaudii H. Milne Edwards & Lucas, 1853, Orbigny's Voy. Amér. mérid., vol. 6 pt. 1, p. 26.

West of Bocana Río Lempa, near Isla Tasajera, San Vicente; March 19, 1953; no. 88. — 1 male, cb. 20 mm.

Shore near El Cuco, San Miguel; April 19, 1953; no. 154. — 1 juvenile, cb. 10 mm.

The juvenile specimen from El Cuco quite strongly resembles juveniles of *O. occidentalis*. The eyes in the Cuco specimen, however, are smaller and less swollen than in the *O. occidentalis* juveniles, while moreover the style of the eyes is already slightly indicated.

Ocypode gaudichaudii is known from El Salvador to Chile. It has been reported previously from El Salvador by Rathbun (1918, p. 374).

Ocypode occidentalis Stimpson

Ocypoda occidentalis Stimpson, 1860, Ann. Lyc. nat. Hist. New York, vol. 7, p. 229.

Shore near Las Salinas, Sonsonate; barren black sandy beach; March 25, 1953; no. 111. — 11 juveniles, cb. 6-13 mm.

Shore near La Libertad, La Libertad; summer 1952; G. Kruseman. — 5 males, cb. 21-46 mm, 3 females, cb. 30-35 mm, 1 juvenile, cb. 10 mm.

Estero de Tecoluca, sea shore in the extreme eastern part of La Libertad province; April 5, 1953; no. 134. — 5 juveniles, cb. 5-9 mm.

Playa Hermosa, Bocana La Chepona, near the mouth of Río Grande San Miguel, Usulután; black sandy beach; April 9-11, 1953; no. 145. — 1 juvenile, cb. 7 mm.

The species is known from a large number of localities on the American west coast from Mexico to Peru. I do not know of any previous record from El Salvador.

Uca zacae Crane

Uca zacae Crane, 1941, Zoologica, New York, vol. 26, p. 175, textfigs. 4C, 5, pl. 1 fig. 2, pl. 2 fig. 5.

Los Blancos, S. of La Herradura, La Paz; in mangroves; summer 1952; G. Kruseman. — 7 males, cb. 8-11 mm, 4 females, cb. 9-11 mm.

Estero de Jaltepeque near La Herradura, La Paz; on the side of a stone pier in mangrove region, water dirty; March 15, 1953; no. 70. — 1 male, cb. 6 mm, 1 female, cb. 7 mm.

The specimens agree entirely with the description and the figures given by Crane of the present species. *Uca zacae* was known from Nicaragua and Costa Rica, so that its known range of distribution is now extended slightly to the north.

Uca brevifrons (Stimpson)

Gelasimus brevifrons Stimpson, 1860, Ann. Lyc. nat. Hist. New York, vol. 7, p. 292.

Río Zunzal, slightly west of Río Coyol, Sonsonate; about 1 km from the sea, a rather fast flowing river; April 8, 1953; no. 139. — 1 female, cb. 16 mm.

The species occurs on the west coast of America and has been reported from Lower California (Mexico) to Panama. This is the first record of the species from El Salvador.

Uca beebei Crane

Uca beebei Crane, 1941, Zoologica, New York, vol. 26, p. 192, textfigs. 4P, 5, pl. 4 fig. 16, pl. 5 fig. 20, pl. 6 fig. 27.

Shore of Bahia de la Unión near La Unión, La Unión; April 17, 1953; no. 169. — 1 male, cb. 10 mm.

The specimen agrees in all respects with Crane's description and figures. The species was known from various localities between Nicaragua and Panama. Its known range is now extended slightly to the north.

Uca limicola Crane

Uca limicola Crane, 1941, Zoologica, New York, vol. 26, p. 198, texfigs. 4T, 5, pl. 4 fig. 17, pl. 5 fig. 22, pl. 6 fig. 29.

Shore of Bahia de la Unión, near La Unión, La Unión; April 17, 1953; no. 169. — 1 male, cb. 13.5 mm.

The present male specimen, which has a carapace length of 8.2 mm, is larger than Miss Crane's typical specimens, that were not longer than 6.6 mm. As in all other characters there is the closest resemblance between my specimen and the description given by Miss Crane of *Uca limicola*, I have little hesitation to refer it to that species.

Until now the species was only known from the type locality, Golfito, Gulf of Dulce, Costa Rica.

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EXPLANATION OF THE PLATES

Plate I

Fig. 1. *Lepidopa deamae* Benedict, specimen from Playa los Blancos (leg. Kruseman). Dorsal view. × 1.2.

Fig. 2. *Xantho taboganus* (Rathbun), specimen from near El Cuco (Boeseman, no. 154). Dorsal view. × 2.4.

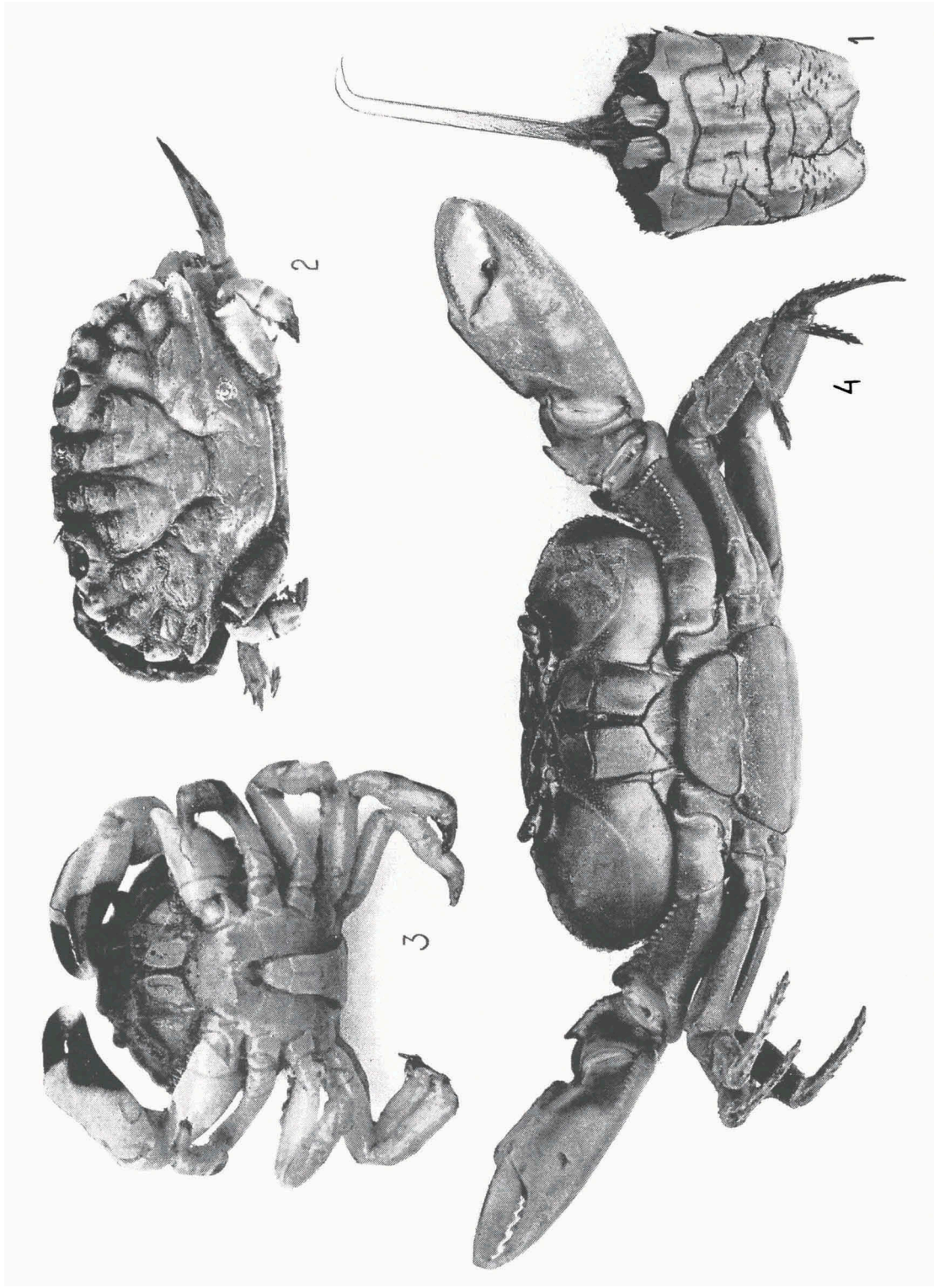
Fig. 3. *Metopocarcinus truncatus* Stimpson, specimen from near El Cuco (Boeseman, no. 154). Ventral view. × 6.

Fig. 4. *Pseudothelphusa magna* Rathbun, female specimen from Lago de Guija (Boeseman, no. 266). Oblique ventral view. × 0.75.

Plate II

Fig. 1. *Pseudothelphusa magna* Rathbun, male specimen from Lago de Guija (Boeseman, no. 266). Dorsal view. × 0.9.

Fig. 2. The same. Ventral view. × 0.9.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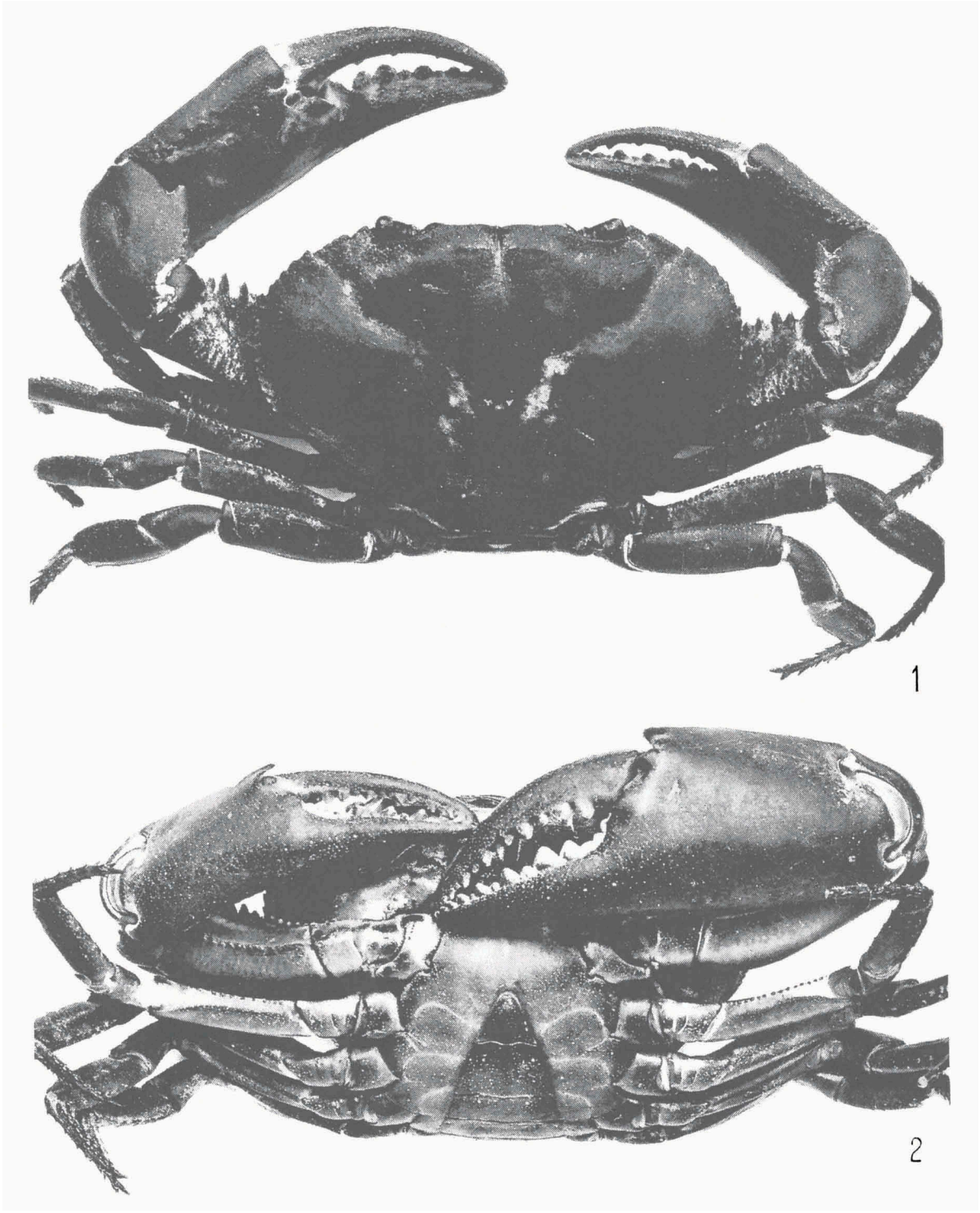
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