

A GENERAL REVISION OF THE
PALAEMONIDAE (CRUSTACEA DECAPODA
NATANTIA) OF THE AMERICAS.

I. THE SUBFAMILIES EURYRHYNCHINAE
AND PONTONIINAE

(PLATES 1-63)

By LIPKE B. HOLTHUIS

ERRATA FOR PART I

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- p. 130, line 11 from bottom: for Guérin, 1857, Sagra's Historia Cuba read:
Guérin, 1857, Sagra's Historie Cuba
- p. 180, footnote 9: for vid. footnote 6 on p. 142 read:
vid. footnote 7 on p. 179
- p. 240, line 2 from bottom: for Lebour, new species read:
Lebour
- pp. 311 and 315; pls. 55 and 57 have been interchanged. The plates in-
serted as n. 55 is n. 57, and vice versa.

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A GENERAL REVISION OF THE PALAEMONIDAE
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AMERICAS. I. THE SUBFAMILIES EURYRHYNCHINAE
AND PONTONIINAE

By LIPKE B. HOLTHUIS

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INTRODUCTION

Heretofore our knowledge of the American Palaemonidae was so confused, and the descriptions of and remarks on the several species scattered over such a large number of more or less important papers, that it was very difficult to get a correct idea of the size, the status, and the distribution of the various species.

When beginning the study of the Palaemonid material collected by the Allan Hancock Expeditions during the years 1931-1941, it at first was the intention to restrict this study to the West-American forms. This, however, soon proved to be very inconvenient. In the first place, the material, though for the far greater part collected along the Pacific shores of America, contained several items, collected during the 1939 Expedition in the Caribbean Sea, which were too important to remain unpublished, but not important enough to justify separate publication. Secondly, the study of the West-American material (especially of the species of the genus *Macrobrachium*) proved to be impossible without a thorough knowledge of the East-American species. The study of the latter, however, brought so many new factors to light, that it was thought desirable to give a revision of all the American representatives of the present family. The present paper therefore contains a complete list of all known American Palaemonidae, with keys to all genera and species, giving the full synonymy and the distribution of each species. Furthermore a description and figures of each species, if possible, are given. It is hoped to contribute in this way to a better understanding of one of the most important groups of Caridea.

This report is based in the first place on the extensive and well preserved collections made by the Allan Hancock Expeditions during the years 1931-1938, 1940, 1941 along the Pacific American coast from California to Peru, the Galapagos Islands and that of 1939 to the

Caribbean Sea. Also the extensive American material of the United States National Museum at Washington, D.C., was studied, just like the material present in the Rijksmuseum van Natuurlijke Historie at Leiden, Holland, and the Zoological Museum at Amsterdam, Holland. Furthermore, specimens of this group, among which several types, in the Museum of the Academy of Natural Sciences at Philadelphia, Pa. and the American Museum of Natural History at New York and the Istituto e Museo di Zoologia della Università at Turin, Italy were examined.

ACKNOWLEDGEMENTS

The present study was made possible by the Allan Hancock Foundation, who gave me the opportunity to study their material in the U. S. National Museum at Washington, D.C. during a year. I should like to express here my deepest gratitude to Dr. Waldo L. Schmitt, head curator of the Zoology Department of the U. S. National Museum, for his kindness and interest shown on every occasion and for the troubles he took in making it possible for me to visit the United States and study the above mentioned material. At the same time I tender my best thanks to Prof. Dr. H. Boschma, director of the Rijksmuseum van Natuurlijke Historie, Leiden, Holland, without whose recommendations and help I never should have been able to spend this year in the United States.

Furthermore I am much indebted to the directors of the above mentioned Museums for placing their material at my disposal, which certainly has been a great help for the preparation of this report. I also am very grateful to Dr. Fenner A. Chace, curator of Marine Invertebrates at the U. S. National Museum, Dr. John C. Armstrong, assistant curator of Invertebrates of the American Museum of Natural History, and Mr. J. Parker of the Museum of the Academy of Natural Sciences at Philadelphia, for their kind assistance during my visits to their Museums. Type material of Palaemonid species was sent on my request by the Carnegie Museum at Pittsburgh, Pa. and the Museum of Zoology of the University of Michigan at Ann Arbor, Mich., for which I am much indebted to the directors. I am also indebted to Dr. Teresita Paulucci Maccagno of the Istituto e Museo di Zoologia della Università at Turin.

Mr. Joel W. Hedgpeth provided me with material and data on the distribution and literature of various forms, for which I wish to tender him my best thanks.

For reasons of convenience the present paper deals only with the subfamilies Euryrhynchinae and Pontiinae, while the subfamily Palaemoninae will be dealt with in a separate paper.

A bibliography will be given at the end of the second paper.

Family **Palaemonidae**

The family Palaemonidae may be divided into four subfamilies, three of which occur in American waters. The fourth subfamily Typhlocaridinae is only known from subterranean waters of the Mediterranean region. The three subfamilies, which have representatives in America may be distinguished as follows:

1. Upper antennular flagellum with the two rami free throughout their length. Second pleopods of males without appendix masculina. Appendix interna absent from second pleopod in females. No pleurobranch on third maxilliped. . . . Euryrhynchinae
 - 1¹. Upper antennular flagellum with the two rami fused in their basal part. Appendix masculina generally present on second pleopod of male. Appendix interna on second pleopod of female. 2
2. Pleurobranch absent from third maxilliped. Posterior margin of telson with three pairs of spines (in *Anchistioides* 1 or 2 pairs only are present there). Pontiinae
 - 2¹. Pleurobranch present on third maxilliped. Posterior margin of telson with two pairs of spines and one or more pairs of setae. Palaemoninae

Subfamily **Euryrhynchinae**

This subfamily has been erected for the genus *Euryrhynchus* which formerly was placed in the subfamily Palaemoninae. Examination of specimens of *Euryrhynchus wrzesniowskii* namely showed that it could not be maintained in the latter subfamily. The main differences with the Palaemoninae are the absence of pleurobranches from the bases of the third maxillipeds, the shape of the antennulae and that of the pleopods and uropods. The Euryrhynchinae are most closely related to the subfamily Typhlocaridinae, with which they have the shape of the rostrum, of the telson, of the eyes and the mouthparts in common, while also the branchial formula of the two subfamilies is the same. The Typhlocaridinae, may be recognized from the Euryrhynchinae, and from the two other subfamilies as well, by the presence of a longi-

tudinal suture on the carapace extending from the antennal region of the anterior margin of the carapace backwards over the whole length of the carapace. The subfamily Euryrhynchinae is distinguished from all other subfamilies of the Palaemonidae by having the two rami of the upper antennular flagellum free throughout their length and by the features of the pleopods mentioned in the key. It contains only one genus:

Genus EURYRHYNCHUS Miers, 1877

Definition: The rostrum is short, depressed and toothless. The carapace is smooth, provided with an antennal spine only. The antero-lateral angle of the carapace is produced.

The abdomen is smooth. The dorsal surface of the telson possesses two pairs of spinules. The posterior margin of the telson is broad and rounded, it bears two pairs of spinules and numerous hairs.

The eyes are reduced in size, but provided with pigment.

The antennulae have the stylocerite short and blunt, the antero-lateral angle of the basal segment is strongly produced. The upper antennular flagellum has the shorter ramus entirely free from the longer.

The mandible bears no palp. All maxillipeds are provided with exopods. The second maxilliped bears a podobranch, the third maxilliped an arthrobranch.

All pereopods are provided with pleurobranches. The first legs are slender. The second pair is strong and unequal in strength. The last three legs are slender. The dactylus is biunguiculate. The propodus is provided with posterior spinules. The propodus of the fifth leg has transverse rows of hairs in the distal part of the posterior margin.

The second pleopods of the male have no appendix masculina, while small appendices internae are present on the second to fifth pleopods. In the female, appendices internae are present only on the third to fifth pleopods.

The exopod of the uropod is provided with a row of spinules running inwards from the end of the straight outer margin. The peduncle of the uropod bears a blunt process, which reaches over the bases of the exo- and endopod.

Type: *Euryrhynchus wrzesniowskii* Miers.

The genus is only known from fresh water of northern South America. It contains two species:

1. Rostrum not reaching beyond eyes. Carpus of second pereopod

without a spine at lower part of anterior margin. Merus of second pereopod without spines at anterior margin. . . .

. *wrzesniowskii*

1¹. Rostrum reaching beyond eyes. Carpus of second pereopod with a sharp tooth-like spine at lower part of anterior margin. Anterior margin of merus of second pereopod with two spines in ventral part. *burchelli*

Euryrhynchus wrzesniowskii Miers

Pl. 1, figs. a-l; pl. 2, figs. a-f

Euryrhynchus wrzesniowskii Miers, 1877, Proc. Zool. Soc. Lond., 1877, p. 662, pl. 67, fig. 2.

Euryrhynchus Wrzesniowskii Calman, 1907, Ann. Mag. Nat. Hist., ser. 7, vol. 19, p. 297, fig. 1.

Euryrhynchus wrzesniowskii Spandl, 1926, Speläol. Monogr., vol. 11, p. 90.

Euryrhynchus Wrzesniowskii Chappuis, 1927, Die Binnengewässer, vol. 3, p. 88.

Euryrhynchus wrzesniowskii Gordon, 1935, Proc. Linn. Soc. Lond., 1934-35, p. 135; Gordon, 1935a, Journ. Linn. Soc. Lond. Zool., vol. 39, p. 327, figs. 13-21; Chace, 1943, Proc. New Engl. Zool. Cl., vol. 22, p. 35; Holthuis, 1948, Proc. Kon. Nederl. Akad. Wetensch., vol. 51, p. 1111; Holthuis, 1950a, Siboga Exped., mon. 39a9, p. 2; Holthuis, 1950b, Zool. Meded., vol. 31, p. 28.

Description: The rostrum is depressed, triangular, it ends in a sharp point which fails to reach beyond the eyes, or reaches as far as the end of the cornea. Some long hairs are present on the rostrum, there are no teeth. The carapace is smooth and provided with antennal spines only. The antennal spines are placed on the lower orbital angle and are well developed. The anterolateral part of the carapace is produced forwards.

The abdomen is smooth. The pleurae of the first three segments are broadly rounded. In the adult female, the pleurae of the second segment are strongly enlarged and the left and right second pleurae overlap each other in the median part of the ventral side of the body, they form together with the first and third pleurae a brood-pouch. The pleurae of the fourth and fifth segments are narrower and triangular. The sixth segment is somewhat longer than the fifth and $\frac{2}{3}$ as long as the telson. The telson bears two pairs of dorsal spines, which are placed rather close together in its middle, the anterior pair is placed closer to

the lateral margins of the telson than the posterior pair. The posterior margin of the telson is broad and tongue-like produced posteriorly. At both the posterolateral angles of the telson 2 spines are present: an outer shorter and an inner longer one; the margin of the telson between the inner spines is provided with numerous setae.

The eyes are small. The cornea is shorter and narrower than the eyestalk. It is provided with black pigment and has a very irregular margin separating it from the stalk.

The basal segment of the antennular peduncle has the stylocerite blunt and short. The anterolateral angle of the segment ends in a strong tooth which reaches the end of the second segment. The anterior margin of the basal segment is concave. The upper antennular flagellum has the two rami entirely free; none of their joints are fused. The shorter ramus has the joints which are 3 to 5 in number, longer and broader than any of the other flagella.

The scaphocerite is small; it is almost twice as long as broad. The final tooth is very strong and overreaches the lamella. The lamella has the largest breadth near the base. It is produced anteriorly along the inner side of the final tooth. The antennal peduncle reaches almost the end of the scaphocerite. A strong external spine is present near the base of the scaphocerite.

The mandible has no palp; the incisor process is rather slender, ending in about 5 teeth; the molar process ends in some blunt knobs and bears a row of spinules. The maxillula has both the inner and upper lacinia rather slender; the palp is well developed and is distinctly bilobed. The maxilla has the endite consisting of a single undivided lobe; the palp is well distinct; the scaphognathite is slender and rather large. The first maxilliped has the endites of the coxa and basis separated by a small notch; the palp is well developed; the exopod is large, with a distinct caridean lobe, which ends in a rather narrow top; the epipod is ovate. The second maxilliped does not show much difference from that of the species of *Macrobrachium*; it is provided with an epipod bearing a well developed podobranch. The third maxilliped reaches about to the middle of the scaphocerite; the last joint is only slightly shorter than the penultimate and is about half as long as the antepenultimate segment; the exopod reaches slightly beyond the antepenultimate segment; an epipod and an arthrobranch are present, no pleurobranch is visible.

The first leg reaches with somewhat more than half the carpus beyond the scaphocerite. The fingers are as long as the palm. The carpus is about 1.5 times as long as the chela and slightly longer than the merus.

The second pereopods are strong and unequal. They reach with the larger part of the carpus beyond the scaphocerite. The larger leg has the fingers rather slender; they are somewhat longer than the palm and close over their entire length. The dactylus bears in the proximal part of the cutting edge two or three, the fixed finger one or two small teeth. The palm is somewhat compressed. The carpus is as long as the palm, there is no spine near the anterior margin of the carpus. The merus is slightly shorter than the carpus and longer than the ischium. The lower part of the anterior margin of the merus is provided with two blunt lobes. All the joints of the second leg are provided with soft and rather long hairs, and small granulations. The smaller leg is slenderer than the larger, but otherwise equal in shape; the teeth on the fingers are much less distinct than in the larger leg, or may be absent entirely. The third leg reaches with more than half the propodus beyond the scaphocerite. The dactylus is slender and distinctly bifid, while moreover a distinct spine is present on the anterior margin. The propodus is about twice as long as the dactylus and has the posterior margin provided over its entire length with spinules. The carpus is more than half as long as the propodus, the merus is as long as the latter joint. The fourth leg is similar to the third, while the fifth is more slender. The fifth leg has, like the species of *Macrobrachium* and *Palaemon*, numerous transverse rows of setae in the distal part of the posterior margin.

The pleopods of the male lack the appendix interna in the first and the appendix masculina in the second pair. The appendices internae of the second to fifth pairs are much less developed than in the Palaemoninae. The females possess feebly developed appendices internae on the third to fifth pleopods.

The uropods are peculiar by possessing an elongate bluntly topped process at their peduncle, this process overreaches the basal part of the exo- and endopods. The endopod is broadly ovate, the exopod is more triangular. The outer margin of the exopod ends in a distinct tooth, from which a row of spines runs inward.

Size: The material of Gordon (1935a), of which the two specimens observed by me have formed a part, measured 8 to 19 mm. The only ovigerous female was 14.5 mm long. The eggs are very large and few.

Colour: In life the specimens of this species are of a pale bluish grey colour, sometimes tinged with a pale pink; bluish green specimens have also been reported (Holthuis, 1950b).

Material examined: Two specimens of this species are in the collection of the U. S. National Museum. They formed part of the material described by Gordon (1935a) from Manicole Swamp, Upper Cuyuni River, British Guiana. The Rijksmuseum van Natuurlijke Historie at Leiden possesses numerous specimens from Surinam (= Dutch Guiana): small creeks along the railroad from Paramaribo to the interior at 40 and 70 km S. of Paramaribo, and from creeks in the savanna and in swamps N. of Moengotapoe, N. E. Surinam.

Distribution: The species is recorded in literature from: Manicole Swamp, Upper Cuyuni!¹ and from Forest Pool, Mazaruni, both localities in British Guiana (Gordon, 1935a), Zanderij I at 40 km S. of Paramaribo, and Sectie Q at 70 km S. of Paramaribo, Surinam River basin, Dutch Guiana! (Holthuis, 1948), N. of Moengotapoe, N. E. Dutch Guiana! (Holthuis, 1950b), Cayenne, French Guiana (Miers, 1877; Calman, 1907). The species lives in fresh, generally slightly acid water. It inhabits pools and creeks generally in heavily shaded localities. The type specimens were reported from a well.

Type: The type locality is Cayenne, French Guiana. The only type specimen still in existence is preserved in the British Museum, London.

Remarks: The species was extensively described and figured by Gordon (1935). In her description she states an arthrobranch to be present at the base of the second maxilliped, and a pleurobranch at the base of the third maxilliped. This caused her to place the species in the subfamily Palaemonidae. The specimens seen by me, however, bear a podobranch on the second maxilliped and an arthrobranch on the third. No pleurobranch is present at the base of the latter appendage. This distinctly proves that *Euryrhynchus* can not be kept in the Palaemoninae. The branchial formula and other characters made the erection of a new subfamily for this particular genus necessary.

¹ An exclamation mark (!) placed after a locality in the paragraph "Distribution" indicates that the material recorded in literature from that locality has been seen by me. If more than one author reports the species from the same locality, the exclamation mark also is placed after the name of the author whose material has been examined.

Euryrhynchus burchelli Calman

Pl. 2, figs. g-m

Euryrhynchus Burchelli Calman, 1907, Ann. Mag. Nat. Hist., ser. 7, vol. 19, p. 297, figs. 2-8.

Euryrhynchus burchelli Spandl, 1926, Speläol. Monogr., vol. 11, p. 90.

Euryrhynchus Burchelli Chappuis, 1927, Die Binnengewässer, vol. 3, p. 88.

Euryrhynchus burchelli Gordon, 1935, Journ. Linn. Soc. Lond. Zool., vol. 39, p. 334; Chace, 1943, Proc. New Engl. Zool. Cl., vol. 22, p. 35; Holthuis, 1950a, Siboga Exped., mon. 39a9, p. 2.

Description: Calman (1907) only gave the following notes on this species: "Merus of second peraeopods with two acute spiniform teeth at the distal end of its lower surface; carpus with a sharp tooth on the inner side near the distal end; fingers distinctly longer than the palm. Telson with the tip broadly rounded, not projecting nearly as far as the long lateral spines."

Size: The following measurements are given by Calman of the only specimen at his disposal:

Total length, 13.5 mm; length of carapace, 4.75 mm; length of rostrum, 0.6 mm; first leg, length of merus, 1.5 mm; carpus, 1.7 mm; chela, 1.2 mm; second leg, length of merus, 1.95 mm; carpus, 1.7 mm; chela, 4.4 mm; palm, 2.5 mm; fingers, 1.9 mm.

Distribution: The only record of this species in literature is: Pará, Brazil, from a well (Calman, 1907). I have seen no material of it.

Type: The type locality is mentioned above. The type is preserved in the Hope Museum, Oxford, England.

Subfamily **Pontoniinae**

The present group is considered by some authors to constitute a distinct family, but the differences between it and the Palaemoninae are so slight, that at most it can be given a subfamily rank. Many Pontoniinae have a very curious body form, which probably is adapted to their way of living as commensals in and on other animals. Several Pontoniinae live endozootic in Mollusks, Ascidia and even in Holothuroidea, while others live epizootic on corals and Echinodermata (Crinoidea, Asteroidea, Ophiuroidea and Echinoidea). A large number of Pontoniinae, however, are free living and have the same general shape of the body as e.g. species of *Palaemon*. All Pontoniinae are marine forms. The differences between the Pontoniinae and the Palaemoninae have already been given on p. 3.

The number of forms of Pontiinae known from American waters at present amounts to 13 genera and 55 species. The number certainly will increase strongly as many species, due to their small size and strange habitats, probably have been overlooked. This also explains the large number (28) of new species described here.

The American genera of Pontiinae may be distinguished as follows:

1. All maxillipeds with well developed exopods 2
 - 1¹. At least third maxillipeds without exopods 8
2. Hepatic spine present 3
 - 2¹. Hepatic spine absent 5
3. Mandible with a palp *Palaemonella*
 - 3¹. Mandible without a palp 4
4. First to fourth abdominal segments with the pleurae rounded.

Body laterally compressed *Periclimenes*

 - a. Dactylus of last three legs biunguiculate
 - subgenus *Periclimenes* s.s.
 - a¹ Dactylus of last three legs simple
 - subgenus *Harpilius*
 - 4¹. Fourth and fifth abdominal segments with the pleurae
 pointed. Body strongly depressed *Harpiliopsis*
5. Scaphocerite rudimental. Rostrum spiniform, without teeth

. *Typton*

 - 5¹. Scaphocerite well developed 6
6. A row of 3 or 4 spines on carapace behind antennal spine.

Second legs with the fingers short and depressed. Dactylus of last three legs with a distinct basal protuberance

. *Fennera*

 - 6¹. No spines on carapace except the antennal and sometimes the supraorbital. Fingers of second legs laterally compressed.

Dactylus of last three legs, though sometimes swollen in the basal part, never with a distinct basal protuberance 7
7. Rostrum compressed, with distinct teeth . . . *Periclimenaeus*
 - 7¹. Rostrum depressed, with at most two very small teeth near the apex *Pontonia*
8. Second maxilliped with a well developed exopod. Dactylus of last three legs biunguiculate. Rostrum compressed, with teeth.

Postorbital tubercle present *Anchistioides*

 - 8¹. Second maxilliped without exopod. Dactylus of last three legs simple 9
9. Pleurae of the third to fifth segments of the abdomen ending in narrowly pointed toothlike tips 10

- 9¹. Pleurae of the first to fourth segments of the abdomen rounded 11
10. Pterygostomian and postorbital spines present. Dactylus of last three legs with basal protuberance . . . *Coutièrea*
- 10¹. Pterygostomian and postorbital spines absent. Dactylus of last three legs without a basal protuberance *Pseudocoutièrea*
11. Hepatic spine present, antennal spine absent. Rostrum compressed, toothed, not winglike broadened over the bases of the eye-stalks *Waldola*
- 11¹. Hepatic spine absent, antennal spine present. Rostrum depressed or if compressed with winglike expansions in the basal part; these lateral expansions partly covering the eye-stalks 12
12. Rostrum compressed in the distal part, generally with dorsal teeth. No notch in the posterior orbital margin. This margin formed by the anterior margin of the carapace *Neopontonides*
- 12¹. Rostrum depressed throughout its length, anterior margin truncate. Posterior orbital margin formed by a carina which runs behind the anterior margin of the carapace. A notch in this orbital margin *Veleronia*

Genus PALAEMONELLA Dana, 1852

Definition: The body is laterally compressed. The rostrum is compressed, well developed and provided with teeth. The carapace is smooth. Supraorbital, antennal and hepatic spines may be present, the supraorbital spines sometimes are absent. A postorbital ridge is well developed.

The pleurae of the first four abdominal segments are rounded.

The scaphocerite is well developed.

The mandible bears a one-, or two-jointed palp. The inner lacinia of the maxillula is slender. Exopods are present on all maxillipeds.

The first legs have the carpus not segmented. The second legs are stronger than the first. The last three legs are slender with the dactylus simple (some species with a biunguiculate dactylus have been referred to this genus, but their position is doubtful). The dactylus never is provided with basal tubercles.

The pleopods are of the normal Palaemonid type. No appendix interna is present on the first pleopod. An appendix masculina is present

on the second pleopod. The uropods are elongate; the exopod has the outer margin ending in a tooth, which at its inner side bears a movable spine.

As far as we know all species of *Palaemonella* are free living or live epizootic on Crinoids.

Type: The type species of the genus is the indo-westpacific *Palaemonella tenuipes* Dana 1852.

Remarks: The genus is very closely related to *Periclimenes*, in fact the only important difference is that the species of *Palaemonella* have the mandible provided with a palp, while those of *Periclimenes* lack that palp. The two American species of *Palaemonella*, known at this moment, may, however, be distinguished easily from the known American *Periclimenes* species, by having a supraorbital spine. One has, however, to be very careful with this character as indo-westpacific species of *Palaemonella* without such spines and of *Periclimenes* with those spines are known.

In literature 2 species have been recorded from America under the name *Palaemonella*. One, recorded as *Palaemonella tenuipes* Dana from Bermuda, is not that indo-westpacific species but belongs to *Periclimenes americanus* (Kingsley) (vid. p. 60). The other was described as new by Ives (1871) under the name *Palaemonella yucatanica*; examination of the type showed it to be a species of *Periclimenes* (vid. p. 41).

Of the two *Palaemonella* species known at present to occur in American waters, one up till now was incorrectly placed in the genus *Periclimenes*, the other is a new species. Both species occur at the west coast of America, one being confined to the Galapagos Islands, the other extending from S. California to Ecuador and the Galapagos Islands. They may be separated as follows:

1. Second legs equal in shape and strength. Dactylus normal in shape, without a lamelliform outwards curved dorsal part. Fingers of second leg shorter than the palm. Rostrum high and straight *holmesi*
- 1¹. Second legs strongly unequal in shape and strength. The dactylus of the larger leg dorsally lamelliform and curved outwards. Smaller second leg with the fingers longer than the palm. Rostrum slender and curved upwards
 *asymmetrica*

***Palaemonella holmesi* (Nobili)**

Pl. 3, figs. a-h; pl. 4, figs. a-i

- Anchista tenuipes* Holmes, 1900, Occ. Pap. Calif. Acad. Sci., vol. 7, p. 216. (non *Periclimenes tenuipes* Borradaile, 1899).
- Periclimenes tenuipes* Rathbun, 1904, Harriman Alaska Exped., vol. 10, p. 34, fig. 12.
- Periclimenes Holmesi* Nobili, 1907, Ann. Mus. Zool., Univ. Napoli, n. ser. vol. 2, pt. 21, p. 5.
- Periclimenes (Falciger) holmesi* Borradaile, 1917, Trans. Linn. Soc. Lond. Zool., ser. 2, vol. 17, p. 372.
- Periclimenes tenuipes* Schmitt, 1921, Univ. Calif. Publ. Zool., vol. 23, p. 39, fig. 24.
- Periclimenes (Ancylocaris) holmesi* Kemp, 1922, Rec. Indian Mus., vol. 24, p. 218.
- Periclimenes tenuipes* Schmitt, 1924, Proc. Calif. Acad. Sci., ser. 4, vol. 13, p. 386.
- Periclimenes (Ancylocaris) holmesi* Chace, 1937, Zoologica, New York, vol. 22, p. 132; Schmitt, 1939, Smithsonian Misc. Coll., vol. 98, pt. 6, p. 9.
- Periclimenes tenuipes* Hewatt, 1946, Ecol. Monogr., vol. 16, p. 199; Schmitt, 1946, Ecol. Monogr., vol. 16, p. 208.

Description: The rostrum is straight or has the tip directed slightly upwards. It is rather deep and reaches a little beyond the scaphocerite. The upper margin bears 6 to 9 teeth (generally 8), 2 of which are situated on the carapace behind the orbit, the teeth are regularly divided over the upper margin, the first generally being somewhat remote from the rest. The lower margin bears two to four (generally three) teeth, there is a distinct unarmed stretch just before the tip of the rostrum. The carapace is provided with antennal, hepatic and supraorbital spines. The supraorbital spine is small and situated on a postorbital ridge which ventrally ends in the antennal spine. The midrib of the rostrum merges with the posterior margin of the orbit. The lower orbital angle ends in a rather acute tip. The antennal spine stands slightly below this angle, the hepatic spine is almost as strong as the antennal and stands below and behind it. The anterolateral angle of the carapace is broadly rounded.

The abdomen has the pleurae of the first 4 segments rounded, that of the fifth ends in a small acute point. The sixth abdominal segment is 1.5 times as long as the fifth segment and $\frac{2}{3}$ as long as the telson. The dorsal surface of the telson bears 2 pairs of fairly large spines, which are placed at $\frac{1}{3}$ and $\frac{2}{3}$ of its length. The posterior margin of the telson

bears the usual 3 pairs of spines, the intermediate of which is very long and slender.

The eyes have the cornea globular, the stalk is slightly longer than the cornea. An ocellus is present. Some dark coloured bands, 2 to 4 in number, are visible in some of my spirit specimens.

The basal segment of the antennular peduncle has the stylocerite rather strong and pointed, it almost reaches to the middle of the basal segment. The anterolateral tooth reaches to or somewhat beyond the slightly forwardly produced anterior margin of the segment. The last 2 segments of the peduncle are much more slender than the basal segment. The second segment is somewhat shorter and broader than the third. The upper antennular flagellum has the 2 rami fused for 11 to 14 joints. The free part of the shorter ramus consists of 3 joints and is about $\frac{1}{8}$ of the length of the fused part.

The scaphocerite is slender and reaches distinctly beyond the antennular peduncle. It is almost 4 times as long as broad. The outer margin is somewhat concave. The final tooth is strong and reaches with its full length beyond the lamella. The lamella is broadest in the basal part and becomes gradually narrower anteriorly, being very narrow near the tip. The antennal peduncle falls far short of the middle of the scaphocerite. An external spine is present near the base of the scaphocerite.

The mandible has the incisor process ending in 3 distinct teeth, the molar process bears blunt knobs at the end. A very small palp consisting of 1 segment with a short hair at the top is present. The maxillula and maxilla are not different from those of *Periclimenes longicaudatus*, though the inner laciniae of the maxilla are somewhat more slender. The first maxilliped has a deep notch between the basis and the coxa, the palp is well developed, the exopod bears a large caridean lobe, the epipod is large and slightly bilobed. The second maxilliped is as in *Periclimenes longicaudatus*, the epipod is large, but bears no podobranch. The third maxilliped reaches somewhat beyond the antennal peduncle. The penultimate joint is 1.5 times as long as the ultimate, and about half as long as the antepenultimate. The exopod almost reaches the end of the antepenultimate segment. An epipod and a small arthrobranch are present.

The first legs reach with the chela beyond the scaphocerite. The fingers are as long as the palm, the whole chela is slender, it is $\frac{3}{4}$ to $\frac{3}{5}$ of the length of the carpus. The merus is almost as long as the carpus. The ischium is $\frac{2}{3}$ of the length of the merus. The second legs in adult males reach with a part of the merus beyond the scaphocerite, they are equal in shape. The fingers are about half as long as the palm (in very

old males they may become less than half as long as the palm, in younger specimens they are relatively longer). The fingers are somewhat compressed. The cutting edge of the dactylus bears a large tooth slightly behind its middle; about midway between this tooth and the tip of the finger a much smaller tooth is present, the edge between the 2 teeth is distinctly concave. Behind the larger tooth there are one broad and two narrow short teeth. In very old specimens the teeth may become indistinct and even disappear entirely. The fixed finger has the cutting edge armed with teeth, similar to those of the dactylus. These teeth, however, are stronger than, and placed slightly behind those of the dactylus. In very old males the broad tooth is very much broader than in the young and sometimes the broad and the smaller teeth are fused to an uninterrupted ridge. When the fingers are closed, the concave parts of the cutting edges between the two anterior teeth, form a conspicuous gap. The palm is elongate and slender, it is 6 to 9 times as long as broad in adult males. The carpus is 0.6 to 0.8 times as long as the palm. The anterior margin of the carpus bears 2 distinct spines at the inner and in the lower part. The merus is slightly longer than the carpus and bears no spines. The ischium is shorter than the merus and also is unarmed. The third leg reaches with a larger or smaller part of the propodus beyond the scaphocerite. The dactylus is slender and simple, it measures about half the length of the propodus, while the merus is about as long as the latter joint. The fifth leg reaches distinctly less far forwards than the third. It is similar to the third leg, in shape.

The first pleopod of the male has the endopod ovate, with the inner margin concave. The second pleopod of the male has the appendix masculina as long as the appendix interna. The other pleopods and the uropods are normal.

Ovigerous females have the second legs as in the males, the relations between the joints, however, is different. The fingers are $\frac{3}{5}$ of the length of the palm. The teeth generally are smaller and the gaps in the fingers less distinct. The carpus is $\frac{2}{3}$ of the length of the chela and it is slightly shorter than the merus. The ischium measures $\frac{4}{5}$ of the length of the merus.

Young specimens have the rostrum relatively shorter and more slender. The fused part of the upper antennular flagellum consists of less (6 to 9) segments and the free part of the shorter ramus is about $\frac{1}{4}$ as long as the fused part. All the legs reach less far forwards. The second legs are less strong than in the adults and the palm is, compared with the carpus and the fingers, shorter.

Size: The largest male seen by me measures 24 mm. Schmitt (1946) mentions a specimen of 25 mm. Oviparous females are 10 to 21 mm long. The eggs are rather numerous and small, measuring 0.3 to 0.4 mm in diameter.

Colour: Many of the alcoholic specimens seen by me have a small reddish brown band close to the tips of the fingers. The eyes have 2 to 4 dark coloured bands over the cornea. Chace (1937) describes the colour of this species as "semi-translucent, pale brown."

Material examined: The Allan Hancock Expeditions 1933-1941 collected numerous specimens of this species from the following localities:

California: San Clemente Island, off Wilson Cove. 14-16 fms, kelp, gray sand, Feb. 22, 1941, Sta. 1238-41.

Lower California, Mexico: La Paz Bay, off Prieta Point, 5 fms, coralline, Feb. 21, 1936, Sta. 503-36; San Lorenzo Channel. 24 fms, coralline, Mar. 21, 1936. Sta. 607-36; 3-5 fms, sand, coralline and algae, Mar. 7, 1937, Sta. 639-37; 6-13 fms, sand, shells and coralline, Feb. 14, 1940, Sta. 1111-40; Espíritu Santo Island, San Gabriel Bay. 1-4 fms, broken shell, Feb. 22, 1936, Sta. 506-36; 18 fms, coralline, Mar. 6, 1937, Sta. 633-37. Shallow water, coral, Mar. 7, 1937, Sta. 638-37; Espíritu Santo Island, off Ballenas Bay, 25 fms, coralline, Mar. 8, 1937, Sta. 642-37. 8 fms, coralline, Mar. 8, 1937, Sta. 643-37; Off San Francisco Island. 30 fms, coralline, Feb. 24, 1936, Sta. 513-36; E. of San Francisco Island. 15 fms, sand, Feb. 25, 1936, Sta. 517-36; Puerto Escondido. 18-21 fms, sand and cake urchins, Feb. 11, 1940, Sta. 1096-40; Concepción Bay, Coyote Bay. 2-3 fms, sand and kelp, Mar. 14, 1936, Sta. 585-36; Outside Concepción Bay. 12 fms, coralline, Mar. 15, 1937, Sta. 683-37; South of Tortuga Island. 18 fms, sand, Mar. 17, 1937, Sta. 692-37; San Francisquito Bay. 10 fms, sand, kelp, red, green and brown algae, Mar. 1, 1936, Sta. 531-36; 20 fms, sand and kelp, Mar. 2, 1936, Sta. 532-36; Off San Francisquito Bay. 10-20 fms, coral, nullipores and kelp, Mar. 1, 1936, Sta. 530-36; 40 fms, broken shell and sand, Mar. 2, 1936, Sta. 533-36; South of Isla Partida, 45 fms, sand, Mar. 9, 1936, Sta. 559-36; 70 fms, coral and sand, March 9, 1936, Sta. 561-36; Parallel to Angel de la Guardia Island, eastside. 10 fms, scallop, red algae and sand, Mar. 8, 1936, Sta. 554-36; Angel de la Guardia Island, Puerto Refugio. 8-10 fms, Ulva, Mar. 20, 1937, Sta. 706-37; Gonzaga Bay, off Willard Island. 10-20 fms, mud, Jan. 30, 1940, Sta. 1064-40; Off Consag Rock. 10-25 fms, basket stars, Mar. 24, 1937, Sta. 719-37; 40-45 fms, basket stars, Jan. 31, 1940, Sta. 1067-40.

Sonora, Mexico: Off Rocky Point. 6 fms, rock, basket stars, Mar. 24, 1937, Sta. 720-37; 10 or 11 fms, sand and shell or sand and mud, Feb. 2, 1940, Sta. 1072-40; 3-10 fms, sand and algae, Feb. 3, 1940, Sta. 1073-40; East of Tiburon Island. 5 fms, sand and kelp, Mar. 11, 1936, Sta. 571-36; South of Tiburon Island. 8-10 fms, kelp and coralline, Mar. 10, 1936, Sta. 564-36; 40 fms, sand and mud, Mar. 11, 1936, Sta. 565-36; 20 fms, sand and shell, Mar. 11, 1936, Sta. 566-36; 4 fms, sand and *Ulva*, Mar. 11, 1936, Sta. 567-36; 12 fms, sand and coralline, Mar. 28, 1937, Sta. 732-37; 16 fms, sand, Jan. 25, 1940, Sta. 1044-40; East of San Esteban Island. 20-70 fms, sand and rock, Mar. 10, 1936, Sta. 562-36.

Revilla Gigedo Islands, Colima, Mexico: Clarion Island, Sulphur Bay. 28-35 fms, gray sand and coralline, Mar. 16, 1939, Sta. 917-39.

Costa Rica: Port Culebra. 3-10 fms, sand and shell, Feb. 24, 1934, Sta. 254-34; Port Culebra, off South Viradores Islands. 10 fms, sand and shells, Feb. 25, 1934, Sta. 257-34.

Panama: Secas Islands. 15 fms, rock, nullipores, Feb. 22, 1934, Sta. 251-34; Bahia Honda. 5-8 fms, sand, Mar. 9, 1933, Sta. 113-33; shallow water, coral, Mar. 10, 1933, Sta. 114-33; Taboga Island. 2-5 fms, mud and sand, May 2, 1939, Sta. 959-39.

Colombia: Gorgona Island, off Coconut beach. Shallow water, Jan. 22, 1935, Sta. 411-35.

Ecuador: Off La Plata Island. 7-10 fms, rock and nullipores, Feb. 10, 1934, Sta. 213-34.

Galapagos Islands, Ecuador: Tower Island, Darwin Bay. 40-70 fms, white sand and rock, Jan. 16, 1938, Sta. 783-38.

In the collection of the U.S. National Museum, specimens are present from: Lower California, Mexico (South of Bahia de Ballenas, 26° 14'N, 113° 13'W, 48 fms, yellow mud, May 3, 1888, *Albatross* Sta. 2834; Bahia de la Magdalena, inside northern point of entrance to bay, between Blecker Pt. and anchorage, 10-15 fms, sand and weed, July 18, 1938, Franklin D. Roosevelt Presidential Cruise; Cape San Lucas, off Punta Gorda, 6-10 fms, rock, July 19, 1938, Franklin D. Roosevelt Presidential Cruise; La Paz, J. S. Kingsley collection), Tepic, Mexico (Maria Madre Island, 4-10 fms, G. H. Hanna coll.), Panama (Taboga Island, June 15, 1924, E. Deichmann coll.).

Distribution: The species is an inhabitant of shallow coastal waters of the American west coast from S. California to Ecuador. It lives on sandy or rocky bottom and only once has been reported from a mud bottom, probably it prefers to live among corals and weeds. The records in literature are: Santa Cruz Island, California (Hewatt, 1946; Schmitt,

1946), Santa Catalina Island, California (Holmes, 1900; Schmitt, 1946), Magdalena Bay, Lower California! (Chace, 1937; Schmitt, 1938!), San Lucas Bay, Lower California (Chace, 1937, Cape San Lucas, Lower California! (Schmitt, 1938), off Espíritu Santo Island, Lower California (Rathbun, 1904), Concepción Bay, Lower California (Rathbun, 1904), Santa Inez Bay, Lower California (Chace, 1937), Patos Island, N. of Tiburon Island, Gulf of California, (Schmitt, 1924).

Type: The type locality is Santa Catalina Island, California. It is doubtful, whether the type specimens are still in existence.

Remarks: This species proves to be very variable in a number of characters. Some of the characters change during the growth of the animal, as for instance the shape of the rostrum and the upper antennular flagellum. Also the second legs in adults are strongly different from those in young specimens, but they moreover often are different among adult specimens themselves. In some specimens the carpus of the second legs may be rather short and broad, in others it is long and slender. Thanks to the large amount of material which I could study, it became clear that no taxonomic importance of any kind may be attached to these characters, though some of them may be almost constant in specimens of one lot. Another remarkable variable character is afforded by the dactylus of the last three legs, which sometimes is very long and slender, being $\frac{1}{3}$ of the length of the propodus, but also may be short, measuring $\frac{1}{5}$ of the length of the propodus. All intermediate stages occur and the character of a long or a short dactylus is not in the least connected with characters shown by the second legs: there are specimens with a slender carpus of leg 2 and a short dactylus of leg 3, with a stout carpus of leg 2 and a slender dactylus of leg 3, but both other combinations occur as well. Most material from Panama is conspicuous by its small size, ovigerous females being 10 to 12 mm long, but in no other way good differences could be found with the Californian specimens. Some of the variability of the second leg is already mentioned in literature: Rathbun (1904) and Schmitt (1924) report their specimens have the fingers relatively shorter than described by Holmes. Dr. Schmitt (1946) comes to the conclusion that the differences shown by Rathbun's and Holmes's specimens are due to the fact that the second legs are unequal in strength in this species and that Holmes described the smaller second leg and Rathbun the larger. In most of my material, the left and right legs are perfectly identical, and the fact that in Dr. Schmitt's specimen from Putas Island, the 2 legs are different, may be due to the loss and regeneration of one of the legs. Holmes's statement

that the "postero-lateral angle of the fifth abdominal segment is rounded, that of the sixth acute," obviously is an error as in all the material seen by me, the fifth segment ends in an acute point, which was observed also by Rathbun (1904) and Schmitt (1921) in their specimens. It seems not quite impossible to me that Holmes with his fifth and sixth segments in reality meant the fourth and fifth segments respectively.

The species originally was described by Holmes as *Anchista* (err. pro *Anchistia*) *tenuipes*. *Anchistia* Dana (1852) and *Periclimenes* Costa (1844) proved to be synonyms, so that Rathbun (1904) named the species *Periclimenes tenuipes*. Nobili (1907) in a paper, which as Kemp (1922, p. 223) pointed out was "written during the distinguished author's last illness" and "the product of a disordered mind," changed the names of both *Periclimenes tenuipes* Borradaile (1899) and *P. tenuipes* (Holmes, 1900) on account of the existence of an imaginary *Periclimenes tenuipes* Leach. Though the species *Periclimenes tenuipes* Leach has never been described, the specific name *holmesi* given by Nobili to the present species must be used, as *Periclimenes tenuipes* (Holmes, 1900) is preoccupied by *Periclimenes tenuipes* Borradaile (1899).

A careful examination of the oral parts of a large number of specimens revealed the surprising fact, that a distinct, though very small and only one-jointed palp is present on the mandible. From this evidence it is clear that the present species up till now always has been referred to the wrong genus; it in reality is a *Palaemonella*.

The species is closely related to the following, which is restricted to the Galapagos Islands.

Palaemonella asymmetrica, new species

Pl. 5, figs. a-h

Description: The rostrum is slender and slightly curved upward, it reaches about to the end of the scaphocerite. The upper margin bears 6 or 7 teeth. The first tooth is placed slightly in advance of the middle of the carapace and is generally separated by a considerable distance from the second, which stands just behind the orbit. The other teeth are regularly divided over the upper rostral margin. The lower margin bears 2, seldom 3, teeth, which leave a rather large unarmed space before the apex. The carapace is provided with supraorbital, antennal and hepatic spines. The supraorbital spine generally is much stronger than in the previous species, and stands on a not very distinct postorbital ridge, which ventrally ends in the antennal spine and dorsally becomes obsolete. The midrib of the rostrum ends in the orbital margin. The lower angle

of the orbit is rather acute. The antennal and hepatic spines are of about the same strength. The anterolateral angle of the carapace is broadly rounded.

The abdomen is smooth. The pleurae of the first 4 segments are rounded; that of the fifth ends in a distinct sharp tooth. The third segment has the posterior margin somewhat produced in the median, but this is much less so than in the species of the subgenus *Periclimenes* s.s. The sixth segment is less than 1.5 times as long as the fifth, and $\frac{2}{3}$ as long as the telson. The telson is similar to that of *P. holmesi*, the dorsal spines too are large and arranged so as to divide the telson in 3 equal parts, while the intermediate posterior pair of spines is extremely long.

The eyes have the cornea globular, it is somewhat broader and about as long as the stalk. There are 2 to 4 broad concentric bands of a dark colour over the cornea, between which the cornea has a much lighter colour.

The basal segment of the antennular peduncle has the stylocerite rather strong and ending in a sharp point, it fails to reach the middle of the segment. The outer margin is about straight and ends in a strong final tooth, which distinctly overreaches the rounded anterior margin, and almost attains the middle of the second segment of the peduncle. The third segment of the antennular peduncle is slender, it is narrower and longer than the second. The upper flagellum has the fused part of the two rami consisting of 8 to 10 joints. The free part of the shorter ramus consists of 4 or 5 joints and is less than $\frac{1}{4}$ of the length of the fused portion.

The scaphocerite is slender, it is about 5 times as long as broad, and reaches somewhat beyond the antennular peduncle. The outer margin is concave and ends in a strong final tooth, which reaches with almost its entire length beyond the lamella. The lamella is broadest in the basal part and gradually narrows anteriorly, being extremely narrow at the top.

The mouth parts are entirely similar to those of *P. holmesi*. The third maxilliped reaches with the last joint beyond the antennal peduncle.

The first pereopods are slender and reach with the chela and sometimes with part of the propodus beyond the scaphocerite. The fingers are slightly longer than the palm. The carpus is 1.2 to 1.4 times as long as the chela and 1.2 times as long as the merus. The ischium is shorter than the merus. The second legs in the adult male are strongly unequal in shape. They reach with part of the merus beyond the scaphocerite. The stronger of the two legs, (sometimes being the left, some-

times the right), has the fingers about half as long as the palm. The dactylus has the upper distal part very thin and curved outwards, the margin of this outwardly curved flap is slightly serrate. The cutting edge of the dactylus bears in its proximal third a rather large tooth, behind which there are about 4 much smaller teeth. Distally of the larger tooth the edge is entire, showing only a shallow concave excavation just before the large tooth. The cutting edge of the fixed finger is similarly armed as that of the dactylus, the teeth here are placed slightly behind those of the dactylus; furthermore the fixed finger bears a distinct tooth at the distal end of the excavation in the cutting edge. When the fingers are closed the two excavations are just opposite each other and form a distinct gap. The fingers are provided with long hairs. The palm is cylindrical. The carpus measures about $\frac{2}{3}$ of the length of the palm, and has the anterior margin provided with an inner and a ventral spine. The merus is slightly shorter than the carpus, and 1.5 times as long as the ischium. No spines are present in the merus and ischium. The smaller second leg has the ischium, merus and carpus of the same length and shape as in the stronger leg, they only are narrower. The chela, however, is entirely different in shape. The fingers are slightly longer than the palm and are provided with long hairs. In the proximal part the cutting edges are provided with numerous very small teeth of equal size, these teeth become inconspicuous anteriorly and finally disappear entirely, the ultimate half of the cutting edges being entire. The fingers close in the proximal toothed part, but strongly gape in the distal part. The third leg reaches with about $\frac{1}{3}$ of the propodus beyond the scaphocerite. The dactylus is simple. The propodus is about 5 times as long as the dactylus, twice as long as the carpus and about as long as the merus. The ischium is half as long as the merus. The fifth leg only slightly overreaches the scaphocerite, it is similar in shape to the third leg, though the propodus is somewhat shorter.

The pleopods and uropods are as in the previous form.

Ovigerous females have the second legs weaker than the males, though they are similarly built. The teeth of the larger chela are weaker than in the male, a smaller tooth is present in front of the largest tooth of the dactylus, while no gap like that in the male is visible. The fingers of the smaller leg do not gape and have less teeth in the proximal part. All legs do not reach as far forward in the male.

In very young specimens the second legs are equal in shape. The fingers are somewhat shorter than the palm and have only some inconspicuous teeth.

Size: The largest male seen by me measures 20 mm. Ovigerous females of 12 to 15 mm are present in the material studied. The eggs are relatively few and small, measuring 0.45 to 0.55 mm in diameter.

Colour: In the preserved specimens only faint traces of the original colour are visible. The 2 to 4 colour bands over the cornea have already been mentioned. Furthermore a faint and narrow brownish band is visible close to the tips of the fingers of the second legs in some of the specimens.

Material examined: The Allan Hancock Expeditions 1933-1935 gathered a large quantity of material of this species from:

Galapagos Islands, Ecuador: Tower Island, Darwin Bay. 3-4 fms, tangles, Feb. 25, 1933, Sta. 99-33. James Island, Sullivan Bay. 5-20 fms, dredge, Jan. 22, 1934, Sta. 177-34. Shallow water, coral, Jan. 23, 1934, Sta. 180-34. 20 fms, algae, Dec. 12, 1934, Sta. 336-35. 30 fms, rock and sand, Dec. 12, 1934, Sta. 338-35. 20 fms, rock with sand patches and red algae, Dec. 12, 1934, Sta. 341-35. Shore, rock, Dec. 12, 1934, Sta. 343-35. Indefatigable Island, Academy Bay. 3-4 fms, sand, Feb. 4, 1933, Sta. 51-33. 15-25 fms, sand, rock and algae, Jan. 20, 1934, Sta. 169-34. Barrington Island. 2-3 fms, dredging in bay, Feb. 2, 1933, Sta. 46-33. Chatham Island, east of Wreck Bay. 4 fms, rock, Jan. 30, 1933, Sta. 41-33. Charles Island, Post Office Bay. 15 fms, rock, Jan. 19, 1934, Sta. 167-34. 8-10 fms, sand, rock and algae, Jan. 27, 1934, Sta. 193-34, 35-40 fms, rock, Jan. 29, 1934, Sta. 197-34.

Distribution: The species is only known from the Galapagos Archipelago, where it lives in the shallow coastal waters, on rocky or sandy bottom.

Type: Holotype is a male of 17 mm length, from Sullivan Bay, James Island (Sta. 177-34). The holotype (Cat. No. 90201) and part of the paratypes are preserved in the collection of the U.S. National Museum at Washington, D.C., the other paratypes are in the collection of the Allan Hancock Foundation, Los Angeles, Calif.

Remarks: This species is very closely related to *Palaemonella holmesi*, but may be recognized immediately by the totally different shape of the second legs. The left and right legs are quite unequal in shape, while they are equal in *P. holmesi*. Also the shape and dentition of the chela in both legs of *P. asymmetrica* strongly differs from that of *P. holmesi*. Furthermore in *P. asymmetrica* the rostrum generally is more slender, the supraorbital spine stronger, while the size of *P. holmesi* as a rule is larger than that of *P. asymmetrica*. *P. asymmetrica* is confined to the Galapagos Islands, while *P. holmesi*, except for one record from Tower Island, has not been observed there and is known from the American mainland and the islands close by only.

Genus *PERICLIMENES* Costa, 1844

Definition: The body is laterally compressed. The rostrum is compressed and is provided with teeth. The carapace is smooth and may be provided with supraorbital, antennal and hepatic spines, though the supraorbital and seldom also the antennal spines may be missing. Sometimes a postorbital ridge is present.

The abdomen generally has all the segments with broadly rounded pleurae, in some species, however, the fifth abdominal segment may end in a small sharp tooth.

The scaphocerite is well developed.

The mandible shows no trace of a palp. The inner lacinia of the maxillula is slender. Exopods are present on all maxillipeds.

The first pereopod has the carpus not segmented. The second legs are stronger than the first. The last three legs have the dactylus either biunguiculate or simple, there are no basal protuberances at the posterior margin of the dactylus.

No appendix interna is present on the first pleopod of the male. An appendix masculina is present on the second pleopod of the male. The pleopods are normal. The uropods are elongate and the exopod has the outer margin ending in an immovable tooth which at its inner side bears a movable spine.

The species of this genus are free living or epizootic on Porifera, Coelenterata, and Echinodermata.

Type: The type species is *Periclimenes insignis* Costa, 1844, which species at present is considered identical with *Periclimenes amethysteus* (Risso, 1826) from the eastern Atlantic.

Remarks: The differences between this genus and *Palaemonella* have already been pointed out (p. 12).

Periclimenes is divided into two subgenera, both of which are represented in American waters. The total number of American species of this genus amounts to 14. They may be separated as follows:

- | | |
|--|---|
| 1. Dactylus of last three legs biunguiculate ² | |
| subgen. <i>Periclimenes</i> s.s. | 2 |
| 1 ¹ . Dactylus of last three legs simple ² | |
| subgen. <i>Harpilius</i> | 9 |
| 2. Antennal spine absent. Eastern. <i>longicaudatus</i> | |
| 2 ¹ . Antennal spine present. | 3 |
| 3. All dorsal teeth of the rostrum placed in advance of the orbit. | |

² In *Periclimenes* (P.) *iridescens* the 2nd tooth may become extremely inconspicuous.

- Scaphocerite less than twice as long as broad. Eastern.
- *perryae*
- 3¹. One or more of the dorsal teeth of the rostrum placed on the carapace behind the orbit. Scaphocerite more than twice as long as broad. 4
4. Posterior teeth of the dorsal margin of the rostrum placed closer together than the other teeth, 4 or 5 of these teeth behind the orbit. Lower teeth of the rostrum well developed. Midrib of rostrum about as far from upper as from lower margin of rostrum. Endopod of first pleopod of males with a distinct lobe at inner side. Eastern. *tenellus*
- 4¹. Posterior teeth of dorsal margin of rostrum more widely spaced than the anterior, only 1 or 2 teeth behind the orbit. Lower teeth of rostrum distinct or little developed, sometimes absent. Endopod of first pleopod of male without any lobe at inner margin (this latter character is not known with certainty from *P. pandionis*). 5
5. Fingers of second legs about $\frac{1}{5}$ of length of palm. Those of first legs half as long as palm. Scaphocerite oval in shape with outer margin convex. Rostrum short and high. Eastern.
- *harringtoni*
- 5¹. Fingers of second legs longer than half the length of palm. Those of first legs as long as or slightly shorter than palm. Scaphocerite elongate, with outer margin concave or almost straight. 6
6. Anterior margin of basal segment of antennular peduncle with 2 or 3 spines, apart from anterolateral spine. Scaphocerite with lamella truncated anteriorly. Rostrum slender, with some distinct ventral teeth. Eastern. *yucatanicus*
- 6¹. Anterior margin of basal segment of antennular peduncle without spines, with the exception of the anterolateral spine. Scaphocerite somewhat produced antero-internally. 7
7. Rostrum reaching beyond antennular peduncle, with 9 dorsal and 4 distinct ventral teeth. Midrib of rostrum as far removed from upper as from lower rostral margin. Free portion of shorter ramus of upper antennular flagellum about as long as fused part. Anterolateral tooth of basal segment of antennular peduncle reaching almost to end of second segment. Eastern.
- *pandionis*
- 7¹. Rostrum falling far short of end of antennular peduncle, upper margin with 5-8, lower margin with 0-3 extremely

- small and inconspicuous teeth. Free part of shorter ramus of upper antennular flagellum less than half as long as fused part. Anterolateral tooth of basal segment of antennular peduncle not attaining middle of second segment. . . . 8
8. Large chela in adult specimens with dactylus normal, not ending dorsally in an inward curved lamella. Dactyli of last 3 legs sometimes very inconspicuously bifid. Eyes with cornea slightly more than half as long as stalk. Eastern. . . . *iridescens*
- 8¹. Large chela in adult specimens with dactylus ending dorsally in an inwardly curved lamella. Dactyli of last three legs always distinctly biunguiculate. Eyes with cornea less than half as long as eyestalk. Western. . . . *infraspinis*
9. Antennal spine absent. Inner margin of incisor process of mandible with spinules. Eastern. . . . *pauper*
- 9¹. Antennal spine present. Inner margin of incisor process of mandible without spinules. . . . 10
10. Abdomen with third segment strongly produced in median posterior part. This produced part laterally compressed to a distinct hump. . . . 11
- 10¹. Third abdominal segment at most slightly produced in median posterior region, never with a broad compressed hump. . . . 12
11. Rostrum slender. Second pereopods equal. Carpus longer than chela, fingers normal. Eastern. . . . *magnus*
- 11¹. Rostrum high, with the upper margin convex. Second pereopods strongly unequal. Carpus in both legs shorter than chela. Dactylus of larger leg dorsally ending in an inward curved lamella. Western. . . . *lucasi*
12. Rostrum with lower margin unarmed, midrib running close to lower margin. Telson with dorsal spinules very small. Anterior margin of scaphocerite broadly rounded, final tooth not overreaching lamella. Eastern. . . . *rathbunae*
- 12¹. Rostrum with lower margin provided with distinct teeth; midrib being about as far from upper as from lower margin. Telson with dorsal spinules distinct. Anterior margin of lamella of scaphocerite either strongly antero-internally produced or overreached by final tooth. . . . 13
13. Postorbital ridge present. Anterolateral tooth of basal segment of antennular peduncle distinctly overreaching the evenly convex anterior margin of the segment. Scaphocerite with final tooth overreaching lamella. Second leg in adult specimens with a

distinct gap between the fingers. Eastern. . . *americanus*
 13¹. Postorbital ridge wanting. Anterolateral tooth of basal
 segment of antennular peduncle overreached by the strongly
 anteriorly produced anterior margin of the segment. Scapho-
 cerite with lamella overreaching final tooth. Second legs
 without gap between the fingers. Western. . . *veleronis*

Subgenus **PERICLIMENES** Costa, 1844

Periclimenes (Periclimenes) longicaudatus (Stimson)

Pl. 6, figs. a-m; pl. 8, fig. m

Urocaris longicaudata Stimson, 1860, Proc. Acad. Nat. Sci. Phila.,
 1860, p. 39; Kingsley, 1878, Proc. Acad. Nat. Sci. Phila., 1878,
 p. 330; Kingsley, 1878a, Bull. Essex Inst., vol. 10, p. 65; Kings-
 ley, 1880, Proc. Acad. Nat. Sci. Phila., 1879, p. 424; Howard,
 1883, South Carolina, p. 294; Kingsley, 1899, Amer. Nat., vol.
 33, p. 718; Rathbun, 1900a, Proc. Wash. Acad. Sci., vol. 2, p.
 155; 1902a, Bull. U.S. Fish Comm., vol. 20, pt. 2, p. 126 (p.p.);
 non Pearson, 1905, Ceylon Pearl Oyster Rep., vol. 4, p. 78, pl. 1,
 fig. 5; Fowler, 1912, Ann. Rep. New Jersey State Mus., 1911,
 p. 559; Borradaile, 1917, Trans. Linn. Soc. Lond. Zool., ser. 2,
 vol. 17, p. 354. (non *Urocaris* sp.,? *U. longicaudata*, p. 323);
 Hay & Shore, 1918, Bull. U.S. Bur. Fish., vol. 35, p. 394, pl.
 27, fig. 7.

Periclimenes (Periclimenes) longicaudatus Kemp, 1922, Rec. Indian
 Mus., vol. 24, p. 141.

Urocaris longicaudata Schmitt, 1924b, Zoologica, New York, vol. 5, p.
 169.

Periclimenes longicaudatus Schmitt, 1935, Sci. Surv. Porto Rico, Virgin
 Isl., vol. 15, p. 164.

Periclimenes (Periclimenes) longicaudatus? Gurney & Lebour, 1941,
 Journ. Linn. Soc. Lond. Zool., vol. 41, p. 146, fig. 16.

Periclimenes longicaudatus McDougall, 1943, Ecol. Monogr., vol. 13,
 p. 371.

Description: The rostrum is straight, short and rather high. It
 reaches to the end of the second or to the end of the third segment of
 the antennular peduncle. The upper margin is convex and is provided
 with 7-9 teeth, the distal of which are more crowded than the proximals.
 The first two teeth are placed behind the orbit, the distance between
 the first and second teeth is much larger than that between the other
 teeth. The lower margin is about straight, with 1 or 2 (seldom without)

small teeth close to the apex. The midrib of the rostrum runs close along the lower margin. The carapace has the lower angle of the orbit strongly anteriorly produced in a lobe, which is somewhat constricted near the base. The carapace bears no supraorbital and no antennal spines. The absence of the antennal spine is unique; in all other species of the subgenus *Periclimenes*, namely, this spine is present. The anterolateral angle of the carapace is about rectangular with a broadly rounded top.

The abdomen is smooth. All pleurae are rounded. The third abdominal segment is somewhat produced in the middle of the posterior margin. The sixth abdominal segment is twice as long as the fifth, and is distinctly longer than the telson. The anterior of the two dorsal pairs of spines of the telson is situated in or slightly behind the middle of the telson, the posterior pair lies midway between the anterior pair and the posterior margin of the telson. This posterior margin is provided with the usual 3 pairs of spinules.

The eyes are well developed and elongate. The eyestalk is narrower than the cornea, and almost twice as long.

The basal segment of the antennular peduncle has the stylocerite well developed, but the scale fails to reach the middle of the segment. The outer margin of the basal segment is convex and ends in a strong spine, which overreaches the forwardly produced anterior margin. This anterior margin ends in a rather sharp point, which touches the outer margin of the second segment. The second segment of the peduncle is somewhat shorter and broader than the third. The upper antennular flagellum has the 2 rami fused for 4 to 8 joints. The free part of the shorter ramus consists of 5 to 9 joints and is about $\frac{3}{5}$ to $\frac{4}{5}$ of the length of the fused part.

The scaphocerite is about thrice as long as broad. The outer margin is slightly concave and ends in a strong final tooth, which is far overreached by the lamella. The lamella remains about the same breadth throughout its length. The antennal peduncle reaches almost the middle of the scaphocerite. A distinct outer spine is present on the antennal peduncle, near the base of the scaphocerite.

The mandible is normal in shape: the incisor process ends in 3 teeth, the molar process has several knobs and ridges, no spinules are present. The maxillula has the inner lacinia narrow; the palp is bilobed. The maxilla is normal in shape; of the two endites the lower is distinctly smaller than the upper. The first maxilliped shows no notch between the endites of coxa and basis. The palp is well developed; the exopod possesses a large caridean lobe; the epipod is slightly bilobed. The 2nd maxilliped is normal in shape; the exopod reaches beyond the endopod.

No podobranch is present on the epipod. The third maxilliped fails to reach the end of the first antennular segment. The penultimate segment is about twice as long as the ultimate and shorter than the antepenultimate. The exopod is small and reaches somewhat beyond the middle of the antepenultimate segment. The epipod is small. A reduced arthrobranch is situated slightly below the epipod.

The first pereopods are slender, reaching almost to the end of the scaphocerite. The chela is slender, the fingers are unarmed and measure $\frac{2}{3}$ of the length of the palm. The carpus is as long as the chela, and $\frac{4}{5}$ of the length of the merus. The second legs are equal in size and shape, they are distinctly stronger than the first. They reach with the fingers and part of the palm beyond the scaphocerite. The fingers are about $\frac{3}{4}$ to $\frac{4}{4}$ as long as the palm. The cutting edges are entire but for 2 faint denticles in the proximal part of the edge of the dactylus. The palm is somewhat swollen. The carpus is as long as or slightly shorter than the palm and about 0.7 times as long as the merus. Its anterior margin is entire except for a notch at the inner side. The ischium is about as long as the palm. No spines are present on any of the joints. The third pereopod reaches about to the end of the scaphocerite. The dactylus is slender, it is about 4 times as long as high, and is distinctly bifid. The propodus is 4 times as long as the dactylus, twice as long as the carpus and as long as the merus. Several rather long spines are placed in the distal part of the posterior margin of the propodus. The fifth leg is more slender than the third, though it reaches less far forwards than that leg. The dactylus is about 4.5 times as long as high. The propodus is somewhat more than 4 times as long as the dactylus, fully twice as long as the carpus and distinctly longer than the merus. The propodus bears spines similar to those of the 3rd leg, moreover, some hairs are present.

The pleopods are normal. The appendix masculina on the endopod of the 2nd pleopod is as long as the appendix interna. A figure of the endopod of the first pleopod of the male is given here.

The uropods are elongate and normal in shape.

Size: The largest male observed by me measures 17 mm. Oviparous females are 15 to 22 mm in length. The eggs are numerous and small, measuring 0.3 to 0.5 mm in diameter.

Colour: According to Hay and Shore (1918) the living animal "escapes observation by reason of its almost perfect transparency."

Material examined: The Allan Hancock 1939 Atlantic Expedition collected 2 specimens of this species at :

British West Indies: Trinidad, Port of Spain, 1 fm depth, sand and algae, April 18, 1939, Sta. A35-39.

In the U.S. National Museum I examined specimens from: North Carolina (Beaufort: Laboratory wharf and Shackleford Bank); South Carolina (mouth of Bulls Creek and Cooper River, $\frac{1}{2}$ mile above mouth, Charleston Co.; near Port Royal and $\frac{1}{2}$ mile inside May River, Beaufort Co.), Florida (Fort Pierce, St. Lucie Co.; Pigeon Key and off Key West, Monroe Co.; Marco and Marco Pass, Collier Co.; Punta Rassa, Lee Co.; Charlotte Harbor, Charlotte Co.; Lemon and Sarasota Bays, Sarasota Co.), Mississippi (Cat Island), Louisiana (Chandeleur Sound), Bahama Islands (Andros Bank), W. Cuba (between Cayo Point and Lete), Jamaica, Porto Rico (Mayaguez), off Culebra, N. E. Brazil (off Jacuma, Parahyba).

Distribution: The species occurs in shallow littoral waters between N. Carolina and N. Brazil. The records in literature are:

Coast of Carolina (Stimpson, 1860), Beaufort, Carteret Co., N. C. (Kingsley, 1880; Hay & Shore, 1918; McDougall, 1943), Marco Pass, Collier Co., Fla. (Kingsley, 1880), Marco, Collier Co.! (Rathbun, 1902a), Punta Rassa, Lee Co., Fla.! (Rathbun, 1902a; Kemp, 1922), Charlotte Harbor, Charlotte Co., Fla. (Kingsley, 1880), Sarasota Bay, Sarasota Co., Fla.! (Rathbun, 1902a), ? Bermuda (Gurney & Lebour, 1941), Andros Bank, Bahama Islands!, (Rathbun, 1902a), off Cuba (Schmitt, 1924b), Jamaica!, Rathbun, 1902a), Mayaguez, Porto Rico!, (Rathbun, 1902a), Guanica Harbor and Ballena Point, Porto Rico (Schmitt, 1935), off Culebra!, (Rathbun, 1902a), off Jacuma, Parahyba, Brazil!, (Rathbun, 1900a).

The species is recorded twice from the Indian Ocean, namely from N. Malé Atoll, Amirante Island (Borradaile, 1917) and from Aripu Paar, Ceylon (Pearson, 1905). The specimens recorded by Pearson, however, prove to belong to *Periclimenes aesopius* (Bate). Borradaile (1917) refers his specimens with some doubt to the present species, his remarks on the material are not sufficient, however, to make out the identity with certainty. The present species occurs in shallow water (0 to 6 fathoms, with 1 record of 14.75 fathoms), between eelgrass (Hay & Shore, 1917 or among sponges and algae, while Schmitt (1924) reports it from Sargassum.

Type: The type locality is "coast of Carolina" (Stimpson, 1860). It is not known to me where the type, if still extant at all, is preserved.

Remarks: In the collection of the U.S. National Museum material of a species of *Periclimenes* (subgenus *Periclimenes*) is present from: Gulf of Mexico, South of Apalachicola Bay, 28° 45'N, 85° 02'W,

30 fms, gray sand, broken coral, March 15, 1885, *Albatross* Sta. 2405, 2 specimens 13-14 mm.

Off Cape Catoche, Yucatan, 22° 18'N, 87° 04'W, 24 fms, white rock, coral, January 30, 1885, *Albatross* Sta. 2365.

These specimens were identified by Miss Rathbun as *Urocaris longicaudata* and mentioned under this name in her 1902 paper. The specimens, however, show some differences from the other material of *Periclimenes longicaudatus*, namely:

1. The rostrum is much shorter (falling largely short of the end of the first segment of the antennular peduncle), and bears less (6) dorsal teeth.
2. An antennal spine is present.
3. The free part of the shorter ramus of the antennular flagellum is relatively shorter. It consists of about 5 joints and is half as long as the fused part, which consists of about 6 to 7 joints.
4. The fingers of the first legs are about as long as the palm.
5. The second legs have the fingers slightly shorter than the palm, the carpus is 1.6 times as long as the palm, 1.2 times as long as the merus and as long as the ischium.

The specimens are 12 to 14 mm in length and therefore in all probability are juvenile. At first I was inclined to consider them to be only juvenile specimens of *P. longicaudatus* and to ascribe differences mentioned above to the age of the specimens, but juvenile specimens of *P. longicaudatus* of 13 mm from Beaufort, found together with adult specimens showed most of the adult characters: the rostrum, though being shorter than in the adults reaches beyond the first segment of the antennular peduncle, the number of dorsal teeth is normal, the antennal spine is absent, the relation of the free and fused part of the shorter ramus of the upper antennular flagellum is more like that in *P. longicaudatus*. The fingers of the first legs are shorter than in the above mentioned specimens.

The aberrant specimens show a close resemblance to the young stage of a *Periclimenes* described and figured by Gurney & Lebour (1941), and referred with some doubt by these authors to *Periclimenes (Periclimenes) longicaudatus*. Their doubt is based on the fact that there are fewer dorsal teeth on the rostrum than in *P. longicaudatus* (1 tooth in the last larva, 2 in the post-larva and first young stage, 3 in the 2nd and 3rd young stages) and in "having the third abdominal segment produced into a hood in a similar way to *Periclimenes (Periclimenes) aesopius* (Bate) redescribed by Kemp (1922)." The difference of the shape in the rostrum probably is due to age only and my speci-

mens fit nicely in this series. The fact that both the post-larva and the first young stages have two, and the second and third stages 3 teeth, show that the process of addition of new teeth is rather slow. In one of my specimens the third segment was reaching slightly over the fourth, forming thereby a hoodlike process, in the other specimens the abdomen is perfectly normal. There is, however, certainly not a more or less compressed tooth-like hump as in *P. aesopius*, but considering the figures given by Gurney and Lebour this also is not the case, or at least not so distinctly, in their 3rd young stage. A very important difference between the specimen of Gurney and Lebour and my material is that in their specimen the antennal spine is said to be absent, while it is present in my specimens; in the second young stage of Gurney and Lebour's material, however, the spine is present.

In view of this evidence the whole matter seems to be pretty confused and without more additional material no definite conclusion as to the identity of Gurney and Lebour's Bermuda specimen and those from the Gulf of Mexico mentioned by Rathbun can be made. Like Rathbun's specimens, that of Bermuda (outside Gurnet Rocks) was collected in water which is much deeper (20 fms), than that in which adult specimens of *Periclimenes longicaudatus* are usually found.

***Periclimenes* (*Periclimenes*) *perryae* Chace**

Pl. 7, figs. a-o

Periclimenes (*Periclimenes*) *perryae* Chace, 1942, Proc. New Engl. Zool. Cl., vol. 19, p. 82, pl. 24.

Description: The following description of this species has been given by Chace (1942): "Carapace short and robust, but not markedly depressed, with prominent antennal and hepatic spines placed nearly in line with one another. Rostrum deep, down-curved, and buttressed in its basal half by a strong lateral carina. It is armed dorsally with seven prominent teeth, and ventrally with two less prominent ones; there are setae anterior to all of the teeth.

"Antennular peduncle with basal segment armed distally with two well-marked spines in addition to the usual lateral one. Outer antennular flagellum fused for the first four segments, and the shorter ramus of the unfused portion somewhat shorter than the fused part. The remaining two free flagella are short, not more than twice the length of the peduncle. Both the antennular peduncle and the well-developed antennal scale reach scarcely as far as the tip of the rostrum. The blade of the scale is broad and far outreaches the outer spine.

"Abdomen broadly rounded and unarmed, the margins of all of the pleura rounded. The sixth somite is 1.42 times the length of the fifth, and the telson, including the terminal spines, is 1.53 times the length of the sixth somite. Telson armed with two pairs of dorsal spines placed almost on the lateral margins, and three pairs of terminal spines, of which the intermediate pair is the longest.

"Mandible without palp, but all three pairs of maxillipeds are provided with exopods. First pair of legs with carpus distinctly longer than merus or chela, which are subequal. Second pair of legs very unequal. The left, or larger, one has the carpus nearly as wide as long and a little more than one fifth as long as the chela. There is no spine on the merus. The chela is not quite four and one half times as long as wide, and the palm is more than four times as long as the fingers. The dactyl shows a pronounced twist, and is produced into a broad, laminate crest on the outer margin; the inner margin has two prominent teeth which alternate with two similar teeth on the fixed finger. The smaller, or right, second leg has the chela 2.6 times as long as the carpus, and the palm about two and one half times the length of the fingers. Third, fourth and fifth legs similar in form and subequal in length. The merus is unarmed. The propodus is about five and one half times the length of the dactyl, which is strongly curved and bears an almost inconspicuous, apparently movable, spinule behind the tip."

Size: "The unique specimen is about 11 mm long."

Distribution: The species is only known from shallow water (5.5 fms) off Sanibel Island, Lee Co., W. Florida.

Habitat: The above specimen was found on an ophiuran belonging to the species *Astrophyton muricatum* (Lam.).

Periclimenes (Periclimenes) tenellus (Smith)

Pl. 8, figs. a-l

Anchistia tenella Smith, 1882, Bull. Mus. Comp. Zool. Harvard, vol. 10, p. 55, pl. 9, fig. 1.

Periclimenes tenellus Borradaile, 1898a, Ann. Mag. Nat. Hist., ser. 7, vol. 2, p. 383.

Periclimenes (Cristiger) tenellus Borradaile, 1917, Trans. Linn. Soc. Lond. Zool., ser. 2, vol. 17, p. 363.

Periclimenes (Ancylocaris) tenellus Kemp, 1922, Rec. Indian Mus., vol. 24, p. 179.

Description: The rostrum is slender and reaches to the end of the scaphocerite, it is about straight. The upper margin bears 9 to 11 teeth,

4 or 5 of which are placed on the carapace behind the orbit, the others are regularly divided over the upper margin of the rostrum. The proximal teeth are placed closer together than the distals, sometimes there is a distinct unarmed stretch before the apex. The first tooth is not appreciably more remote from the second than the third is. Its distance to the orbit is about $\frac{1}{3}$ of the length of the carapace. The lower margin bears 2 or 3 widely separated teeth. The carapace is smooth and provided with distinct antennal and hepatic spines. The lower angle of the orbit is produced forwards in a lobe which is slightly constricted near the base. The anterolateral angle of the carapace is rounded.

The abdomen is smooth and has the pleurae rounded. The third segment is somewhat posteriorly produced in the median part, but shows no distinct hump. The sixth segment is twice as long as the fifth and $\frac{5}{6}$ of the length of the telson. The dorsal spines on the telson are placed in the middle and at $\frac{3}{4}$ of its length. The posterior margin bears the 6 usual pairs of spines.

The eyes are well developed. The cornea is globular and slightly more than half as long as the eyestalk.

The basal segment of the antennal peduncle has the stylocerite slender and reaching almost to the middle of the segment. The outer margin of the segment is straight and ends in a strong anterolateral tooth, which reaches almost to the end of the second segment of the peduncle. It distinctly overreaches the rounded anterior margin of the segment. The second segment is distinctly shorter and somewhat broader than the third. The fused part of the upper antennular flagellum consists of 6 joints; the free part of the shorter ramus of 5 or 6 joints, it is somewhat shorter than the fused part.

The scaphocerite is 2.5 times as long as broad. The outer margin is straight or slightly convex and ends in a strong tooth, which, however, is overreached by the lamella. The lamella gradually narrows anteriorly and has the apex broadly rounded. The antennal peduncle reaches to the middle of the scaphocerite. A small external spine is present near the base of the scaphocerite.

The mouth parts strongly resemble those of *P. longicaudatus*. No differences could be found in the mandible and maxillula. The maxilla has the endite more deeply cleft than in *P. longicaudatus* and thereby has the two lobes more elongate. The first maxilliped has the notch between basis and coxa more distinct, while the epipod is somewhat larger and more distinctly bilobed. The second maxilliped is exactly as in *P. longicaudatus*. The third maxilliped reaches almost to the end of the antennal peduncle. The ultimate segment is about $\frac{3}{4}$ of the

length of the penultimate and is about half as long as antepenultimate segment. The exopod fails to reach the end of the antepenultimate segment. An epipod and a very small arthrobranch are present.

The first leg reaches with the fingers beyond the scaphocerite. The fingers are about as long as the palm and are, like in *P. longicaudatus* and *P. yucatanicus*, unarmed. The carpus is $\frac{5}{4}$ of the length of the chela and as long as the merus. The second pereopods are unequal in shape and size. Both reach with part of the carpus beyond the scaphocerite. The fingers in the larger leg (the right in my specimens) are about half as long as the palm. The cutting edges of both fingers bear in the proximal part two distinct teeth, those of the dactylus being placed slightly before those of the fixed finger. The fixed finger is higher than the dactylus, the outer surface of the fingers is convex, the inner surface of each finger has a rather sharply defined elevated longitudinal line. The space between these lines is strongly concave, so that the cutting edge lies in a rather deep hollow. The palm is cylindrical. The carpus is very short, being about $\frac{1}{4}$ of the length of the palm, it is cupshaped and has the anterior margin entire except for a rather deep incision. The merus is almost thrice as long as the carpus and as long as the ischium, no spines are present on any of the joints. The smaller leg is similar in construction to the larger, only it is more slender and the relations between the joints are different. The fingers are $\frac{3}{4}$ of the length of the palm. The carpus is about $\frac{2}{3}$ of the length of the palm and $\frac{3}{5}$ of that of the merus. Ischium and merus are of about the same length. The third pereopod reaches with almost half the propodus beyond the scaphocerite. The dactylus is bifid. The propodus is somewhat more than four times as long as the dactylus, about 1.5 times as long as the carpus and about as long as the merus. The fifth leg reaches almost as far forward as the third. The joints of this leg resemble those of the third leg, the propodus being only slightly longer. Some spines are present in the distal part of the posterior margin of the propodus of each of the last three legs.

The males have the endopod of the first pleopod with a digitiform process in the distal part of the inner margin. This process is certainly no appendix interna, as it totally lacks the hookshaped hairs and as there is no articulation whatsoever with the endopod itself. The second pleopod of the male has the appendix interna much longer than the appendix masculina. The other pleopods and the uropods are normal in shape.

Size: The largest male observed by me measured 22 mm. Ovigerous females are 22 to 25 mm long. The eggs are numerous and small, being 0.3 to 0.5 mm in diameter.

Material examined: The U.S. National Museum possesses 12 specimens (among which 2 males and several ovigerous females), from off Martha's Vineyard, 39° 58'N, 70° 06'W, bottom sand and shells, depth 146 fms, Sept. 21, 1881, U.S.S. *Fish Hawk*, Sta. 1038.

Distribution: The species up till now was known only from the original record (Smith, 1882) from off South Carolina, 32° 7' W, 78° 37'5" N, bottom pebbles, depth 229 fms, summer 1880. U.S.S. *Blake*, Sta. 316.

Type: The type of this species is preserved in the Museum of Comparative Zoology at Cambridge, Mass. The type locality, off South Carolina, 32° 7'W, 78° 37'5" N, has been given above.

Remarks: As stated by Smith himself, his specimen was defective, having probably lost the antennal scale and first two legs of the right side and having these regenerating. The larger of the legs in Smith's specimen in reality is the smaller, the actual larger leg is lost and a new leg is regenerated in its place, this new leg has not yet attained its full size and strongly resembles the left leg. In the specimens at my disposal the right leg is the larger, at least those few specimens in which the two legs still are attached to the body.

The species was placed by Kemp (1925) in his subgenus *Ancyclocaris* on account of the fact that in Smith's figure the dactylus of the last three legs was shown to be simple. Examination of my material, however, proved that the dactylus is distinctly bifid, which makes it necessary to place the species in the subgenus *Periclimenes* s.s.

Periclimenes (Periclimenes) harringtoni Lebour

Pl. 9, figs. a-k

Periclimenes harringtoni Lebour, 1949, Proc. Zool. Soc. Lond., vol. 118, p. 1110, fig. 3.

Description: The rostrum is short, straight and rather high, it reaches about to the middle of the second segment of the antennular peduncle. The upper margin is slightly curved and bears 6 to 8 teeth, 1 or 2 of which stand on the carapace behind the orbit. The ultimate tooth may be extremely small. The distances between the teeth become smaller anteriorly, the ultimate tooth, however, is separated from the top of the rostrum by a larger distance than from the previous tooth. The lower margin bears 1 to 4 extremely small, almost invisible teeth and is somewhat convex. The midrib of the rostrum runs rather close to the lower margin. The carapace is smooth and provided with antennal and hepatic spines. No supraorbital spines or postorbital ridges are

present. The lower orbital angle is produced in a short rounded lobe. The anterolateral angle of the carapace is broadly rounded.

The abdomen is smooth and has the pleurae of all segments broadly rounded. The third segment has the posterior margin slightly produced, but no hump is present. The sixth segment is 1.5 times as long as the fifth and $\frac{3}{4}$ of the length of the telson. The 2 pairs of dorsal spines of the telson are rather large and placed in the middle and at $\frac{3}{4}$ of the length of it. The posterior margin bears the usual 6 pairs of spinules, the intermediate pair of which is about 1.5 times longer than the inner pair.

The eyes have the cornea globular and only slightly shorter than the eyestalk. An ocellus is present.

The basal segment of the antennular peduncle has the stylocerite large and pointed, it reaches beyond the middle of the segment. The anterolateral spine is strong, but is outreached by the forwardly produced part of the anterior margin. The second and third segments of the peduncle are short, the second is slightly longer and broader than the third. The upper antennular flagellum has the two rami fused for 4 to 6 joints, the free part of the shorter ramus consists of three or four joints and is about half as long as the fused part.

The scaphocerite is oval in shape, it is about 2.5 times as long as broad. The outer margin is slightly convex, the final tooth is overreached by the lamella. The antennal peduncle reaches about to the middle of the scaphocerite. A spine is present at the outer side of the base of the scaphocerite.

The oral parts are quite typical. The incisor process of the mandible bears 4 teeth, a row of spinules is present at the end of the molar process. The inner lacinia of the maxillula is narrow, the palp is bilobed. The maxilla has the inner lacinia not cleft. The first maxilliped has the basis and coxa separated by an indistinct notch, the epipod is not bilobed. The third maxilliped reaches slightly beyond the base of the scaphocerite. The ultimate segment measures $\frac{2}{3}$ of the length of the penultimate and is slightly less than half as long as the antepenultimate segment. The exopod fails to reach the end of the antepenultimate segment; an epipod and a reduced arthrobranch are present.

The first leg reaches with the chela beyond the scaphocerite. The fingers are unarmed and half as long as the palm. The carpus is somewhat longer than the chela and of about the same length as the merus. The second legs are strongly different in size. The larger leg reaches with the entire carpus beyond the scaphocerite. The fingers are short and heavily built, being $\frac{1}{4}$ or $\frac{1}{5}$ of the length of the palm. Both cutting edges are provided with 2 distinct teeth in about the middle of their

length. The palm is elongate and cylindrical. The carpus is about half as long as the palm, somewhat shorter than the merus and about as long as the ischium. No spines are present on any of the joints. The smaller leg reaches with the chela beyond the scaphocerite. It looks similar to the larger leg but only much smaller, while moreover the relations between the various joints are different. The fingers are about $\frac{1}{3}$ of the length of the palm. Like in the large leg each finger possesses 2 teeth, which, however, are much smaller. The carpus is half as long as the whole chela and slightly shorter than the merus, which is about as long as the ischium. The third leg reaches with about half the propodus beyond the scaphocerite. The dactylus is slender and bears in the middle of its posterior margin a small accessory tooth. The propodus is somewhat more than thrice as long as the dactylus; no spines are placed on the posterior margin. The carpus is $\frac{1}{3}$ of the length of the propodus, while the merus measures about $\frac{4}{5}$ of the length of that joint. The fifth leg is similar to the third.

The first pleopod of the male has the endopod broadly ovate, with the inner margin straight. The endopod of the second pleopod of the male has the appendix masculina slightly longer than the appendix interna.

The uropods are normal in shape.

Size: The only male observed by me measures 13 mm. Ovigerous females are 14 and 16 mm long. The eggs are numerous and small, being 0.4 to 0.6 mm in diameter.

The type specimen of this species, an ovigerous female had a length of ca. 9.5 mm. The eggs of this specimen are 0.5 to 0.7 mm in diameter. These measurements of the eggs have been taken by myself, Lebour's statement that the eggs are 0.16 x 0.09 mm must be incorrect.

Colour: According to a note, which accompanied the specimen from White Shoal (coll. W. L. Schmitt, Sta. 8-31) it was in life transparent, especially in the chelae, the last two segments and the tail fan; centrally inside it was of a very pale translucent fawn colour, while many opaque white specks were present. Lebour (1949, p. 1110) states her specimen to be of a pinkish-red colour, but at the same time this author remarks that her specimen was dead when collected so that the colour may not be natural.

Material examined: My material, four specimens in all (2 ovigerous females, 1 non-ovigerous female and 1 male) originates from the Tortugas. One of the ovigerous specimens is from opposite the N. end of White Shoal, in the line connecting the lighthouse and no. 8 Red Buoy (depth 65 fms, dip with orange peel bucket, June 21, 1931, W. L.

Schmitt coll., Sta. 8-31). The other specimens are from near the upper end at the west side of the lower section of White Shoal (7 fms, dip with orange peel bucket, July 24, 1931, W. L. Schmitt coll., Sta. 41-31). This material is deposited in the U.S. National Museum, Washington, D.C.

Through the kindness of Dr. Marie V. Lebour I was able to examine the type specimen of this species, which is preserved in the collection of the Laboratory of the Marine Biological Association at Plymouth, England.

The species was only known from the original record by Lebour (1949) from Harrington Sound, Bermuda.

Remarks: The specimens from Sta. 41-31 were obtained from a red sponge.

The species may be recognized immediately by the extremely short fingers of the first and second legs.

Periclimenes (Periclimenes) yucatanicus (Ives)

Pl. 10, figs. a-1

Palaemonella Yucatanica Ives, 1891, Proc. Acad. Nat. Sci. Phila., 1891, p. 183, pl. 5, fig. 8.

Palaemonella yucatanica Sharp, 1893, Proc. Acad. Nat. Sci. Phila., 1893, p. 124; Borradaile, 1917, Trans. Linn. Soc. Lond. Zool., ser. 2, vol. 17, p. 358.

Description: The rostrum is rather narrow and directed obliquely upwards. It reaches to the end of the antennular peduncle. The upper margin bears 7 or 8 teeth, 2 of which are placed behind the orbit. The first tooth is placed slightly in front of the middle of the carapace (in my specimen the distance between this tooth and the posterior margin of the orbit is $\frac{5}{13}$ of the length of the carapace, rostrum excluded). The second tooth is placed slightly behind the orbit and is separated from the first tooth by a distance which is much larger than the distances between the other teeth. These latter teeth are regularly divided over the rostrum. The lower margin of the rostrum bears 2 or 3 teeth in the distal part. In the Hancock specimen the rostrum is broken. The carapace possesses no supraorbital spine, but both the antennal and hepatic spines are present. The lower orbital angle is strongly anteriorly produced.

The abdomen has all the pleurae broadly rounded. The third segment is produced in the median part of the posterior margin, forming a distinct hump. The sixth segment is almost twice as long as the fifth and $\frac{4}{5}$ as long as the telson. The telson is provided with the usual 2 dorsal

and 3 posterior pairs of spinules; the dorsal spinules are placed in the middle and at $\frac{3}{4}$ of the length of the telson.

The eyes have the cornea globular. The eyestalk is almost thrice as long as the cornea.

The first segment of the antennular peduncle is rather long. The stylocerite is slender, but distinctly fails to reach the middle of the first segment. The outer margin of the basal segment is straight and ends in a distinct anterolateral tooth, which fails to reach the anterior margin of the segment. This margin namely is strongly produced and almost reaches the middle of the second segment, it ends in a rather sharp point, which almost touches the outer margin of the second segment. That part of the anterior margin of the basal segment, which lies between its tip and the anterolateral tooth bears 2 or 3 strong spines (in my Cape Florida specimen there are two spines in the left and three in the right peduncle; in the Tortugas specimen there are three spines at the left side, while the right peduncle is missing; in the Colombia specimen there are 2 spines on either side). The second segment of the antennular peduncle is slightly shorter and broader than the third. The upper antennular flagellum has the two rami fused for about 14 joints, while the free part of the shorter ramus consists of about 5 joints. The fused part of the shorter ramus is almost 4 times as long as the free part.

The scaphocerite is slightly more than 2.5 times as long as broad. It reaches as far forwards as the antennular peduncle. The outer margin is about straight, the lamella overreaches the final tooth for a small distance. The lamella is of about the same breadth over its entire length, the top is broadly rounded, almost being truncated. The antennal peduncle reaches to the middle of the scaphocerite. An exterior spine is present at the base of the scaphocerite.

The mandible and the maxillula do not differ appreciably from those of *P. longicaudatus*; the incisor process of the mandible, in the specimens of the present species seen by me, ends in four teeth, but this character may be variable within the species. The maxilla has the inner lacinia not cleft, but simple. The first maxilliped is as in *P. longicaudatus*; the notch between basis and coxa and the bilobation of the epipod are even less distinct than in that species. The second maxilliped is typical. The third maxilliped reaches about to the end of the antennal peduncle. The ultimate joint measures $\frac{4}{5}$ of the length of the penultimate and $\frac{3}{5}$ of the antepenultimate. The exopod almost reaches to the end of the antepenultimate joint. An epipod and a reduced arthrobranch are present.

The first pereopod reaches with part of the fingers or even with part of the palm beyond the scaphocerite. The fingers are as long as

the palm. The carpus is somewhat longer than the chela and slightly shorter than the merus. The second pereopods in my specimens are somewhat different in shape and size. The larger leg reaches with part of the carpus beyond the scaphocerite. In my female specimen the fingers are $\frac{2}{3}$ of the length of the palm. The cutting edge of the dactylus bears 2, that of the fixed finger 1 small denticle in the extreme proximal part. The denticle of the fixed finger is situated at a level between those of the dactylus. The palm is about cylindrical. The carpus is slightly shorter than the fingers. It is circular in transverse section and more or less cupshaped. The anterior margin is entire but for a rather deep incision. The merus is 1.5 times as long as the carpus. The ischium is $\frac{4}{5}$ of the length of the merus. No spines are present on any of the joints. (The specimen from the Allan Hancock material differs from that of Florida by having the carpus of the larger leg much longer, being slightly longer than the palm and as long as the merus.) The smaller second leg resembles the larger strongly. It reaches with the chela beyond the scaphocerite. The general shape is the same as in the larger leg, but the relations between the joints are different. The fingers are $\frac{3}{5}$ of the length of the palm; no teeth are visible on the cutting edges. The carpus is longer than the fingers and is $\frac{11}{13}$ of the length of the palm. The merus is about as long as the palm and the ischium is as long as the carpus. (The specimen from the Allan Hancock material has the smaller second leg different from that of the Florida specimen described above. The fingers are $\frac{3}{4}$ of the length of the palm, the carpus is 1.3 times as long as the palm and as long as the merus.) The third leg reaches somewhat beyond the scaphocerite. The dactylus is bifid and is about 4 times as long as broad. The propodus is about 4 times as long as the dactylus, slightly less than twice as long as the carpus and as long as the merus. The fifth leg reaches with part of the propodus beyond the scaphocerite, it is slightly more slender than the 3rd leg. In the distal part of the posterior margin of the propodus of the last three legs a few spines are present.

The first pleopod of the male has the endopod with the upper part of the margin rounded; no processes are present. The second pleopod of the male has the appendix masculina slightly longer than the appendix interna. The uropods are normal in shape.

Size: My female specimens measure 24 and 26 mm, the male is 23 mm long. Ives' specimen, an ovigerous female, according to the figure is about 30 mm long. Ives figures the eggs numerous and small.

Material examined: The Allan Hancock 1939 Expedition collected a male specimen of this species:

Colombia: 1 mile S.W. of Cape la Vela. 13 fms, gray sand, April 8, 1939, Sta. A 13-39 D 1.

In the U.S. National Museum a specimen of this species is present from Cape Florida, Dade Co., S.E. Florida (October 29, 1896, B. W. Evermann coll.), and one from S. of Long Key, Tortugas, 5-6 feet depth (August 5, 1924, W. L. Schmitt coll.). I examined the type specimen of this species from off Progreso, Yucatan State, S.E. Mexico, 20 feet depth (1890, A. Heilprin coll.), in the Museum of the Academy of Natural Sciences at Philadelphia. Since Ives' description no original records of this species have been made in literature.

Remarks: *Palaemonella Yucatanica* of Ives does not belong to the genus *Palaemonella*, since it lacks the mandibular palp, as I could ascertain by examination of the type. The species obviously belongs to *Periclimenes*, subgenus *Periclimenes* s.s. It is most closely related to *Periclimenes tenellus*, from which it differs, however, in the shape of the rostrum, and of the antennula.

The specimen from Colombia (Allan Hancock Expedition), differs markedly in the shape of the 2nd pereopods from the Cape Florida specimens. As, however, in all other characters the 2 specimens show perfect resemblance, and moreover the Florida specimen is a female, while the Hancock specimen is a male, I think it better to consider them both to belong to one and the same species. More material will make clear if we have to do here with a sexual dimorphism, a variation occurring during the growth of the animal (as in *P. infraspinis*) or with two distinct forms. If the latter is the case, then the Hancock specimen belongs to the true *Periclimenes Yucatanicus* as it agrees better with Ives' description than the Florida specimen does.

***Periclimenes (Periclimenes) pandionis*, new species**

Pl. 11, figs. a-i

Description: The rostrum is straight, rather high and reaches slightly beyond the end of the scaphocerite. The upper margin is straight and is provided with 9 teeth, 2 of which are placed on the carapace behind the orbit. The first tooth is placed somewhat before the middle of the carapace and is separated from the next tooth by a distance, which is distinctly larger than the interspaces between the other teeth. The lower margin bears 4 teeth in the distal part. No postorbital ridge is present. The midrib of the rostrum merges with the posterior margin of the orbit. The lower angle of the orbit is produced in a rounded lobe. Antennal and hepatic spines are present on the carapace, supraorbital spines are lacking. The hepatic spine is slightly stronger than the antennal. The anterolateral angle of the carapace is broadly rounded.

The abdomen has the pleurae of all segments broadly rounded. The sixth segment is almost twice as long as the fifth and 0.8 times as long as the telson. The dorsal surface of the telson bears 2 distinct pairs of spinules, one in the middle and one at $\frac{3}{4}$ of its length. The posterior margin bears the usual 3 pairs of spinules, the intermediate of which is twice as long as the inner pair.

The eyes are well developed and have the cornea globular. The eyestalk is only slightly longer than the cornea.

The basal segment of the antennular peduncle has the stylocerite slender and pointed and reaching beyond the middle of the segment. The anterolateral tooth of the basal segment is strong and reaches almost to the end of the second segment and far overreaches the slightly convex anterior margin of the first segment. The second segment is broader and shorter than the third. The upper flagellum has the 2 rami fused for 5 joints, the free part of the shorter ramus consists of 5 joints, too, and is about as long as the fused part.

The scaphocerite reaches somewhat beyond the antennular peduncle. It is thrice as long as broad. The outer margin is slightly concave and ends in a strong final tooth, which, however, is distinctly overreached by the somewhat antero-internally produced lamella. The antennal peduncle reaches to the middle of the scaphocerite. A small external spine is present near the base of the scaphocerite.

The oral parts differ only in the following points from those of *P. longicaudatus*. The inner lacinia of the maxilla is more deeply cleft. The epipod of the first maxilliped is larger and more distinctly bilobed. The third maxilliped almost reaches to the end of the antennal peduncle. The ultimate joint is somewhat shorter than the penultimate and about half as long as the antepenultimate. An epipod is present, but no arthrobranch was observed, though it may have been present.

The first pereopod reaches about to the end of the scaphocerite. The fingers are slender and are as long as the palm, they are unarmed. The carpus is about as long as the chela and slightly shorter than the merus. Only one of the second legs is present. This leg reaches with the chela beyond the scaphocerite. The fingers are $\frac{5}{9}$ of the length of the palm, their tips are crossing. The cutting edge of the dactylus bears 1 tooth, while the edge of the fixed finger bears 3 teeth, these teeth all are situated in the proximal part of the edges. The palm is cylindrical. The carpus is conical and short; it is about $\frac{1}{3}$ of the length of the palm and half as long as the merus. The ischium is almost as long as the merus. No spines are present on any of the joints. An incision is present at the inner side of the anterior margin of the carpus. The third leg reaches

somewhat beyond the scaphocerite. The dactylus is distinctly bifid. The propodus is 4 times as long as the dactylus and twice as long as the carpus. The merus is slightly shorter than the propodus and somewhat less than twice as long as the ischium. The fifth leg is similar to the third, only the carpus and propodus are somewhat longer.

The pleopods and uropods in my only specimen, which is a female, are normal in shape.

Size: The type and only specimen is 18 mm long.

Material examined: The only known specimen thus far, is preserved in the U.S. National Museum (Cat. No. 85366). It was collected from the Gulf stream off Key West, Fla., 24° 21'55" N, 81° 58'25" W (98 fms, Feb. 14, 1902, *Fish Hawk*, Sta. 7279).

Periclimenes (*Periclimenes*) *iridescens* Lebour

Pl. 12, figs. a-m; pl. 20, figs. i-j

Periclimenes iridescens Lebour, 1949, Proc. Zool. Soc. Lond., vol. 118, p. 1112, figs. 4, 5.

Description: The rostrum is short, straight and rather high. It reaches to the base or to the end of the second segment of the antennular peduncle. The upper margin is somewhat convex and bears 5 to 7 teeth, one or two of which are placed behind the orbit on the carapace. The first tooth is farther removed from the second than the third is. The teeth are regularly divided over the rostrum though there sometimes is an unarmed portion before the tip. The lower margin bears 0 to 3 teeth, if teeth are present, then they are extremely small and inconspicuous. The carapace bears no postorbital ridge; the rostral midrib runs close to the lower margin of the rostrum. Antennal and hepatic, but no supraorbital spines are present. The lower orbital angle is forwardly produced into a blunt lobe, which is somewhat constricted near the base. The antennal spine stands somewhat below this angle. The hepatic spine is of about the same strength as the antennal and is situated distinctly below it. The anterolateral angle of the carapace is broadly rounded.

The abdomen has the pleurae of all the segments rounded. The third segment is slightly produced in the posterior median part, but does not form a hump. The sixth segment is about twice as long as the fifth and slightly longer than the telson. The telson is provided with 2 pairs of minute dorsal spinules. The anterior pair is situated in the middle of the telson, the second pair halfway between the first pair and the posterior margin of the telson. The 3 posterior pairs of spines are of

the usual shape. The intermediate pair is distinctly longer than the inner pair.

The eyes are well developed. The cornea is slightly more than half as long as the stalk, it is globular. An ocellus is present.

The basal segment of the antennular peduncle has the stylocerite slender and sharply pointed, it reaches about to the middle of the segment. The outer margin is slightly sinuous and ends in a strong final tooth, which reaches about as far forwards as the strongly convex anterior margin of the segment. The second and third segments are about the same length. The upper antennular flagellum is fused for 6 or 7 joints, the free part of the shorter ramus consists of about 3 joints and is less than half as long as the fused part.

The scaphocerite reaches slightly beyond the antennular peduncle. It is about thrice as long as broad. The outer margin is somewhat concave. The final tooth is distinctly outreached by the lamella, which is slightly produced intero-anteriorly. The antennal peduncle reaches almost to the middle of the scaphocerite. A distinct external spine is present near the base of the scaphocerite.

The mandible has the incisor process ending in 4 teeth, the molar process bears some small spinules. In one of the specimens examined by me the left maxilla has the endite entire, while in the right it is slightly incised. The maxillula and the first and second maxillipeds are exactly like those of *P. lucasi*. The third maxilliped fails to reach the end of the antennal peduncle. The ultimate segment is 0.8 times as long as the penultimate and about half as long as the antepenultimate joint. The exopod is well developed; an epipod and a small rudiment of an arthrobranch are present.

The first pereopod falls short of the end of the scaphocerite. The fingers are as long as the palm, the cutting edges are unarmed. The carpus is just a little longer than the chela and as long as the merus. The second legs are unequal and reach with part of the palm beyond the scaphocerite. In my material the fingers of the larger leg are 0.5 to 0.8 times as long as the palm. They are normal in shape, without an incurved lamelliform portion in their basal half. Both cutting edges bear 2 teeth, the proximal of which is less distinct than the distal; the teeth of the dactylus are placed slightly in advance of those of the fixed finger. The fingers close over their whole length. The carpus is short, and conical; it is $\frac{1}{4}$ of the length of the chela (in some specimens it is $\frac{1}{2}$ as long as the chela). The anterior margin of the carpus is entire but for an incision in the lower part. The merus is about as long as the ischium and slightly or distinctly less than twice as long as the carpus. The

smaller second leg has the fingers slightly longer or slightly shorter than the palm, they are slender and unarmed. The carpus is about as long as or somewhat longer than the fingers, while merus and ischium both are of about the same length as the carpus. Just like in the larger leg none of the joints bears spines, and the anterior margin of the carpus shows an incision. The third leg reaches almost to the end of the scaphocerite. The dactylus is bifid, the additional tooth varying strongly in size: in some specimens it is very distinct, but in others it is small and narrow and even may become obsolete so that it only can be seen with the aid of a powerful lens. The propodus is 4 times as long as the dactylus and slightly more than twice as long as the carpus; it is moreover somewhat longer than the merus. The fifth leg does not differ much from the third, it only has the propodus and carpus longer.

The pleopods are normal in shape. The endopod of the first pleopod of the male is figured here. The second pleopod of the male has the appendix masculina shorter than the appendix interna. The uropods are of the usual shape.

Size: The specimens examined by me measure 11 to 15 mm. Ovigerous females are 14 to 15 mm long. The eggs are rather small and few, measuring 0.3 to 0.6 mm. Lebour's type specimen, an ovigerous female, is about 14 mm long.

Colour: Dr. Lebour (1949, p. 1112) describes the colour of this species as follows: "The colour was blue, pink, orange and yellow, and the whole animal was brilliantly iridescent. The legs and telson tended to be colourless at the tips."

Development: Dr. Lebour (1949, p. 1114, fig. 5) describes the newly hatched larva of this species, of which also figures are given by her.

Material examined: The Allan Hancock Expedition 1939 collected 16 specimens of this species at:

Venezuela: Cubagua Island. 2-5 fms, sand and algae, April 14, 1939, Sta. A 24-39.

On my request, Dr. Marie V. Lebour kindly sent me the type of the present species for examination. This type is preserved in the collection of the Laboratory of the Marine Biological Association at Plymouth, England.

Distribution: Up till now the species was only known from the type which was collected 10 miles outside Castle Roads, Bermuda, in 80-100 fms.

Remarks: This species is most remarkable, in that the dactylus of the last three legs may vary from seemingly simple to distinctly bifid.

In one specimen the dactylus of the third leg is like the almost simple form figured, while that of the fifth is somewhat more distinctly bifid. It seems as if the character of the simple or bifid dactylus of the last three legs, which character is generally used to separate the subgenera *Harpilius* and *Periclimenes* s.s. is not of a very large value.

The species is most closely related to *P. infraspinis* Rathbun from the West American coast, but it may be recognized immediately by the entirely different shape of the legs and by its smaller size.

***Periclimenes (Periclimenes) infraspinis* (Rathbun)**

Pl. 13, figs. a-l

Urocaris infraspinis Rathbun, 1902b, Proc. U.S. Nat. Mus., vol. 24, p. 903; Rathbun, 1904, Harriman Alaska Exped., vol. 10, p. 31, fig. 10; Kemp, 1915, Mem. Indian Mus., vol. 5, p. 277; Borradaile, 1917, Trans. Linn. Soc. Lond. Zool., ser. 2, vol. 17, p. 354; Schmitt, 1921, Univ. Calif. Publ. Zool., vol. 23, p. 37, fig. 22.

Periclimenes (Periclimenes) infraspinis Kemp, 1922, Rec. Indian Mus., vol. 24, p. 143; Chace, 1937, Zoologica, New York, vol. 22, p. 132.

Description: The rostrum is straight and reaches about to the beginning or to the end of the third segment of the antennular peduncle. It is rather high. The upper margin is somewhat convex and bears 5 to 8 teeth, the first of which (sometimes the first 2) stands behind the posterior limit of the orbit. This first tooth is separated from the second by a distance which is distinctly larger than the distances between the other teeth. The teeth are rather regularly divided over the rostrum. The lower margin of the rostrum is about straight and bears 1 or 2 small teeth in the extreme distal part. The midrib of the rostrum runs close to the lower margin. The carapace is provided with antennal and hepatic spines. The lower angle of the orbit is produced forwards in a rounded lobe. The anterolateral angle of the carapace is broadly rounded.

The abdomen has all the pleurae rounded. The third segment is somewhat produced in the median part of the posterior margin, but no distinct hump is formed there. The sixth segment is fully twice as long as the fifth and is somewhat longer than the telson. The telson has the 2 pairs of dorsal spines placed in the middle and at $\frac{3}{4}$ of its length, while the posterior margin bears the usual 3 pairs of spines.

The eyes have the cornea globular. The stalk is about twice as long as the cornea. An ocellus is present.

The basal segment of the antennular peduncle has the stylocerite slender and reaching almost to its middle. The outer margin is somewhat convex and ends in a distinct anterolateral tooth, which generally is overreached by the anteriorly produced anterior margin of the segment, but sometimes reaches as far as this margin. This anterior margin fails to reach the middle of the second segment of the peduncle. The second segment is somewhat broader and about as long as the third. The upper flagellum has the two rami fused for 7 to 10 joints. The free part of the shorter ramus consists of 3 or 4 joints and is considerably shorter than half the fused part.

The scaphocerite reaches only slightly beyond the antennular peduncle, it is thrice as long as broad. The outer margin is about straight and ends in a strong final tooth, which is far overreached by the lamella. The lamella is somewhat produced at the inner anterior angle. The antennal peduncle reaches to the middle of the scaphocerite. A strong outer spine is present near the base of the scaphocerite.

The mandible, maxillula and maxilla are very similar to those of *P. longicaudatus*. The maxillula has the upper lacinia slightly broader than figured for the latter species. Also the first and second maxillipeds are exactly like those of *P. longicaudatus*. The third maxilliped fails to reach the end of the antennal peduncle. The ultimate joint is $\frac{2}{3}$ to $\frac{3}{4}$ of the length of the penultimate joint and about half as long as the antepenultimate joint. The exopod fails to reach to the end of the antepenultimate joint. An epipod and a small arthrobranch are present. The first leg distinctly fails to reach the end of the scaphocerite. The fingers are as long as the palm, with the cutting edges unarmed. The carpus is 1.2 times as long as the chela and quite as long as the merus.

The second legs in the various stages show considerable differences. In the largest specimens (22 mm length) the left and right legs are strongly different in shape. The larger leg (sometimes the left, sometimes the right) reaches with the whole chela or with the larger part of it beyond the scaphocerite. The fingers are somewhat longer than half the palm. They are strongly compressed, while the upper part of the dactylus is bent inwards, being similar in this respect to *Periclimenes latipollex* Kemp (vid. Kemp, 1922, p. 150, pl. 4, fig. 3). The dactylus bears 2 strong teeth in the proximal half of the cutting edge. Two smaller teeth are present on the cutting edge of the fixed finger, these teeth are placed slightly before those of the dactylus. The palm is cylindrical. The carpus is less than half as long as the palm and somewhat more than half as long as the merus. The anterior margin of the carpus shows a rather deep incision. The ischium is almost as long as the merus. No spines are present

on any of the joints. The smaller leg reaches with the fingers and a very small part of the palm beyond the scaphocerite. The fingers are about as long as the palm and bear no teeth. The carpus is $\frac{7}{5}$ of the length of the palm. The merus is as long as the carpus and slightly shorter than the ischium. In smaller specimens (about 18 mm) the second legs are equal in shape and reach with the larger part or with the whole length of the fingers beyond the scaphocerite. The fingers are slightly shorter than the palm. The cutting edges bear no teeth. The carpus is somewhat longer than the palm and slightly shorter than the merus. Ischium and merus are about of the same length. There are no spines on any of the joints, the anterior margin of the carpus, however, is provided with a rather deep incision. In very young specimens (11 mm of length) the legs are equal, the fingers are as long as the palm, the carpus is 1.5 times as long as the palm, while carpus, merus and ischium are of the same length. These legs thus strongly resemble the smaller leg of the adults. The third leg fails to reach the end of the scaphocerite. The dactylus is bifid and is almost 5 times as long as broad. The propodus is about 3.5 times as long as the dactylus, twice as long as carpus and about as long as the merus. The fifth leg reaches somewhat beyond the third. It is of about the same shape as the third being only a little more slender.

The endopod of the first pleopod of the male is about oval in shape, with the inner margin convex. The second pleopod of the male has the appendix interna slightly longer than the appendix masculina.

The uropods are normal.

Colour: According to Chace (1937) the colour in life is semi-translucent, pale brown.

Size: The largest male observed by me is 22 mm long. Ovigerous females of 17 to 23 mm length have been examined by me. The eggs are numerous and small, being 0.4 to 0.6 mm in diameter.

Material examined: The Allan Hancock Expeditions 1933-1937 and 1940, collected a large number of specimens of this species from:

Lower California, Mexico: San Jaime Bank, off Cape San Lucas. 75 fms, rock, coralline and sponge, March 3, 1937, Sta. 618-37; San Lorenzo Channel. 3-5 fms, sand, coralline, algae, March 7, 1937, Sta. 639-37; East of San Francisco Island, 15 fms, sand, Feb. 25, 1936, Sta. 517-36.; 47 fms, coarse sand, March 9, 1937, Sta. 650-37; Agua Verde Bay, off San Marcial Reef. 8 fms, rock, March 11, 1937, Sta. 662-37; Puerto Escondido. 18-21 fms, sand, cake urchins, Feb. 11, 1940, Sta. 1096-40; Carmen Island, Salinas Bay. 20 fms, shell, March 14, 1937, Sta. 673-37; South of Tortuga Island. 21 fms, volcanic sand, March 13, 1936, Sta. 576-36; San Francisquito Bay. 20 fms, sand, kelp, March

2, 1936, Sta. 532-36; East of Angel de la Guardia Island. 10 fms, sand, red algae, scallops, March 8, 1936, Sta. 554-36; Off Willard Island, Gonzaga Bay. 10-20 fms, mud, Jan. 30, 1940, Sta. 1064-40; San Felipe Bay. 2.5 fms, sand, Feb. 2, 1940, Sta. 1071-40.

Sonora, Mexico: off Rocky Point. 3-11 fms, mud, sand and algae, Feb. 2 and 3, 1940, Sta. 1072-40 to 1074-40.

Costa Rica: Salinas Bay. 2 fms, coarse sand, Feb. 11, 1935, Sta. 477-35; Port Parker. 2 fms, rock, algae, Feb. 9, 1935, Sta. 467-35.

Galapagos Islands, Ecuador: South Seymour Island, Velero Bay, off swimming beach. 2-4 fms, sand, shells, Feb. 19, 1933, Sta. 87-33; Indefatigable Island, Academy Bay. 3-4 fms, sand, Feb. 1, 1933, Sta. 51-33; Albemarle Island, east of south end. 58-60 fms, sand, nullipores, Jan. 26, 1934, Sta. 190-34; Onslow Island, N. of Charles Island. Crater, coral, Jan. 27, 1934, Sta. 194-34; Hood Island, Gardner Bay. 20 fms, kelp, algae, rock, Dec. 19, 1934, Sta. 362-35.

In the collection of the U.S. National Museum specimens of this species are present from: San Diego Bay, California (3 fms); Puerto San Bartolomé, Lower California; off San José Island, Lower California (8 fms); Concepción Bay, Lower California; Guaymas, inner harbor, Sonora, Mexico.

Distribution: The species is known from shallow littoral waters from S. California (San Diego) to Costa Rica and the Galapagos Islands. The records in literature are: San Diego Bay, S. California, 3 fms!; (Rathbun, 1902b, 1904), off San José Island, Lower California, 8 fms!; (Rathbun, 1904), Concepción Bay, Lower California!; (Rathbun, 1902b, 1904), Santa Inez Bay, Lower California, 3 fms, sand and seaweed (Chace, 1937), Guaymas, Sonora, Mexico (Rathbun, 1904).

Remarks: Chace reports specimens of this species out of the stomach of an Eared Grebe, *Colymbus nigricollis californicus* (Heermann).

The species shows a variation in the shape of the second legs, which with less material easily might have been the cause of the erection of a new species. Kemp (1922) mentions a similar case for his *Periclimenes diversipes*, and it is therefore advisable to be on the alert for similar cases in other species.

The species generally lives in shallow waters near the coast, on a sandy or rocky bottom, among weeds. Most of the records of the depth in which the species has been collected do not exceed 21 fms, being generally 1-5 fms. Some specimens of the Hancock Expeditions, however, are reported from hauls from a depth of 58-60 and 75 fms.

Subgenus **HARPILIUS** Dana, 1852

Periclimenes (Harpilius) pauper, new species

Pl. 14, figs. a-k

Description: The rostrum is straight and reaches slightly beyond the second segment of the antennular peduncle. The upper margin is slightly convex, and bears 7 teeth, the first of which stands on the carapace behind the orbit, while the second is placed over the posterior orbital margin. The distance between the first and the second tooth is larger than that between the other dorsal teeth. The teeth are regularly divided over the rostrum, though the ultimate tooth is separated from the apex of the rostrum by a larger distance, than it is from the antepenultimate tooth. The lower margin of the rostrum is about straight and unarmed. The carapace is smooth. It only bears hepatic spines. Antennal as well as supraorbital spines are absent. No postorbital ridge is present either. The midrib of the rostrum runs close to the lower border. The lower orbital angle is produced forwards to a rounded lobe. The anterolateral angle of the carapace is almost rectangularly rounded.

The abdomen has the pleurae of all segments broadly rounded. The third segment is only slightly produced in the median part of its posterior margin and does not form a hump there. The sixth segment is more than twice as long as the fifth and is slightly longer than the telson. The 2 dorsal pairs of spines of the telson are distinct and placed in the middle and at $\frac{3}{4}$ of the length of the telson. The posterior margin of the telson is provided with the usual 6 spines, the intermediate pair of which is slender and somewhat longer than the inner pair.

The eyes have the cornea globular and about half as long as the stalk. An indistinct ocellus is present.

The basal segment of the antennular peduncle has the stylocerite slender and pointed, reaching about to the middle of the length of the segment. The outer margin is slightly convex. The anterolateral tooth is strong and overreaches the anterior margin of the basal segment, which ends in a rather acute angle. The second and third segments are of about equal length. The upper antennular flagellum has the two rami fused for 5 joints. The free part of the shorter ramus is composed of 3 joints and is slightly less than half as long as the fused portion.

The scaphocerite reaches beyond the antennular peduncle. It is thrice as long as broad. The outer margin is about straight. The final tooth is overreached by the lamella, which is somewhat produced antero-

internally. The antennal peduncle reaches about to the middle of the scaphocerite. A distinct outer spine is present near the base of the scaphocerite.

The mandible has the incisor process ending in 3 teeth; the inner margin of the process bears some small spines. The molar process ends in some blunt knobs, and is provided with a short row of small spinules.

The maxillula has both laciniae broader than in *P. americanus*, while the palp is less distinctly bilobed. The maxilla shows no difference with that of *P. americanus*. The first maxilliped differs from that of *P. americanus* by having no distinct notch between the basis and the coxa, and by having the epipod smaller. The second maxilliped is of the usual shape. The third fails to reach the end of the antennal peduncle. The ultimate segment is $\frac{2}{3}$ of the length of the penultimate and less than half as long as the antepenultimate. A rather small exopod, an epipod and a reduced arthrobranch are present.

The first leg reaches to the end of the scaphocerite. The chela is slender, the fingers are as long as the palm and are unarmed. The carpus is somewhat shorter than the chela, while the merus is distinctly longer than the chela. The second legs are equal and reach with the whole chela beyond the scaphocerite. The fingers are slightly shorter than the palm and bear no teeth. The palm is cylindrical. The carpus is about as long as the palm and $\frac{2}{3}$ of the length of the merus, it is somewhat shorter than the ischium. None of the joints bears any spines. The third pereopod reaches with the dactylus beyond the scaphocerite. The dactylus is slender and simple, it has, however, a very small notch on the posterior margin. The propodus is 2.5 times as long as the dactylus and is provided with some spines at the posterior margin. The carpus is half as long as the propodus, while the merus is as long as the latter joint and somewhat less than twice as long as the ischium. The fifth leg is similarly built as the third.

The first pleopod of the male has the endopod oval, with the outer margin slightly convex. The second pleopod has the appendix masculina almost as long as the appendix interna. The other pleopods and the uropods are normal in shape.

Size: The only specimen at my disposal, a male, is 12 mm long.

Material examined: The holotype and only specimen was collected by the 1939 Allan Hancock Expedition from:

Venezuela: Cubagua Island. Rocky shore, April 15, 1939, Sta. A 30-39. Holotype, AHF no. 395.

It is preserved in the collection of the Allan Hancock Foundation at Los Angeles.

Remarks: This species is distinguished from all other representatives of the subgenus by missing the antennal spine. The only other species of *Periclimenes* without this spine is *Periclimenes (Periclimenes) longicaudatus* (Stimpson), which, however, has a distinctly bifid dactylus of the last three legs. Furthermore the two species differ in the shape of the mandible and the second legs.

***Periclimenes (Harpilius) magnus*, new species**

Pl. 15, figs. a-f

Description: The rostrum in my only specimen is broken and the top is missing. The remaining part points obliquely upwards and fails to reach the end of the basal segment of the antennular peduncle. The lower margin bears no teeth. Of the upper margin 4 teeth are visible, the first 2 of which are placed behind the orbit. The distance between the first and second tooth is distinctly larger than that between the other teeth. The midrib of the rostrum runs rather close to the lower margin. The carapace bears antennal and hepatic spines. No supraorbital spines or postorbital ridges are present. The lower angle of the orbit is produced in a slender lobe. The antennal spine is placed somewhat below this lobe and is somewhat smaller than the hepatic spine, which stands somewhat below and far behind the antennal spine. The anterolateral angle of the carapace is broadly rounded.

The pleurae of the abdomen all are rounded. The posterior margin of the third abdominal segment is strongly produced in the median part and forms a distinct hump, which is laterally compressed. The sixth segment is more than twice as long as the fifth and somewhat longer than the telson. The anterior pair of dorsal spinules of the telson is placed slightly behind the middle of the telson; the posterior pair stands halfway between the anterior pair and the posterior margin of the telson. This posterior margin bears the usual six spines; the intermediate pair is almost twice as long as the inner pair.

The eyes are well developed and slender. The stalk is somewhat less than thrice as long as the cornea. The cornea is globular and is provided with an ocellus.

The antennula has the stylocerite at the basal segment slender and pointed, it fails to reach the middle of the segment. The outer margin of the segment is straight or slightly convex, the anterolateral spine is strong, but is overreached by the forwardly produced anterior margin of the segment. This margin ends in a rather acute point, but does not reach the middle of the second segment. The second and third segments

are slender, the second being almost as long as the third. The upper flagellum has the two rami fused for 19 joints. The free part of the shorter ramus consists of 4 joints and is less than $\frac{1}{4}$ as long as the fused part.

The scaphocerite reaches slightly beyond the antennular peduncle, it is thrice as long as broad. The lamella is of about the same breadth over its entire length and has the apex broadly and equally rounded. The outer margin of the scaphocerite is straight and ends in a distinct tooth which, however, is overreached by the lamella. The antennal peduncle reaches about to the middle of the scaphocerite. A very small external spine is situated at the base of the scaphocerite.

The oral parts strongly resemble those of *P. lucasi*. The mandible has the incisor process with 4 teeth; no spinules could be observed on the knobs of the molar process. The maxilla has the inner lacinia unclenched. The third maxilliped fails to reach the end of the antennal peduncle. The ultimate segment measures $\frac{5}{7}$ of the length of the penultimate and is somewhat more than half as long as the antepenultimate. The exopod fails to reach the end of the antepenultimate joint. An epipod and a reduced arthrobranch are present.

The first leg reaches with the larger part of the palm beyond the scaphocerite. The chela is slender, the fingers are unarmed and as long as the palm. The carpus is $\frac{4}{3}$ as long as the chela. The merus is 1.5 times as long as the chela. The second legs are equal in shape and size. They reach with a large part of the carpus beyond the scaphocerite. The fingers are $\frac{5}{6}$ as long as the carpus and as long as the ischium. No spinules or teeth are present on any of the joints. The third leg reaches with the larger part of the propodus beyond the scaphocerite. The dactylus is slender and simple, it is somewhat less than half as long as the propodus. The carpus measures $\frac{3}{4}$ of the length of the propodus. The merus is $\frac{4}{3}$ as long as the propodus, and more than twice as long as the ischium. The fifth leg reaches with the entire propodus beyond the scaphocerite. It is of about the same shape as the third leg, only the carpus and propodus are distinctly longer; the propodus is 1.2 times as long as the carpus.

The pleopods and uropods in my specimen, a female, are normal in shape.

Size: The only specimen at my disposal measures 28 mm from the tip of the telson to the tip of the scaphocerite.

Material examined: The type and only specimen of this species is preserved in the collection of the U.S. National Museum (Cat. No. 85367). It is collected in the Gulf of Mexico, off Aransas, Texas, 27°

40' N, 96°34'W, 27.5 fms, Pelican Sta. 42, April 22, 1938.

Remarks: The species is most closely related to *Periclimenes* (*Harpilius*) *lucasi*, but may be distinguished from that species by the shape of the legs and probably by that of the rostrum.

***Periclimenes* (*Harpilius*) *lucasi* Chace**

Pl. 16, figs. a-k; pl. 19, figs. f-h

Periclimenes (*Ancylocaris*) *lucasi* Chace, 1937, *Zoologica*, New York, vol. 22, p. 133, fig. 8.

Description: The rostrum is straight and directed obliquely upwards. It fails to reach the end of the antennular peduncle, but overreaches the base of the last joint of it. The upper margin is convex and bears 8 or 9 teeth, one of which is placed behind the orbit. The distance between the first and second teeth is larger than that between the other teeth. The teeth are distributed rather regularly over the rostrum, the ultimate, however, are placed closer together than the proximals, while there is a distinct, though small, unarmed portion just before the tip of the rostrum. The lower margin of the rostrum bears 1 to 3 very small and inconspicuous teeth close to the apex, the rest of the margin is straight and unarmed. The carapace is provided with antennal and hepatic spines, no supraorbital spines or postorbital ridges are present. The antennal spine is placed somewhat below the lower angle of the orbit, which is anteriorly produced to a broadly topped lobe. The hepatic spine is about as large as the antennal and is situated on a lower level. The anterolateral angle of the carapace is rounded.

The abdomen has the pleurae of all segments rounded. The third abdominal segment is distinctly produced in the median part of the posterior margin; the median posterior part of the segment is somewhat compressed and forms a distinct hump. The sixth segment is about twice as long as the fifth and of about the same length as the telson. The upper surface of the telson bears 2 pairs of very small spinules, the anterior of which is placed in about the middle of the telson, the posterior is situated halfway between the anterior pair and the apex of the telson. The posterior margin bears the usual 3 pairs of spines, the intermediate of which is only slightly longer than the inner pair.

The eyes are elongate. The cornea is globular and is about half as long as the eyestalk. An ocellus is present.

The antennular peduncle has the basal segment very long. The stylocerite is slender and pointed, but does not reach the middle of the segment. The outer margin of the segment is straight and ends in a strong final tooth, which is distinctly overreached by the forwardly pro-

duced anterior margin, which almost reaches as far as the middle of the second segment. The second and third segments of the antennular peduncle together are shorter than the basal segment. The second is somewhat shorter and broader than the third. The upper antennular flagellum has the two rami fused for 7 to 14 joints. The free part of the shorter ramus consists of 3 to 6 joints and is less than $\frac{1}{4}$ of the length of the fused part.

The scaphocerite reaches only slightly beyond the antennular peduncle. It is about thrice as long as broad, and is of about the same breadth over its entire length, the top of the lamella is broadly rounded. The outer margin is straight and ends in a strong final tooth, which fails to reach the end of the lamella. The antennal peduncle fails to reach the middle of the scaphocerite. An external spine is present near the base of the scaphocerite.

The oral parts show some differences from those of *P. americanus*. The mandible has four teeth on the distal end of the incisor process and some spinules are present on the molar process. The upper lacinia of the maxillula is broader than in *P. americanus*. The maxilla has the endite not cleft, but simple. The first maxilliped has the endites of the coxa and basis not separated; the palp is distinct; the exopod bears a well developed caridean lobe; the epipod is small and somewhat bilobed. The second maxilliped is of the usual shape. It bears a large epipod; no podobranch is present. The third maxilliped reaches about to the end of the antennal peduncle. The penultimate segment is about 1.2 times as long as the ultimate, while the antepenultimate is almost twice as long as the ultimate. The exopods fail to reach the end of the antepenultimate segment. An epipod and a small arthrobranch are present.

The first pereiopod reaches with the fingers beyond the scaphocerite. The fingers are as long as the palm. The carpus is 1.2 times as long as the chela and as long as the merus. The ischium is $\frac{3}{5}$ of the length of the merus. The fingers are unarmed. The second legs are unequal in shape. They reach with the chela and part of the carpus beyond the scaphocerite. The larger leg has the fingers about $\frac{2}{3}$ as long as the palm. The upper part of the dactylus is lamelliform and curved inwards. Some 3 or 4 small teeth are present in the proximal half of the cutting edge, the teeth of the dactylus being placed slightly before those of the fixed finger. There is only a narrow space between the two cutting edges, the fingers almost close entirely. The palm is cylindrical. The carpus is somewhat shorter than the palm and slightly

more than half as long as the whole chela. Carpus, merus and ischium are about of the same length. None of the joints is provided with spines, the anterior margin of the carpus shows a distinct incision on the inner side. The smaller second leg has the fingers of the chela normal, no inwardly curved lamelliform dorsal portion is present in the dactylus. There are no teeth on the cutting edge. The fingers are $\frac{4}{5}$ of the length of the palm. The carpus is about 1.5 times as long as the palm and $\frac{6}{7}$ as long as the whole chela, it is longer than the merus. The merus and ischium are of about the same length. Like in the larger leg there are no spines on any of the joints; the carpus bears here too an incision at the inner part of the anterior margin. The third leg reaches with part of the propodus beyond the scaphocerite. The dactylus is simple and is about $\frac{1}{3}$ of the length of the propodus, which is twice as long as the carpus and about as long as the merus. The fifth leg resembles the third, only the propodus and carpus are longer.

The pleopods are normal in shape. The appendix masculina of the second pleopod of the male is only slightly smaller than the appendix interna.

The uropods are normal in shape.

Younger specimens have the second legs more equal, and both resembling the smaller leg of the adult specimens. In the young the legs do not reach as far forwards as in the adults.

Size: The largest male observed by me measures 22 mm. Oviparous females are about 27 mm long. The eggs are numerous and small, measuring 0.4 to 0.6 mm.

Colour: The specimen from Station 460-35 of the Allan Hancock Expeditions in life was coloured as follows: The body is transparent white (colourless). The carapace and first three abdominal pleurae are maroon spotted. The hump of the third abdominal segment is yellow, with a purple spot at each side. The eyestalks are white with a lateral row of dots. The antennae are white with broad yellow tinged bands, and carmine bands which are $\frac{1}{3}$ as wide as the yellow ones. The legs are royal purple and canary yellow banded. The uropods have the extreme $\frac{1}{8}$ of their length purple, followed by a yellow band. A spot of purple and yellow is present at the base of the exo- and endopod. The specimen from Sta. 457-35 was described as: "A little slender white shrimp, in life more or less colourless transparent with delicate fine bright lemon yellow and purple lines on frontal appendages." Chace (1937) describes the colour of the living specimens as "plain, semi-translucent white."

Material examined: The Allan Hancock Expeditions 1934, 1935, 1937, and 1940 collected material of this species from the following localities:

Lower California, Mexico: Off Los Frailes. 5-15 fms, sand and algae, April 4, 1937, Sta. 751-37; Off Consag Rock. 40-45 fms, basket stars, Jan. 31, 1940, Sta. 1067-40.

Costa Rica: Playa Blanca. 3-5 fms, sand and shells, Feb. 8, 1935, Sta. 460-35; Port Culebra. 3-10 fms, sand and shells, Feb. 24, 1934, Sta. 254-34.

Panama: Secas Islands. 12 fms, sand and rock, Feb. 6, 1935, Sta. 457-35; Piñas Bay. 30-35 fms, rock and coarse sand, Jan. 9, 1935, Sta. 442-35.

Distribution: The species is known from shallow littoral waters, from Lower California to S. Panama. Up till now the species was recorded in literature from the original description only: San Lucas Bay, Lower California, 3-9 fms (Chace, 1937) and Arena Bank, Lower California, 3-45 fms (Chace, 1937) from sandy and muddy bottoms.

Type: The type locality is San Lucas Bay, 22° 53'N, 109° 54'W, 3-9 fms. The holotype and 3 paratypes are preserved in the Department of Tropical Research of the New York Zoological Society. One paratype is inserted in the collection of the Museum of Comparative Zoology at Harvard College, Cambridge, Mass.

Remarks: The present species shows a large resemblance to *Periclimenes* (*Periclimenes*) *infraspinis* (Rathbun), from which species it may be distinguished, however, by the presence of simple dactyli of the last three pairs of pereopods, by the remarkable hump on the third abdominal segment, by the much smaller dorsal spines on the telson, by the more rounded top of the scaphocerite and by the unclleft inner lacinia of the maxilla. It is quite distinct from all other species of the subgenus *Harpilius*.

Periclimenes (Harpilius) rathbunae Schmitt

Pl. 17, figs. a-h

Periclimenes rathbunae Schmitt, 1924a, Bijdr. Dierk., vol. 23, p. 70, figs. 5, 6; Schmitt, 1936, Zool. Jb. Syst., vol. 67, p. 370.

Description: The rostrum is short, straight and rather high. It reaches about to the end of the basal segment of the antennular peduncle. The upper margin is somewhat convex and bears 5 to 7 teeth, one or two of which are placed behind the orbit. The interval between the first and second tooth is larger than the spaces between the other teeth, which are regularly divided over the rostrum. The lower margin of the rostrum is unarmed. The carapace bears no postorbital ridge; the midrib of the rostrum runs close to the lower margin of the rostrum. Antennal and hepatic, but no supraorbital spines are present. The lower orbital angle is forwardly produced in a lobe, which is somewhat constricted near the base and ends in a blunt point. The hepatic spine is of about the same strength as the antennal and is situated distinctly below it. The anterolateral angle of the carapace is broadly rounded.

The abdomen has the pleurae of all segments rounded, that of the fifth segment is not produced posteriorly. The third segment is slightly produced in the posterior median region, but does not form a hump. The sixth segment is about 1.6 times as long as the fifth and is slightly shorter than the telson. The telson is provided with two pairs of minute dorsal spinules. The anterior pair is situated behind the middle of the telson, the second pair halfway between the first pair and the posterior margin. The three pairs of spines on this margin are relatively small. The intermediate pair is only slightly longer than the inner pair.

The eyes are well developed. The cornea is globular and only slightly (about $\frac{3}{4}$) shorter than the stalk. An ocellus is present.

The basal segment of the antennular peduncle has the stylocerite slender and reaching about to the middle of the segment. The anterior margin of the segment is strongly produced and overreaches slightly the anterolateral tooth; moreover it reaches beyond the middle of the second segment of the antennular peduncle. The second and third segment of the peduncle are, compared with the other species of the genus, very short and broad. The second segment is broader than long, the third segment is somewhat longer than the second. The fused part of the upper antennular flagellum consists of 9 or 10 joints; the free part of the shorter ramus is less than $\frac{1}{3}$ of the length of the fused, and consists of 3 joints.

The scaphocerite is somewhat less than thrice as long as broad. The outer margin is slightly convex. The final tooth is a little out-reached by the broad lamella. The lamella is of about the same breadth all over its length and has the anterior margin broadly rounded. The antennal peduncle reaches slightly beyond the middle of the scaphocerite. A small, external spine is present.

The oral parts do not differ essentially from those of *P. lucasi*. The third maxilliped fails to reach the end of the antennal peduncle. The ultimate segment is 0.8 times as long as the penultimate and about half as long as the antepenultimate joint. The exopod fails to reach the end of the antepenultimate joint. An epipod is present. As my specimen is in not too good condition I could not make certain if an arthrobranch is present or not.

The first legs reach with part of the fingers beyond the scaphocerite. The fingers are almost as long as the palm. The carpus is as long as the chela and slightly shorter than the merus. The second legs are unequal. In my specimen only the smaller leg is present. I therefore cite Schmitt's (1924a) description of the larger leg: "the dactyl of this larger hand is quite deep, being a little less than twice as deep as the immovable fingers at about the middle of its length; measured from its tip to the articulation, the dactyl is about two-thirds the length of the rest of the hand." The smaller second leg reaches with the chela beyond the scaphocerite. The fingers are slightly shorter than the palm, there are no teeth on the cutting edges. The carpus measures $\frac{3}{4}$ the length of the palm. It is short and cone-shaped; its anterior margin shows an incision in the lower inner part. The merus is about 1.5 times as long as the carpus. The ischium measures about $\frac{3}{5}$ of the length of the merus. There are no spines on any of the joints. The third leg reaches with the dactylus and a small part of the propodus beyond the scaphocerite. The dactylus is simple. The propodus is four times as long as the dactylus. The carpus is about 0.6 times as long as the propodus. The merus is as long as the propodus and twice as long as the ischium. The fifth leg is similar to the third.

The endopod of the first pleopod of the male is oval in shape, with the inner margin slightly convex and with a broad top. The second pleopod has the appendix masculina much longer than the appendix interna. The other pleopods and the uropods are normal in shape.

A young specimen (11 mm long) of *Periclimenes* from Loggerhead Key, Tortugas, is tentatively referred to the present species, with the description of which it agrees in most points. The differences being: 1. The carpus of the only second leg present is longer ($\frac{7}{8}$) than

the palm, but much shorter than the chela. The merus is about as long as the carpus.

2. The dactyli of the last three legs are somewhat more slender. These differences may be due to age, but this cannot be stated with certainty until more material is available.

Size: The only adult specimen, a male, examined by me measures 15 mm. Schmitt (1924a) reported the type specimen, a female, to be about 18.5 mm long.

Material examined: The U.S. National Museum possesses one specimen of this species from the Netherlands West Indies: Bonaire, Kralendijk (De Hoop), under stones, May 12, 1930, P. Wagenaar Hummelinck coll. Furthermore a juvenile specimen from Loggerhead Key, Tortugas, probably belongs here (see above).

Distribution: The species up till now is known only with certainty from shallow coastal waters of the Netherlands West Indies. The records in literature are: Spanish Port, Curaçao (Schmitt, 1924a), Kralendijk, Bonaire! (Schmitt, 1936).

Type: The type locality is Spanish Port, Curaçao. The female holotype is preserved in the collection of the Zoological Museum at Amsterdam, Holland.

Periclimenes (Harpilius) americanus (Kingsley)

Pl. 18, figs. a-j; pl. 19, figs. a-e

- Anchistia americana* Kingsley, 1878a, Bull. Essex Inst., vol. 10, p. 65; Kingsley, 1878b, Proc. Acad. Nat. Sci. Phila., 1878, p. 96; Kingsley, 1882, Bull. Essex Inst., vol. 14, p. 109, pl. 2, fig. 10.
- Palaemonella tenuipes* Heilprin, 1888, Proc. Acad. Nat. Sci. Phila., 1888, p. 322; Heilprin, 1889, Bermuda Islands, p. 151.
- Periclimenes americanus* Borradaile, 1898a, Ann. Mag. Nat. Hist., ser. 7, vol. 2, p. 383.
- Anchistia americana* Kingsley, 1899, Amer. Nat., vol. 33, p. 718, fig. 10.
- Palaemonella tenuipes* Rankin, 1900, Ann. New York Acad. Sci., vol. 12, p. 538.
- Periclimenes Americanus* Verrill, 1900, Trans. Conn. Acad. Arts Sci., vol. 10, p. 580.
- Periclimenes americanus* Rathbun, 1902a, Bull. U.S. Fish Comm., vol. 20, pt. 2, p. 121.
- Periclimenes (Falciger) americanus* Borradaile, 1917, Trans. Linn. Soc. Lond. Zool., ser. 2, vol. 17, p. 371.

- Periclimenes americanus* Rathbun, 1919, Rapp. Onderz. Vissch. Curaçao, vol. 2, p. 324.
- Periclimenes (Ancylocaris) americanus* Kemp, 1922, Rec. Indian Mus., vol. 24, p. 179.
- Periclimenes americanus* Verrill, 1922, Trans. Conn. Acad. Arts Sci., vol. 26, p. 146, pl. 41, fig. 2, pl. 45, figs. 1, 2, pl. 48, fig. 1.
- Palaemonella tenuipes* (?) Verrill, 1922, Trans. Conn. Acad. Arts Sci., vol. 26, p. 149 (non pl. 43, fig. 2).
- Periclimenes americanus* Schmitt, 1935, Sci. Surv. Porto Rico, Virgin Isl., vol. 15, p. 162; Gurney, 1936, Proc. Zool. Soc. Lond., 1936, p. 620, pl. 2, figs. 13-17; Schmitt, 1936, Zool. Jb. Syst., vol. 67, p. 370; Gurney, 1938, Sci. Rep. Gt. Barrier Reef Exped., vol. 6, p. 27, fig. 123b; Gurney, 1939, Ann. Mag. Nat. Hist., ser. 11, vol. 3, p. 125, fig. 2b; Gurney, 1943, Ann. Mag. Nat. Hist., ser. 11, vol. 10, p. 495, figs. 1, 2.
- Periclimenes (Ancylocaris) bermudensis* Lebour, 1949, Proc. Zool. Soc. Lond., vol. 118, p. 1115, fig. 6.
- Periclimenes (Ancylocaris) rhizophorae* Lebour, 1949a, Proc. Zool. Soc. Lond., vol. 119, p. 605.

Description: The rostrum is rather high and straight, with the ultimate tip directed slightly upwards. It reaches about to the end of the antennular peduncle, sometimes reaching to or even beyond the scaphocerite. The upper margin bears 7 to 10 teeth, 2 of which are placed behind the orbit. The first tooth is removed a considerable distance from the second and is placed somewhat before the middle of the carapace. The upper margin of the rostrum is about straight, and the teeth are regularly divided over it up to the tip. The lower margin bears 2, sometimes 3 teeth; there is a considerable unarmed stretch on the lower margin before the apex. The carapace is provided with antennal and hepatic spines only, no supraorbital spines are present. The lower orbital angle is rather acute. A postorbital ridge is present. The hepatic spine is somewhat smaller than the antennal and lies distinctly below it. The anterolateral angle of the carapace is broadly rounded.

The abdomen has the pleurae of the first 4 segments rounded, that of the fifth segment ends in a small tooth. The third abdominal segment has the median part of the posterior margin only slightly produced posteriorly. The sixth segment is 1.3 to 1.5 times as long as the fifth, and 0.6 to 0.8 times as long as the telson. The 2 dorsal pairs of spines of the telson are placed at $\frac{1}{3}$ and $\frac{2}{3}$ of its length. The posterior margin of the telson bears the usual 3 pairs of spines, the intermediate of which are less than twice as long as the inner spines.

The eyes are well developed. The cornea is globular, it is slightly shorter and broader than the stalk. An ocellus is present. Two dark coloured bands are visible on the cornea in fresh material.

The basal segment of the antennular peduncle has the stylocerite rather strong, and sharply pointed, it almost reaches the middle of the segment. The outer margin is somewhat convex and ends in a well developed anterolateral tooth which overreaches the rounded anterior margin of the basal segment, but fails to reach the middle of the second segment. The second and third segments both are elongate, the second is slightly shorter than the third. The upper antennular flagellum has the two rami fused for 8 to 12 joints. (In younger specimens the number of fused joints often is 6). The free part of the shorter ramus consists of 3 or 4 joints and is less than $\frac{1}{4}$ of the length of the fused portion.

The scaphocerite is somewhat more than thrice as long as broad. It slightly overreaches the antennular peduncle. The outer margin is straight or slightly concave and ends in a strong final tooth, which somewhat overreaches the lamella. The lamella gradually narrows towards the apex. The antennal peduncle fails to reach the middle of the scaphocerite. A distinct exterior spine is present near the base of the scaphocerite.

The mandible consists of an incisor process, which ends in three distinct teeth, and a heavy molar process with blunt knobs and ridges. No palp is present. The maxillula has the inner lacinia rather slender and the upper lacinia bears movable spines; the palp is distinctly bilobed. The maxilla has the endite deeply cleft; the palp and scaphognathite are well developed. The first maxilliped has the endites of basis and coxa separated by a well defined notch, the palp is normal in shape, the exopod has the caridean lobe rather large, the epipod is large and slightly bilobed. The second maxilliped is normal in shape, the exopod is large, the epipod is well developed, but bears no podobranch. The third maxilliped reaches with part of the last joint beyond the antennal peduncle; the penultimate joint is $\frac{4}{3}$ as long as the ultimate and about $\frac{4}{5}$ as long as the antepenultimate. The exopod reaches slightly beyond the antepenultimate joint. The epipod and arthrobranch are small.

The first leg reaches with the chela, and often also with a small part of the carpus beyond the scaphocerite. The fingers are as long as the palm and are unarmed. The carpus is about 1.4 times as long as the chela and slightly longer than the merus. The second legs are very strong. The right and left legs are equal in shape and size and reach in the adult males with part of the merus beyond the scaphocerite.

In adult males the fingers are slightly less than half as long as the palm. The dactylus bears 3 or 4 teeth on the cutting edge, the ultimate being rather small and located on the distal half of the edge. The two (or three) other teeth are placed close to the base of the finger. Between the ultimate and penultimate tooth the cutting edge is considerably hollowed. The dentition of the fixed finger is about the same as that of the dactylus; there are, however, 3 or 4 proximal teeth. The concave parts of the cutting edges are placed just opposite each other, so that when the fingers are closed there is a distinct gap. The palm is cylindrical. The carpus is about 0.3 to 0.5 times the length of the chela and $\frac{2}{3}$ to $\frac{1}{2}$ of that of the palm, it is as long as or somewhat shorter than the merus. The merus is about 1.5 times as long as the ischium. In younger specimens the palm is relatively shorter, the fingers being more than half the length of it and the carpus being only slightly shorter than it. The joints of the second leg are unarmed, except for the carpus, which bears two not very distinct teeth in the lower part of the anterior margin. The outer lower angle of the anterior margin of the merus often is somewhat acute. Sometimes minor granular rugosities may be observed on the lower surface of merus and carpus and on the palm. The third leg reaches with the dactylus, sometimes with half the propodus, beyond the scaphocerite. The propodus is 2 to 4 times as long as the dactylus, almost twice as long as the carpus and as long as the merus. The ischium is about half as long as the merus. The dactylus is simple. The fifth leg reaches slightly less far than the third. It strongly resembles the third leg, only the propodus and carpus are somewhat longer.

The first pleopod of the male has the endopod ovate with the inner margin concave. The second has the appendix masculina slightly longer than the appendix interna. The uropods are normal in shape, the outer margin of the exopod ends in a posterior tooth, which at its inner side bears a movable spine.

Ovigerous females and young specimens have the second legs weaker than in the adult males. The fingers are relatively longer when compared with the palm. The teeth are arranged as in the male, but no gap is present. The carpus is relatively longer when compared with the length of the chela. All the legs reach less far forward than in the adult males. Gurney (1943) gives very interesting details about the change of form of the second leg during the growth of the animal.

Size: The largest male observed by me measures 22 mm. Ovigerous females of 13 to 20 mm long were examined. The eggs are numerous and small, being 0.4 to 0.6 mm in diameter.

Colour: The only traces of the original colour pattern I could detect in the material examined by me are the already mentioned bands on the cornea of the eyes. Verrill (1922, pp. 148, 149) gives the following description of the colour of this species. "Color, in life, translucent grayish white, with numerous small, round darker spots, which form a row on the posterior margin of each abdominal segment; two larger median spots and two larger lateral spots on the caudal fin, which is tipped with orange-brown. Each segment is also crossed by a narrow brown band. On the carapace are three oblique orange-brown lateral lines, and a pair of dorsal lines running back from the base of the rostrum. The color so nicely matched that of the whitish shell-sand bottom of the tidal pools in which they were found, that it was difficult to see this shrimp when still."

Material examined: The 1939 Allan Hancock Expedition collected material of this species from:

Colombia: 11 miles S.W. of Cape la Vela. 5 fms, April 8, 1939, Sta. A 12a-39.

Venezuela: Cubagua Island. 2-5 fms, sand and algae, April 14, 1939, Sta. A 24-39. 2 fms, algae, April 15, 1939, Sta. A 28-39.

Netherlands West Indies: 8 miles S.W. of San Nicolaas Bay, Aruba. 24 fms, sand and coralline, April 10, 1939, A 18 D2-39.

British West Indies: Trinidad, Port of Spain. 1-3 fms, sand and algae, April 18, 1939, Sta. A 35-39; Tobago Island, Buccoo Reef. Shore, coral reef, April 20, 1939, Sta. A 41-39.

In the U.S. National Museum specimens of this species are present from: Bermuda (Castle Harbor), North Carolina (Beaufort), Florida (Jupiter Inlet and Boca Raton, Palm Beach Co.; Norris Cut off Miami, Dade Co.; Miami Beach and Cutler Flats, Biscayne Bay, Dade Co.; Upper Jewfish Bush Lake, Bush Key, Harbor Key, Pigeon Key Lake, Key West, and numerous localities near Tortugas, Monroe Co.; Marco, Collier Co.; Punta Rassa, Lee Co.; off Charlotte Harbor, Lemon Bay and Sarasota Bay, Sarasota Co.; Orange Bluff near Clearwater Harbor, Pinellas Co.; off West coast of Florida, 28° 46'N, 84° 49'W), Yucatan (off Cape Catoche), Cuba (Cape San Antonio and Cayo Punta), Isle of Pines (Sigüanea Bay), Jamaica (Montego Bay), Old Providence Island, Porto Rico (Mayaguez, Boqueron Bay, Parguera, Ponce, Arroyo, Puerto Real, Humacao), off Vieques, Culebra (Ensenada Honda), Virgin Islands (St. Thomas, St. Croix), St. Eustatius (Tumble Down Dick Bay). Furthermore I had the privilege of examining a specimen of this species from Mangrove Lake, Bermuda, out of the collection of the Marine Biological Association at Plymouth,

England. This specimen is the type of *Periclimenes rhizophorae* Lebour (= *Periclimenes bermudensis* Lebour non Armstrong). See also under Remarks.

Distribution: This species is very common in the coastal waters of Bermuda, those of the east coast of the United States from North Carolina to S. and W. Florida and throughout the West Indies. The records in literature are: Bermuda! (Heilprin, 1888, 1889; Rankin, 1900; Verrill, 1900, 1922; Rathbun, 1902a!; Kemp, 1922; Gurney, 1936, 1943; Lebour, 1949!), Florida! (Rathbun, 1902a), Key West, Florida! (Kingsley, 1878b; Rathbun, 1902a!), Marco!, Punta Rassa!, Sarasota Bay!, and Clearwater Harbor!, W. Florida (Rathbun, 1902a), off W. Florida, 28° 46'N, 84° 49'W! (Rathbun, 1902a) N. W. of Tortugas, 25° 23'N, 83° 17'W! (Rathbun, 1902a), off Cape Catoche, Yucatan! (Rathbun, 1902a), Old Providence Island, Colombia! (Rathbun, 1902a), Port Antonio, Jamaica (Rathbun, 1902a), Mayaguez!, Ponce!, Puerto Real!, and Humacao!, Porto Rico (Rathbun, 1902a), Condado Bay near San Juan, and Guanica Harbor, Porto Rico (Schmitt, 1935), Vieques!, and Culebra! (Rathbun, 1902a), St. Thomas!, Virgin Islands (Rathbun, 1902a), St. Eustatius! (Rathbun, 1919), Bonaire (Schmitt, 1936), Aruba (Rathbun, 1919).

The species generally lives in shallow coastal water, though records from 40 fms have been made. It seems to prefer a sandy or rocky bottom and lives between algae and coral. Rankin states his specimens of "*Palaemonella tenuipes*" to be "broken out of coral rock." Verrill (1922, p. 149) states of the species: "It swims in large schools often near the surface," while Gurney (1943) remarks that the species in Bermuda is "frequently taken at night, at certain periods of the lunar cycle, swimming at the surface, but only singly or in small numbers."

Gurney (1936, 1943) described and figured the larval stages of the present species.

Type: The type locality is Key West, Florida. The whereabouts of the type specimen is not known to me.

Remarks: There can be but little doubt as to the identity of Heilprin's (1888, 1889) and Rankin's (1900) specimens of "*Palaemonella tenuipes* Dana" with the present species. The external characters of Dana's species indeed show a close resemblance to the present form, and there is no evidence that either of the two above mentioned authors examined the mandible of their material. At least nothing is mentioned about the presence or absence of a mandibular palp. As no *Palaemonella* has ever been mentioned later from Bermuda, and as *Periclimenes*

americanus is very common there (according to Gurney [1936, p. 619] "perhaps the most abundant decapod of Bermuda"), I feel perfectly justified to synonymize *Palaemonella tenuipes* Heilprin (non Dana) with *Periclimenes americanus* (Kingsley).

Like in *Palaemonella holmesi* here too the variability of the length of the carpus of the second legs and that of the dactylus of the last three legs is very large as is shown here by the figures. Often all specimens from one locality show long dactyli, which at the first glance make it probable that the specimens with this feature belong to a separate form. Examination of my large quantity of material, however, revealed that the various characters vary more or less independently of each other and that transitions may be found.

In 1949 Lebour described a new species of *Periclimenes* from Bermuda under the name *Periclimenes (Ancylocaris) bermudensis*. In the same year Lebour (1949a) changed this name, which is preoccupied by the name *Periclimenes (Periclimenaeus) bermudensis* Armstrong, 1940, into *Periclimenes (Ancylocaris) rhizophorae*. Through Dr. Lebour's kindness I was able to examine the type specimen of her species, which now is preserved in the Laboratory of the Marine Biological Association at Plymouth, England. The specimen in my opinion is nothing else but a female of *Periclimenes americanus* (Kingsley) in which the rostrum has been damaged and is regenerated. Actual comparison with specimens of Kingsley's species did not bring forth differences between the two forms. The large cheliped indeed is very slender, but it wholly falls within the range of variation shown by this species (cf. Gurney's 1943, table with measurements of the various joints of the chelipeds of females of this species).

Periclimenes (Harpilius) veleronis, new species

Pl. 20, figs. a-h

Description: The rostrum is straight, rather high. It reaches somewhat beyond the end of the antennular peduncle, but falls short of the end of the scaphocerite. The upper margin of the rostrum is somewhat arched and bears 9 teeth, the first of which is placed behind the orbit. The distance between the first and the second tooth is slightly larger than the distances between the other teeth, which are regularly divided over the rostrum. The last tooth, however, is removed somewhat more from the apex of the rostrum than it is from the penultimate tooth. The lower margin is convex and bears two rather small teeth. No postorbital ridges and no supraorbital spines are visible but hepatic and antennal spines are present. The lower orbital angle is produced into a small lobe, which is rounded at the apex. The hepatic spine is somewhat larger than the antennal, it is placed slightly below and distinctly behind it.

The abdomen has the pleurae of all the segments broadly rounded. The third segment is slightly produced in the median posterior part, but shows no hump there. The sixth segment is somewhat less than twice as long as the fifth, and about equal to the length of the telson. The two dorsal pairs of spines of the telson are distinct and placed in the middle and at $\frac{3}{4}$ of the length of the telson. The posterior margin of the telson bears the usual 3 pairs of spines, the intermediate of which is very slender, but less than twice as long as the inner pair, which bears some hairs.

The eyes are well developed. The cornea is globular and more than half as long as the stalk. An ocellus is present.

The basal segment of the antennular peduncle has the stylocerite slender and reaching about to its middle. The anterolateral spine is strong, but it is slightly overreached by the anterior margin, which is anteriorly produced in a rather sharp angle. The second and third segments are about of the same shape. The upper antennular flagellum has the two rami fused for five joints. The free part of the shorter ramus consists of three joints and is more than half as long as the fused part.

The scaphocerite reaches somewhat beyond the antennular peduncle. It is about thrice as long as broad. The outer margin is somewhat concave and ends in a strong spine. The lamella is of about the same breadth all over its length; it overreaches the final tooth and is somewhat pro-

duced antero-internally. The antennal peduncle reaches about to the middle of the scaphocerite. A distinct external spine is present near the base of the scaphocerite.

The mouth parts are not much different from those of *P. americanus*. The incisor process of the mandible bears four teeth. The maxillula has the upper lacinia somewhat broader and the palp less distinctly bilobed. The third maxilliped reaches slightly beyond the base of the scaphocerite. The last joint measures $\frac{3}{4}$ of the length of the penultimate and is about half as long as the antepenultimate joint. The exopod fails to reach the end of the antepenultimate joint. An epipod and a reduced arthrobranch are present.

The first pereopod reaches with the fingers beyond the antennal peduncle. The fingers are somewhat shorter than the palm. They are unarmed. The carpus is as long as the chela and slightly shorter than the merus. The second leg (only the left is present in my specimen) reaches with the fingers beyond the scaphocerite. The fingers are normal in shape and have the cutting edges provided with 1 tooth in the proximal third. The palm is 1.8 times as long as the fingers and is cylindrical. The carpus is half as long as the merus. No spines are present on any of the joints; the inner part of the anterior margin of the carpus shows a distinct incision. The third leg reaches only slightly beyond the antennal peduncle. The dactylus is simple. The propodus is about 3.5 times as long as the dactylus, somewhat more than twice as long as the carpus and longer than the merus. There are some spinules in the distal part of the posterior margin of the propodus. The fifth leg is similar to the third.

The pleopods and uropods are normal in my only specimen which is a female.

Size: The only specimen at my disposal, an ovigerous female, is 14 mm long. The eggs have a diameter of 0.3 to 0.4 mm.

Material examined: The 1933 Allan Hancock Expedition collected this specimen from:

Ecuador: Off beach at La Libertad. 4 fms, sand, Jan. 19, 1933, Sta. 12-33.

Type: The holotype and only specimen is preserved in the collection of the U.S. National Museum at Washington, D.C. (Cat. No. 90200).

Remarks: The specific name *veleronis* is given after the name of the *Velero III* on which the Allan Hancock Expeditions 1933-1941 were made under the leadership of Captain Allan Hancock.

Genus **HARPILIOPSIS** Borradaile, 1917

Definition: The body is strongly depressed. The rostrum is laterally compressed and provided with teeth. The carapace is smooth, provided with antennal and hepatic spines.

The abdomen is smooth. The pleurae of the first three segments are broadly rounded, those of the fourth and fifth end in a strong spine. The telson bears two pairs of dorsal and three pairs of posterior spines.

The scaphocerite is well developed.

The mandible bears no palp. The inner lacinia of the maxillula is slender. Exopods are present on all maxillipeds.

The first legs have the carpus unsegmented. The second legs are much stronger than the first. The last three legs have the dactylus simple and strongly curved, no basal tubercles are present on the posterior margin of the dactylus.

The pleopods are normal, no appendix interna is present on the first pleopod. The second pleopod of the male bears an appendix masculina. The uropods are elongate; the outer margin of the exopod ends in a tooth, which at its inner side is provided with a movable spine.

All species of this genus, known thus far, are associated with corals.

Type: The type species is *Palaemon Beaupresii* Audouin, 1825.

Remarks: Kemp (1922) in his excellent paper on the Pontoniinae of the Indian region considered the genus *Harpilius* Dana (1852) to consist of five species: *H. depressus*, *H. beaupresii*, *H. lutescens*, *H. consobrinus* and *H. gerlachei*. During my studies on the Siboga Pontoniinae I came to an arrangement of these species, which differs considerably from that of Kemp. *Harpilius lutescens* and *H. consobrinus* proved to be identical; in my opinion they belong in Kemp's subgenus *Ancyllocaris* Schenkel, 1902 of the genus *Periclimenes*. As *Harpilius lutescens* is the type species of *Harpilius* Dana 1852, the subgenus indicated by Kemp as *Ancyllocaris* must now be named *Harpilius* as Dana's name is older than that of Schenkel. *H. gerlachei* is placed by me, together with *H. imperialis* Kubo, in a new genus. *H. depressus* and *H. beaupresii*, which belong in one genus, are generically distinct from all other Pontonids. I therefore reerect for these species the genus *Harpiliopsis* Borradaile, 1917, which genus was synonymized by Kemp (1922) with *Harpilius*. A more elaborate discussion of this problem will be published in my forthcoming paper on the Pontonids of the Siboga and Snellius Expeditions.

One of the two species of *Harpiliopsis* known, occurs in West-American waters, besides being widely distributed in the indo-westpacific region.

Harpiliopsis depressus (Stimpson)

Pl. 21, figs. a-i; pl. 22, figs. a-f

- Harpilius depressus* Stimpson, 1860, Proc. Acad. Nat. Sci. Phila., 1860, p. 38.
- Anchistia spinigera* Ortmann, 1890, Zool. Jb. Syst., vol. 5, p. 511, pl. 36, figs. 23, 23a.
- Periclimenes spinigerus* Borradaile, 1898, Proc. Zool. Soc. Lond., 1898, p. 1004; Borradaile, 1898a, Ann. Mag. Nat. Hist., ser. 7, vol. 2, p. 383; Borradaile, 1899, Willey's Zool. Results, p. 405.
- Anchistia spinigera* Lenz, 1901, Zool. Jb. Syst., vol. 14, p. 434.
- Harpilius depressus* Rathbun, 1906, Bull. U.S. Fish Comm., vol. 23, pt. 3, p. 920, textfig. 68, pl. 24, fig. 12; Balss, 1915, Denkschr. Akad. Wiss. Wien, vol. 91, suppl., p. 27.
- Harpiliopsis depressus* Borradaile, 1917, Trans. Linn. Soc. Lond. Zool., ser. 2, vol. 17, pp. 324, 380, pl. 56, fig. 22.
- non *Harpilius depressus* Tattersall, 1921, Journ. Linn. Soc. Lond. Zool., vol. 34, p. 389, pl. 28, fig. 7. (= *Periclimenes lutescens* (Dana)).
- Harpilius depressus* Kemp, 1922, Rec. Indian Mus., vol. 24, p. 231, figs. 69, 70.
- Harpilius depressus gracilis* Kemp, 1922, Rec. Indian Mus., vol. 24, p. 234, fig. 71.
- Harpilius depressus* Edmondson, 1923, Bull. Bishop Mus., Honolulu, vol. 5, p. 34; Edmondson, 1924, Proc. Pan-Pacif. Sci. Congr., Aust., vol. 2, p. 1553.
- Harpiliopsis depressus* Edmondson, 1925, Bull. Bishop Mus., Honolulu, vol. 27, p. 6.
- Harpilius depressus* Kemp, 1925, Rec. Indian Mus., vol. 27, p. 327; Pesta, 1933, Zool. Anz., vol. 104, p. 279; Ramadan, 1936, Bull. Fac. Sci. Egypt Univ., vol. 6, p. 22; Chace, 1937, Zoologica, New York, vol. 22, p. 135; Armstrong, 1941, Amer. Mus. Novit., n. 1137, p. 12; Edmondson, 1946, Spec. Publ. Bishop Mus., Honolulu, vol. 22, p. 248, fig. 149; Barnard, 1947, Ann. Mag. Nat. Hist., ser. 11, vol. 13, p. 391; Barnard, 1950, Ann. S. Afr. Mus., vol. 38, p. 796, fig. 151 a-e.

Description: The body is strongly depressed. The rostrum, however, is laterally compressed, it is rather deep and reaches about to the end of the scaphocerite, it is directed somewhat downward. The upper margin bears five to seven teeth, all of which are placed on the rostrum proper, the first tooth being placed slightly in advance of the

orbit. The teeth are divided rather regularly over the upper margin, the tip of the rostrum may be unarmed or provided with a subapical tooth. The lower margin bears two to five, generally three or four teeth. The rostrum has a distinct midrib, which merges with the orbital margin. The carapace is smooth. It bears antennal and hepatic, but no supraorbital spines. The antennal spine is placed close below the pointed lower angle of the orbit. The hepatic spine is situated distinctly below the antennal and some distance behind it. The anterolateral angle of the carapace is broadly rounded.

The abdomen is smooth. The pleurae of the first 3 segments are broadly rounded, those of the fourth and fifth segments end in sharply acute teeth (in some specimens these teeth are not very distinct). The sixth segment is $\frac{4}{3}$ as long as the fifth. The telson is as long as the fifth and sixth abdominal segments together. The anterior pair of dorsal spines is placed in the middle of the telson or somewhat behind it, while the posterior pair is situated closer to the anterior pair than to the posterior margin of the telson. Of the three pairs of spines on the posterior margin, the intermediate pair is very strong, the inner pair is about half as long as the intermediate and is much more slender than it.

The eyes are well developed. They have the cornea globular, and slightly shorter than the eyestalk. An ocellus is present.

The basal segment of the antennular peduncle has the stylocerite broad and ending in a slender point, which overreaches the middle of the segment. The anterolateral spine is strong and reaches beyond the end of the second segment of the peduncle. Both the second and third segments are short, the third is slightly longer and narrower than the second. The upper antennular flagellum has the two rami fused for 10 to 12 joints. The free part of the shorter ramus consists of 5 to 8 joints and is less than half as long as the fused part.

The scaphocerite reaches far beyond the antennal peduncle. It is somewhat more than twice as long as broad (in pl. 21, fig. a showing the head and the thorax in dorsal view the scaphocerites seem more slender than they are in reality, because they do not lie horizontally, but are directed obliquely downward to the median line of the body). The outer margin is straight. The lamella is somewhat antero-internally produced and overreaches the final tooth. The antennal peduncle reaches about to the middle of the scaphocerite. The external spine at the base of the scaphocerite is especially strong.

The mandible has the incisor process ending in about four equal teeth; the molar process bears a row of spinules and is rather narrow; no palp is present. The maxillula has the inner lacinia very slender,

also the upper lacinia is not very broad, the palp is very indistinctly bilobed. The maxilla has the endite slender and undivided, the scaphognathite is very broad. All maxillipeds bear large exopods. The first maxilliped has the endites of basis and coxa separated by a distinct notch; the palp is rather short; the caridean lobe of the exopod is very short and broad; the epipod is large and bilobed. The second maxilliped is of the usual shape; the epipod is very large, no podobranch is present. The third maxilliped reaches slightly beyond the end of the antennal peduncle. The ultimate segment is about as long as the penultimate and about half as long as the antepenultimate segment. The exopod is strong and reaches about to the middle of the penultimate segment. An epipod and a well formed though small arthrobranch are present.

The first pereopod reaches with the fingers and part of the palm beyond the scaphocerite. The chela is broadest at the base and tapers gradually towards the top. The fingers are less than half as long as the palm. Numerous long hairs are present in the anterior part of the chela. The carpus is about 1.6 times as long as the chela and of about the same length as the merus, which, however, is distinctly broader. The second legs are strong and equal, they reach with the whole chela beyond the scaphocerite. The fingers are about half as long as the palm. The dactylus bears two, the fixed finger, three large and broad teeth. The palm is cylindrical; it is 3.5 to 4.5 times as long as high. The carpus is short and conical, and is $\frac{1}{3}$ to $\frac{1}{4}$ as long as the palm. The anterior margin of the carpus bears at the inner ventral side a strong spine, the rest of the margin shows some broad lobes. The merus is 1.7 times as long as the carpus, it bears a strong spine at the dorsal part of the anterior margin and one at the inner ventral side of that margin; the outer ventral side of the anterior margin bears a rounded lobe. The ischium is less than half as long as the merus, it bears a strong spine in the ventral part of the anterior margin. The third leg almost reaches to the end of the scaphocerite. The dactylus is simple and short, it is broad at the base and ends in a rather narrow point, which is twisted. The propodus is about four times as long as the dactylus, it bears numerous hairs in the distal half; no spines are present along the posterior margin. The carpus is distinctly more than half as long as the propodus. The merus is longer and broader than the propodus. The fifth leg is slightly more slender than the third.

The endopod of the first pleopod of the male is ovate in shape. The second pleopods of the male have the appendix interna longer than the appendix masculina.

The uropods are elongate. The outer margin of the exopod ends in a final tooth which at its inner side is provided with a long movable spine.

Size: The largest male observed by me is 25 mm long. Ovigerous females are 16 to 27 mm long. The eggs are numerous and small, being 0.4 to 0.7 mm in diameter.

Colour: A specimen from Isabel Island, Sinaloa, Mexico, according to a collector's note was coloured in life as follows: "Of the large chela the fingers are cerise, the palm and the whole body are dark blue-black." Kemp (1922) gives the following description of the colour of Indian specimens: "In life the species was closely and elegantly striped with deep blue on a pale grey ground. There was a narrow mid-dorsal stripe of bright yellow on the third abdominal somite and a similar stripe close to the inferior margins of the first three pleura. The tail-fan was transparent olive-green, the uropods were blotched with blue and with milk-white tips. The chelae of the second legs were finely dotted and suffused with green, with yellowish fingers; the basal segments and the other legs were spotted with blue, the dactyli of the last three pairs being reddish. The eggs were pale brown." Edmondson (1946) gives the colour of Hawaiian specimens as: "pale green."

Material examined: A large amount of material of this species was collected by the Allan Hancock Expeditions in the years 1933-1940. The material came from the following localities:

Gulf of California, Mexico: Espiritu Santo Island, San Gabriel Bay; Shallow water, coral, Feb. 20, 1936, Sta. 501-36; Shallow water, coral, March 20, 1936, Sta. 604-36; Shallow water, coral, March 7, 1937, Sta. 638-37; Shoal, coral, Feb. 14, 1940, Sta. 1110-40.

Sinaloa, Mexico: Isabel Island. Shore, rock, March 19, 1933, Sta. 124-33. 4 feet of water, *Porites* coral, March 19, 1933, Sta. 125-33.

Revillagigedo Islands, Colima, Mexico: Socorro Island, Braithwaite Bay. Shallow water, *Pocillopora* coral, Jan. 3, 1934, Sta. 131-34; Socorro Island, East of Cape Rule. Diving and netting, June 9, 1934, Sta. 297-34; Clarion Island, Sulphur Bay. Shallow water, coral clump, Jan. 5, 1934, Sta. 140-34. Shore, rock, tidepools, June 10, 1934, Sta. 298-34.

Costa Rica: Port Parker. Shallow water, coral, Feb. 9, 1935, Sta. 473-35; Port Culebra. 10 fms, mud, shells, Feb. 24, 1934, Sta. 253-34. 3-10 fms, sand, shells, Feb. 24, 1934, Sta. 254-34; Port Culebra, near South Viradores Islands. Shallow water, coral, Feb. 25, 1934, Sta. 258-34.

Panama: Secas Island. Shallow water, *Porites* coral from bay of South Island, Feb. 22, 1934, Sta. 252-34. Main Island, large open cove, shallow water, coral, Feb. 4, 1935, Sta. 447-35; Shore, tideflats, small coral clump, Feb. 6, 1935, Sta. 454-35; Bahia Honda. Coral from two fms., March 10, 1933, Sta. 114-33. Shallow water, *Porites* coral, Feb. 21, 1934, Sta. 247-34; Taboga Island. Shallow water, *Pocillopora* coral, May 2, 1939, Sta. 958-39; Piñas Bay. Shore, rock, Jan. 28, 1935, Sta. 437-35. 2-4 fms, coral, Jan. 29, 1935, Sta. 444-35.

Colombia: Octavia Bay. Shallow water, coral, Jan. 28, 1935, Sta. 435-35; Port Utria. Shore, reef inside outer island, coral, Feb. 15, 1934, Sta. 239-34; 3 fms, *Pocillopora* coral, Jan. 23, 1935, Sta. 414-35; Shallow water, coral, Jan. 24, 1935, Sta. 419-35; Shallow water, coral, Feb. 25, 1938, Sta. 859-38; Gorgona Island, off Coconut Beach. Shallow water, *Pocillopora* coral, Jan. 22, 1935, Sta. 411-35.

Galapagos Islands, Ecuador: Tower Island, Darwin Bay, Seal Beach no. 1. Shallow water, coral, Feb. 22, 1933, Sta. 94-33; Shallow water, coral, Feb. 24, 1933, Sta. 97-33; Shallow water, coral clumps, Feb. 26, 1933, Sta. 101a-33; Albemarle Island, Albemarle Point. Shore, rock, tide pools, Feb. 11, 1933, Sta. 69-33; Cartago Bay. North shore, *Porites* coral clumps, Feb. 13, 1933, Sta. 73-33; North shore, sand, Feb. 14, 1933, Sta. 76-33; Shallow water, coral, Jan. 25, 1934, Sta. 189-34; Duncan Island. Shallow water, coral, Feb. 15, 1933, Sta. 80-33; Indefatigable Island, Academy Bay. Coral clump in 1 foot water, Jan. 20, 1934, Sta. 168a-34; opposite Gordon Rocks, Shallow water, coral, Dec. 8, 1934, Sta. 315-35; Barrington Island. Shore, *Pocillopora* coral, Jan. 26, 1938, Sta. 811-38; Hood Island, Gardner Bay. Shore, rock, Jan. 26, 1933, Sta. 30-33.

The U.S. National Museum possesses West American material of this species from Mexico (Maria Madre Island, Tres Marias Islands, Tepic State; Clarion Island, Revillagigedo Islands, Colima State), Costa Rica (Cocos Island). Furthermore the U.S. National Museum possesses material of this species from the indo-westpacific region: Red Sea (Mersa Sheikh), Hawaiian Archipelago (Oahu, Molokai and Hawaii). In the Rijksmuseum van Natuurlijke Historie at Leiden, Holland and the Zoological Museum at Amsterdam, Holland, a large quantity of material of the present species is present from the Malay Archipelago.

Distribution: The species is common throughout the indo-westpacific region from the Red Sea and the Seychelles to the Malay Archipelago, Polynesia and Hawaii, and furthermore is abundant along the

West coast of America from the Gulf of California to Colombia and the Galapagos Islands. The records in literature are:

West coast of America: Arena Bank, off the south point of Lower California, Mexico (Chace, 1937).

Indo-west pacific region: Ghardaga, Red Sea (Ramadan 1936), various localities in the Red Sea, from Sinai Peninsula and Gulf of Akaba to Mersa Sheikh and Yanbo (Balss, 1915), Delagoa Bay, S. Africa (Barnard, 1947-1950), Seychelles, Minikoi, Maldive Archipelago and Chagos Archipelago, Western Indian Ocean (Borradaile, 1917), Madras, India (Kemp, 1922), Andaman Islands (Kemp, 1922), Loyalty Islands (Borradaile, 1898, 1899), Rotuma (Borradaile, 1898, 1899), Samoa Islands (Ortmann, 1890; Armstrong, 1941), Palmyra (Edmondson, 1923), Wake and Johnston Islands (Edmondson, 1925), Hawaiian Archipelago, various records from Ocean Island to Hawaii (Stimpson, 1860; Lenz, 1901; Rathbun, 1906; Edmondson, 1923, 1924, 1925, 1946; Kemp, 1925; Pesta, 1933). The species is associated with Madreporal corals of the genera *Porites* and *Pocillopora* as is shown by the Allan Hancock material. In literature it is recorded from *Pocillopora ligulata* Dana from Lower California (Chace, 1937) and from *Pocillopora* sp. from Hawaii (Edmondson, 1946).

Type: The type locality is Hawaii. The type specimen probably is no longer extant.

Remarks: Kemp (1922) described a new variety of this species as *Harpilius depressus* var. *gracilis*, which differs from the typical form by having the scaphocerite and the pereopods more slender, and by the situation of the spines of the telson. In my material the second legs vary in slenderness, but never attain the form of those of Kemp's var. *gracilis*, the spines on the telson, however, often very nearly are situated like those in var. *gracilis*. I therefore refrain from making any comments on the validity of Kemp's variety since I have no material of typical specimens of that variety at my disposal.

Genus *PERICLIMENAEUS* Borradaile, 1915

Definition: The body is clumsy, almost cylindrical, being slightly more compressed than depressed. The rostrum is compressed, well developed and provided with teeth. The carapace is smooth. Supraorbital spines may be present or absent. Antennal spines always are present, generally being very strong. Hepatic spines invariably are missing. A postorbital ridge may be present.

The pleurae of the first five abdominal segments are rounded, those of the first three segments are very broadly rounded.

The scaphocerite is well developed, but rather smaller than in *Periclimenes*.

The mandible bears no palp. The inner lacinia of the maxillula is slender. Exopods are present on all maxillipeds.

The first legs have the carpus not segmented. The second legs are very heavy, the left and right are unequal in shape. One finger of the large leg is provided with a large compressed or hammer-shaped tooth, which fits in a slit or an excavation in the cutting edge of the other finger. The last three legs are rather robust. The dactyli are simple or bifid, they bear no large basal tubercles, though the basal part sometimes is somewhat swollen; this swollen part, however, generally disappears in a slit in the propodus when the dactylus is curved backwards.

The pleopods are of the normal Palaemonid type. The endopod of the first pleopod of the male never bears an appendix interna. An appendix masculina is present on the second pleopod of the male, though it sometimes is very small.

The uropods are broadly ovate.

A number of species of this genus is associated with animals of other groups: one species is known to live epizootic on *Gorgonia*, others live endozootic in Porifera and Ascidia.

Type: The type species of the genus is the indo-westpacific *Periclimenes robustus* Borradaile, 1915.

Remarks: The present genus was considered by Kemp (1922) in his review of the Pontoniinae of the Indian Museum to be a subgenus of *Periclimenes* only. After studying extensive indo-westpacific Pontonid material of the Leiden and Amsterdam Museums, I came to the conclusion that *Periclimenaeus* is a valid genus, which opinion is confirmed by the study of the American material dealt with here.

The main difference from *Periclimenes* lies in the absence of the hepatic spine, while furthermore the antennal peduncle has the basal segment differently shaped, the scaphocerite does not reach beyond the

antennular peduncle, and the antennal peduncle reaches distinctly beyond the middle of the scaphocerite, the third maxilliped has the exopod reaching beyond the antepenultimate segment. The whole shape of the body is more clumsy than in *Periclimenes*, while also the legs generally are shorter and have the joints broader.

The genus comprises at present 25 species, 13 of which are indo-westpacific, the rest American. From American waters up till now 6 species have been recorded in literature as *Coralliocaris atlantica*, *C. pearsei*, *C. wilsoni*, *C. perlatus*, *Periclimenes maxillulidens* and *Periclimenes (Periclimenaeus) bermudensis*. New species were found in the material examined by me, while material of all the previously described species was at hand. This made it possible to bring some light in the confusion existing in regard to this genus. Of the 12 known American species 9 occur at the east coast and 3 at the west coast. Because of their small size specimens of this genus easily are overlooked, and it is to be expected that many more new species will be discovered.

The species known at present from American waters may be separated as follows:

1. Supraorbital spine absent. Rostrum without ventral teeth. Mandible without or with few teeth at end of incisor process; margin of incisor process never crenulated. Dactyli of last three legs simple or bifid, but without small denticles besides the larger claws 2
- 1¹. Small supraorbital spines present. Lower margin of rostrum with a tooth. End of incisor process crenulated by numerous small blunt teeth. Dactyli of last three legs bifid, with additional denticles on posterior margin 11
2. Fixed finger of larger second leg with a hammershaped tooth, fitting in a hole in cutting edge of dactylus. Fingers of smaller second leg longer than palm. Cutting edges of fingers of first legs denticulate. Incisor process of mandible strongly reduced *bermudensis*
- 2^f. Fixed finger of larger second leg with a pit or hole in cutting edge. Dactylus generally with a large hammershaped tooth fitting in the pit of the fixed finger. Fingers of smaller second leg distinctly shorter than palm. Fingers of first legs with cutting edges entire. Incisor process of mandible generally well developed 3
3. Rostrum with rather few (1-5) dorsal teeth, being rather shallow. Posterior margin of telson with the three pairs of spines

- arranged in one row, outer spines never placed conspicuously in advance of the two other pairs. Anterior margin of carpus of large chela not ending in a large spine-like tooth ventrally 4
- 3¹. Rostrum high, with numerous (7-12) dorsal teeth. Posterior margin of telson with outer spines placed distinctly in advance of the two other pairs (sometimes just reaching with top to base of intermediate spines). Chelae of second legs with tubercles. Anterior margin of carpus of large chela ventrally produced in a distinct spine-like process 10
4. Smaller second leg with dactylus short and high, almost semi-circular because of the strongly convex upper margin. Neither of fingers of both chelae of second legs with small denticles in anterior part of cutting edge. 5
- 4¹. Smaller second leg with dactylus elongate, never semi-circular. Dactylus of smaller second leg with numerous denticles in anterior half of cutting edge; generally also some denticles in extreme distal part of edges of fixed finger of this and of dactylus of larger leg 6
5. Dactylus of first pereopod short and with upper margin strongly convex. Third maxilliped with last two segments very slender. Basal segment of antennular peduncle with anterolateral tooth rather broad, almost reaching middle of second segment. Rostrum short and high *pearsei*
- 5¹. Dactylus of first pereopod with upper margin not strongly convex, but regularly sloping down towards tip. Last two segments of third maxilliped rather thickset, not slender as in *P. pearsei*. Anterolateral tooth of basal segment of antennular peduncle large and rather slender, reaching beyond middle of second segment. Rostrum slender *hancocki*
6. Scaphocerite without final tooth. Basal segment of antennular peduncle with a broad distinct anterolateral tooth. First pereopod with chela elongate, all segments slender *schmitti*
- 6¹. Scaphocerite with distinct final tooth. Basal segment of antennular peduncle with anterolateral tooth minute or absent. First pereopod with the segments short and thickset 7
7. Mandible with incisor process reduced in size and consisting of a short simple process without teeth. Scaphocerite with lamella anteriorly produced, outer margin often sinuate. *pacificus*
- 7¹. Mandible with incisor process well developed, ending in

- five or six distinct teeth. Scaphocerite with lamella anteriorly broadly rounded, outer margin convex or straight . . . 8
8. First pair of dorsal spinules of telson large and placed close to anterior margin of telson. Dactylus of last three legs distinctly bifid *ascidiarum*
- 8¹. Dorsal spinules of telson rather small, placed so as to divide telson into three equal parts, first pair never close to anterior margin of telson. Dactyli of last three legs simple . . . 9
9. Rostrum with four teeth on dorsal margin. Basal segment of antennular peduncle, with a distinct, though small anterolateral tooth. Final tooth of scaphocerite large and strong, reaching about as far as end of lamella. Maxillula with upper lacinia provided with numerous spinules at its distal end *atlanticus*
- 9¹. Rostrum with one or two dorsal teeth. Basal segment of antennular peduncle without anterolateral tooth. Final tooth of scaphocerite small, far overreached by lamella. Maxillula with upper lacinia ending in about four large tooth-like spines *maxillulidens*
10. First pereopods exceedingly slender, reaching with larger part of merus beyond scaphocerite. Carpus almost twice as long as chela. Outer spines of posterior margin of telson placed far in advance of the two other pairs *perlatus*
- 10¹. First pereopods short and thickset, reaching with carpus and chela beyond scaphocerite. Carpus is less than 1.5 times as long as chela. Outer spines of posterior margin of telson placed slightly in advance of the two other pairs, reaching with their tips to base of intermediate spines . . . *wilsoni*
11. Merus of third leg without posterior spinules. Dactylus of third leg less than $\frac{1}{3}$ as long as propodus. *caribicus*
- 11¹. Merus of third leg with some posterior spinules. Dactylus of third leg almost half as long as propodus . . . *spinus*

Periclimenaeus ascidiarum, new species

Pl. 22, figs. g-1; pl. 23, figs. a-i

Description: The rostrum is short and directed downwards. It is compressed and bears dorsally three slender teeth, all of which are placed distinctly in advance of the posterior margin of the orbit. The apex of the rostrum is slender and curved upwards, it reaches about to the end of the antennular peduncle. The lower margin is convex and unarmed. The carapace is smooth, it bears antennal spines only, no supraorbital spines are present. The antennal spine is placed slightly below the rounded lower orbital angle. The anterolateral angle of the carapace is broadly rounded and anteriorly produced.

The abdomen is smooth. The pleurae of the first five segments are broadly rounded. The sixth segment is as long as the fifth, and somewhat more than half as long as the telson. The telson is broad. The dorsal spines are large. The first is placed in the anterior quarter of the telson, close to the anterior margin, the second about halfway between the first pair and the posterior margin or somewhat closer to the anterior pair. The spines are separated by a rather small distance from the lateral margin of the telson. The three pairs of spines on the posterior margin of the telson lie in one row, the intermediate pair is slightly longer than the inner pair.

The eyes have the cornea globular and only slightly shorter than the stalk. No ocellus is visible.

The antennular peduncle has the stylocerite broad, short and pointed. It reaches almost to the middle of the segment. The lateral margin of the segment forms a blunt angle with a rounded tip at about the level of the tip of the stylocerite. Anteriorly of this angle the margin is somewhat concave. The anterolateral spine of the segment is extremely small. The second and third segments of the peduncle are of about equal size. The outer antennular flagellum has the two rami fused for about four joints; the free part of the shorter ramus is composed of about two joints and is very much shorter than the fused part.

The scaphocerite is small, it fails to reach the end of the antennular peduncle. It is about twice as long as broad. The outer margin is slightly convex; the final tooth is distinct and almost reaches as far as the lamella. The latter is broadly rounded in front and narrows gradually posteriorly. The antennal peduncle reaches beyond the scaphocerite. No external spine is present near the base of the scaphocerite.

The mandible has the incisor process ending in about seven teeth; the molar process is provided with numerous spinules at the end. The

maxillula has the inner lacinia slender; the upper lacinia is somewhat broader and is provided at its inner margin with strong spines; the line separating the spines from the lacinia often is not very distinctly visible; the palp is not bilobed. The maxilla has the inner lacinia simple; the scaphognathite is not very broad. The first maxilliped has the endites of coxa and basis not separated by a notch. The exopod has the flagellum well developed; the caridean lobe is longer than broad. The epipod is distinctly bilobed. The second maxilliped is normal in shape; an epipod is present. The third maxilliped reaches slightly beyond the base of the scaphocerite. The ultimate joint is about $\frac{2}{3}$ as long as the penultimate and half as long as the antepenultimate joint. The exopod reaches beyond the antepenultimate joint. An epipod is present.

The first pereopod reaches with the carpus and chela beyond the scaphocerite. The fingers are about as long as the palm or slightly longer, they are unarmed and regularly taper toward the tip. The carpus is 1.3 times as long as the chela. The merus is slightly longer than the carpus. The second legs are very unequal in shape and size; they reach with the carpus and the chela beyond the scaphocerite. The chela is smooth, without tubercles. The fingers of the large chela are somewhat less than half as long as the palm; the anterior part of both fingers is curved inwards. The dactylus is provided with a large blunt hammer-shaped tooth, which fits in a large pit in the cutting edge of the fixed finger. Anterior to this tooth the edge of the dactylus is finely denticulate. The edge of the fixed finger is entire except for a tooth at the inside near the base of the above mentioned pit. The dactylus is somewhat shorter than the fixed finger and has the upper margin almost circular. The palm is large and swollen; the chela is much higher proximally than distally. The carpus is cone-shaped, and about $\frac{1}{4}$ of the length of the chela. The merus is about $\frac{1}{3}$ of the length of the chela. The smaller second leg has the fingers about half as long as the palm. The fingers are of equal length, they both bear a broad denticulated tooth in the proximal third; the fingers lie in one level throughout their length, and are not curved inwards. The dactylus has the cutting edge distally of this tooth denticulated, while there are some few denticles before the tip of the fixed finger. The chela is more compressed than in the larger 2nd leg. The carpus is $\frac{2}{7}$ as long as the chela and 0.7 times as long as the merus. The ischium is $\frac{4}{5}$ of the length of the merus. There are no spines on any of the joints of both second legs. The third leg reaches with the propodus beyond the scaphocerite. The dactylus is bifid. At the base of the posterior margin of the dactylus sometimes a

strong tooth is present. The strength of this tooth is variable, sometimes it is very distinct and pointed, as in pl. 23, fig. 9i, or may be rounded and inconspicuous. The propodus is about four times as long as the dactylus, it narrows somewhat anteriorly. The posterior margin is provided with some spines in the extreme distal part only. The carpus is about $\frac{2}{3}$ of the length of the propodus, while the merus is about as long as, but distinctly broader than that joint. The fifth leg is similarly built as the third, but is more slender.

The pleopods of my specimens all being females are normal in shape.

The uropods are broadly ovate. The outer margin of the exopod ends in a tooth, which at its inner side is provided with a long movable spine. The exopod does not extend far beyond the final tooth of the outer margin, but is more or less truncated there with a rounded posterior margin.

Size: The ovigerous females examined are about 10 mm long. The eggs are rather numerous and 0.4 to 0.5 mm in diameter.

Colour: According to a collector's note accompanying Tortugas material the animals are colourless in life.

Material examined: The 1939 Allan Hancock Expedition collected a specimen of this species from:

Colombia: 2 miles S.W. of Cape la Vela. 21-22 fms, gray sand, April 8, 1939, Sta. A 14-39.

In the U.S. National Museum six specimens of this species are present from Tortugas, Florida (N.W. of lighthouse, Loggerhead Key, 0-5 feet depth, Aug. 4, 1924, W. L. Schmitt coll.; In channel between Middle Ground and White Shoal, 10 fms, Aug. 8, 1930, W. L. Schmitt coll., Sta. 45-30; Bird Key Reef, from Ascidiarians, June 28, 1931, W. N. Hess coll.; S. of Tortugas, 40 fms, Aug. 4, 1931, W. L. Schmitt coll.).

Type: Holotype is the largest ovigerous female from Bird Key Reef, Tortugas, June 28, 1931, W. N. Hess (U.S.N.M. Cat. No. 85376).

Remarks: The species is very similar to the East Indian *Periclimenaeus tridentatus* (Miers), which also lives in Ascidia. It may be distinguished among other features, however, by possessing larger spines on the dorsal surface of the telson. Furthermore it is closely related to the American species *P. atlanticus*, and *P. pacificus*.

Periclimenaeus atlanticus (Rathbun)

Pl. 24, figs. a-p

Coralliocaris atlantica Rathbun, 1902a, Bull. U.S. Fish Comm., vol. 20, pt. 2, p. 122, fig. 26.

Periclimenes atlantica Schmitt, 1935, Sci. Surv. Porto Rico, Virgin Isl., vol. 15, p. 163, fig. 27.

Description: The rostrum is directed downward and reaches slightly beyond the basal segment of the antennular peduncle. The upper margin bears four slender teeth, the apex of the rostrum excluded. All the teeth are placed well in advance of the posterior limit of the orbit. The apex of the rostrum is curved upwards. The lower margin is convex and unarmed. The carapace is smooth and armed with an antennal spine only. The anterolateral angle of the carapace is anteriorly produced in a broadly rounded angle.

The abdomen is smooth. The pleurae of the first five segments are broadly rounded. The sixth segment is slightly longer than the fifth, and half as long as the telson. The two pairs of dorsal teeth are rather small, the anterior pair is situated slightly in advance of the middle of the telson, the posterior pair lies halfway between the anterior pair and the posterior margin, close to the lateral margins. The posterior margin bears the usual six spines, which are placed in one row, the intermediate spines are about the same length as the inner pair.

The eyes have the cornea rounded; the latter is shorter and narrower than the stalk.

The basal segment of the antennular peduncle has the stylocerite short and broad, ending in a distinct point, and almost reaching to the middle of the segment. The lateral margin of the segment forms an acute angle at a level with the tip of the stylocerite. Distally of this angle the margin is concave. There is a small anterolateral spine (this spine is not shown in pl. 24, fig. d). The last two segments of the peduncle are short and broad. The upper flagellum has the two rami fused for three joints, while the free portion of the shorter ramus consists of two very short joints.

The scaphocerite is about twice as long as broad. The outer margin is slightly convex and ends in a strong tooth, which reaches about to the end of the lamella. The lamella is broadest in the anterior part and gradually narrows posteriorly; the anterior margin of the lamella is broadly rounded. The antennal peduncle overreaches the scaphocerite. There is no external spine near the base of the scaphocerite.

The oral parts show a close resemblance to those of *P. ascidiarum*.

The third maxilliped reaches about to the middle of the scaphocerite; it resembles the third maxilliped of *P. ascidiarum* perfectly.

The first pereopod reaches with the carpus and the chela beyond the scaphocerite. The fingers are about as long as the palm, they are unarmed and regularly taper towards the top. The palm is higher than the fingers. The carpus is about as long as the chela, and slightly shorter than the merus. Of the second legs only the smaller is known. The fingers are $\frac{4}{9}$ as long as the palm and much less high than it. The cutting edge of both fingers is provided in the proximal part with a tooth, the dactylus moreover bears small denticles in the distal part of the cutting edge, no such denticles are seen on the fixed finger. The carpus is about $\frac{3}{4}$ as long as the chela and 0.7 times as long as the merus. The ischium is slightly shorter than the merus. The third leg has the dactylus simple and rather short and broad. The propodus is six times as long as the dactylus, its posterior margin bears some spinules in the extreme distal part only. The carpus is somewhat more than half as long as the propodus. The merus is about as long as the propodus, but distinctly broader.

The pleopods are normal in shape in both female specimens seen by me. The exopod of the uropod has the outer margin ending in a tooth, which at its inner side is provided with a slender movable spine. The exopod is not prolonged behind the end of the external margin and ends in a broadly rounded posterior margin.

Size: The two female type specimens, which are the only specimens of this species recorded so far, are 5 and 5.5 mm long. I am not sure whether they are adult or not.

Material examined: The two type specimens, preserved in the U.S. National Museum have been examined by me. They came from: Off St. Thomas, Virgin Islands, Sail Rock, W. by N. $\frac{1}{2}$ N. 6 miles, 20-23 fms, coral, Feb. 6, 1899, *Fish Hawk* Sta. 6079.

Remarks: The present species is closely related to *Periclimenaeus maxillulidens* (Schmitt), it differs, however, in the shape of the rostrum, which is more elongated and provided with four instead of three teeth; furthermore the shape of the scaphocerite is different, as it has the final tooth stronger and reaching farther forwards. Probably some more differences between the two species will show up when more material of both is available; the present specimens namely are very small and probably are not fullgrown. I am convinced, however, that the above differences are not due to age. The differences of *P. atlanticus* and *P. ascidiarum* have already been mentioned in the key while the present species differs from *P. pacificus* in the shape of the scaphocerite, by having an anteroventral tooth at the basal segment of the antennular peduncle, in the shape of the mandible and that of the telson.

Periclimenaeus pacificus, new species

Pl. 25, figs. a-k

Description: The rostrum is directed slightly downwards and reaches about to the end of the basal segment of the antennular peduncle. The upper margin bears 2 to 4 teeth, which are placed distinctly in advance of the posterior margin of the orbit. If there are two teeth, then the distance between the two teeth is smaller than that between the ultimate tooth and the tip of the rostrum. The lower margin is convex and bears no teeth. The carapace is smooth and provided with antennal spines only. A rather distinct postorbital ridge starts from the antennal spine. The antennal spine is merged with the lower angle of the orbit. The anterolateral angle of the carapace is broadly rounded and anteriorly produced.

The abdomen is smooth and has the pleurae of the first five segments rounded. The fifth and sixth segments are of about the same length, and together they are as long as the telson. The dorsal spines of the telson are of moderate size. The first pair is placed in the anterior quarter of the telson, the second pair about midway between the anterior pair and the posterior margin of the telson. Both pairs are placed close to the lateral margin of the telson. The spines on the posterior margin are placed in one row, the intermediate and inner spines are of about the same length; they are distinctly longer than the outer spines.

The eyes have the cornea rounded, the latter is shorter and narrower than the eyestalk.

The stylocerite is broad and short, reaching about to the middle of the basal segment of the antennular peduncle. The angle at the outer margin of the basal segment is bluntly rounded. There is no anterolateral spine at the basal segment. The second segment is shorter than the third. The upper antennular flagellum has the two rami fused for three joints, the free part of the shorter ramus is composed of two or three small joints and is about half as long as the fused part. The scaphocerite fails to reach the end of the antennular peduncle. It is 2.5 times as long as broad. The outer margin is concave. The final tooth is strong, but it is distinctly overreached by the lamella. The lamella is broadest in the anterior part and is rather narrowly rounded anteriorly. The antennal peduncle reaches almost to the end of the scaphocerite. No outer spine is present at the basal part of the antennal peduncle.

The mandible has the incisor process short and simple, ending in one tooth. The molar process ends in some teeth and is provided with

spinules. The maxillula has the upper lacinia slightly bilobed, but in other respects resembles that of *P. ascidiarum*. The maxilla, first and second maxillipeds do not differ from those of *P. ascidiarum*. The third maxilliped reaches to the end of the basal segment of the antennular peduncle. The ultimate segment is $\frac{2}{3}$ of the length of the penultimate and about half as long as the antepenultimate. The exopod reaches somewhat beyond the antepenultimate segment.

The first leg reaches with part of the merus beyond the scaphocerite. The chela is short and rather heavy. The fingers are almost as long as the palm, they are unarmed. The carpus is slightly shorter than the chela. The propodus is about as long as the chela. The second pereopods reach with the carpus and chela beyond the scaphocerite and are very unequal in strength. The larger leg has the fingers almost $\frac{2}{5}$ of the length of the palm; they lie in the same plane as the palm. The dactylus has the cutting edge provided with a large hammer-shaped tooth which fits in a deep pit in the cutting edge of the fixed finger. The distal part of the cutting edge of the dactylus bears a number of small denticles; the edge of the fixed finger is unarmed, except for the above mentioned pit. The palm is swollen especially in the posterior part. The carpus is slightly less than half as long as the palm, and as long as the merus, which is of the same length as the ischium. None of the joints is provided with spines or tubercles. The smaller leg has the fingers somewhat less than half as long as the palm (sometimes they only are $\frac{1}{3}$ of the length of the palm). The cutting edge of the dactylus is provided with numerous denticles over almost its entire length. The cutting edge of the fixed finger is entire (in some specimens minute crenulations are visible). The palm is only slightly swollen. The carpus is half as long as the palm. Ischium, merus and carpus are of about the same length, none of them being provided with spines. The third leg reaches with part of the carpus beyond the scaphocerite. The dactylus is short, broad and bifid; the accessory claw, however, sometimes is reduced to a blunt angle. The propodus is about five times as long as the dactylus, its posterior margin bears some spinules in the extreme distal part only. The carpus is slightly shorter than the propodus, while the merus is distinctly longer and broader than the latter joint.

The pleopods of the male and female are of the normal type, figured here for *P. wilsoni*.

The uropods are ovate. The exopod has the outer margin ending in a tooth, which at its inner side bears a movable spine.

Size: The largest male examined by me measures 9 mm. Oviparous

females of 8 to 10 mm have been observed. The eggs are few and large, measuring 0.4 to 0.6 mm in diameter.

Material examined: The 1933 and 1935 Allan Hancock Expeditions collected 6 specimens of this species from:

Panama: Bahia Honda. 2 fms, coral from near East Point, March 10, 1933, Sta. 114-33; Piñas Bay. 32 fms, soft mud, Jan. 29, 1935, Sta. 441-35.

Colombia: Gorgona Island. Shallow water, coral (*Pocillopora*), Jan. 22, 1935, Sta. 411-35.

Galapagos Islands: James Island, James Bay. Shore, rocky ledges, Dec. 11, 1934, Sta. 333-35.

Distribution: The species is known only from the above localities on the west coast of Panama and Colombia and in the Galapagos Archipelago. It seems to live in shallow coastal waters.

Type: The type locality is Piñas Bay, Panama. The holotype is an ovigerous female from that locality (Allan Hancock Expedition 1935, Sta. 441-35). The holotype (U.S.N.M. Cat. No. 90168) and part of the paratypes are deposited in the collections of the U.S. National Museum at Washington, D.C. One paratype is deposited in the collection of the Allan Hancock Foundation, Los Angeles, Calif.

Remarks: The species is closely related to *P. atlanticus* and *P. ascidiarum*. The differences with these two species have already been put forward (vid. p. 79 and p. 83).

***Periclimenaeus maxillulidens* (Schmitt)**

Pl. 26, figs. a-o

Periclimenes maxillulidens Schmitt, 1936, Zool. Jb. Syst., vol. 67, p. 371, pl. 13.

Description: The rostrum is short and directed slightly downward, it reaches to the end of the basal segment of the antennular peduncle or even fails to reach the end of the eyes. It bears two dorsal teeth distinctly in advance of the posterior margin of the orbit. The apex of the rostrum is curved upward. The lower rostral margin is convex and devoid of teeth. The carapace is smooth and provided with an antennal spine only. The antennal spine is placed close to the lower orbital angle, which, however, is only to be seen with difficulty. A strong postorbital carina goes from the antennal spine dorsally. The anterolateral angle of the carapace is rounded and forwardly produced.

The abdomen is smooth and the pleurae of the first five segments are broadly rounded. The sixth segment is about as long as the fifth. The

telson is almost twice as long as the sixth segment. The two dorsal pairs of spinules are rather small and so arranged as to divide the telson in three parts of about equal length. The spinules are somewhat removed from the lateral margins. The posterior margin bears six spinules which are placed in one row; the inner spinules are of about the same length as the intermediate.

The eyes are distinct. The cornea is shorter than, but about as broad as the stalk. No ocellus is visible.

The stylocerite is small but broad and pointed; it fails to reach the middle of the basal segment. The outer margin of the segment shows a blunt rounded angle at the height of the tip of the stylocerite; anteriorly of this angle it is concave. The anterolateral angle of the basal segment bears no spine, but only a group of setae is present there. The second and third segments are short and broad. The upper antennular flagellum has the two rami fused for six to eight joints. The free part of the shorter ramus consists of one or two minute joints and is hardly to be seen.

The scaphocerite is small and fails to reach the end of the antennular peduncle. It is twice as long as broad. The outer margin is slightly convex and ends in a small tooth, which is pressed against the lamella and is far overreached by it. The lamella has the anterior margin broadly rounded. Its largest breadth lies in the anterior half, it narrows gradually posteriorly. The antennal peduncle reaches to the end of the scaphocerite. There is no spine near the exterior part of the base of the scaphocerite.

The oral parts do not differ essentially from those of *P. ascidiarum*. The mandible has the incisor process ending in six, often irregular teeth; the molar process bears numerous small spinules on its distal end (these are not shown in the figure). The maxillula, has the upper lacinia with much fewer (4 to 6) spines which are so indistinctly separated from the lacinia itself that they look like teeth. The palp is distinctly bilobed. There are no differences between the maxilla, first and second maxillipeds and those of *P. ascidiarum*. The third maxilliped almost reaches the end of the scaphocerite. The last joint is $\frac{5}{8}$ of the length of the penultimate and slightly more than half as long as the antepenultimate joint. The exopod reaches somewhat beyond the basal segment.

The first pereopod reaches with the carpus and the chela beyond the scaphocerite. The chela is rather robust. The fingers are slightly shorter than the palm; they gradually taper towards the tip, and are

unarmed. The carpus is slightly longer than the chela and somewhat shorter than the merus. Of the second legs only the larger is known (in the specimen from Florida none of the second legs is present). The fingers are very short, being about $\frac{1}{3}$ of the length of the palm. Both fingers are curved somewhat inwards and form an angle with the palm. The dactylus has the upper margin strongly convex. The cutting edge of the dactylus is provided with a large hammershaped tooth which fits in a large pit in the cutting edge of the fixed finger. A distinct tooth is present on the cutting edge of the fixed finger near the inner basal part of the pit. The palm is large and swollen; it is smooth and shows no tubercles. The carpus is very short and cupshaped, it is about $\frac{1}{4}$ of the length of the palm. The merus is compressed; it is somewhat longer than the carpus. The ischium is about as long as the carpus. There are no spines on any of the joints. The third leg reaches with part of the propodus beyond the scaphocerite. The dactylus is simple, with a narrow movable top; there is no basal tooth. The propodus is four times as long as the dactylus; it is broad and narrows slightly anteriorly. There are only some teeth near the extreme distal part of the posterior margin. The carpus measures $\frac{3}{4}$ of the length of the propodus, while the merus is only slightly longer than the latter joint. The fifth leg strongly resembles the third.

The pleopods in my female specimens are normal in shape.

The uropods are broadly ovate. The outer margin of the exopod ends in a tooth, which at its inner side bears a movable spine.

The posterior margin is broadly rounded and reaches only slightly beyond the end of the outer margin.

Size: The type specimen is 6 mm long. The second specimen seen by me measures 10 mm. Both specimens are non-ovigerous females.

Material examined: In the collection of the U.S. National Museum this species is represented by two specimens, one being the type. The specimens originate from:

Florida: Off Cape San Blas, $29^{\circ} 18'15''\text{N}$ - $29^{\circ} 11'13''\text{N}$, $85^{\circ} 32' 00''$ - $85^{\circ} 29'00''\text{W}$, 25-27 fms, coarse grey sand, broken shells, gravel, sand, coral, Feb. 7, 1885, *Albatross* Sta. 2369-2374.

Netherlands West Indies: Bonaire, entrance of Lac, from sandy debris behind the reef, 4 feet depth, May 10, 1930, P. Wagenaar Hummelinck coll. (type).

Distribution: The two localities mentioned above are the only two from which the species is known at present. Schmitt (1936) recorded the specimen from Bonaire, the only record of the species in literature.

Remarks: The species seems to be most closely related to *P. schmitti* with which it agrees in the unique character of the small number of spines on the upper lacinia of the maxillula, which are very vaguely set off from the lacinia itself. Furthermore the two species resemble each other in the short rostrum which bears only one or two teeth, in the presence of a rather strong postorbital ridge and in the shape of the oral parts. The present species differs from *P. schmitti*, however, by lacking the anterolateral tooth at the basal segment of the antennular peduncle, by possessing a final tooth at the scaphocerite, by the less slender first legs, by the shape of the larger second leg and by having the dactylus of the last three legs simple. The differences from *P. atlanticus* have already been mentioned. (p. 79).

***Periclimenaeus schmitti*, new species**

Pl. 27, figs. a-m

Description: The rostrum is short and straight, it fails to reach the end of the basal segment of the antennular peduncle. The upper margin bears one or two teeth (in only the youngest of my five specimens one tooth is present) not including the upward turned tip of the rostrum. All the teeth are placed on the rostrum proper. The lower margin bears no teeth and is convex. The carapace is smooth. The antennal spine is strong and placed close to the lower angle of the orbit, which is difficult to see. A strong postorbital ridge starts from the antennal spine and proceeds dorsally, where it gradually becomes obsolete. The anteroventral angle of the carapace is broadly rounded and produced forward.

The abdomen is smooth. The pleurae of the first five segments are rounded. The sixth segment is about as long as the fifth and about $\frac{2}{3}$ as long as the telson. The two dorsal spines of the telson are small and placed so as to divide the telson into three equal parts. The spinules are removed a small distance from the lateral margins. The six spines on the posterior margin are placed in one row. The intermediate and inner spines are of about equal length.

The eyes have the cornea globular; the cornea is slightly shorter and narrower than the eyestalk. No ocellus is visible.

The basal segment of the antennular peduncle has the stylocerite short and broad, with a blunt tip; it reaches about to the middle of the basal segment. The outer margin of the basal segment shows a blunt angle at the level of the apex of the stylocerite; distally of that angle the margin is strongly concave. The anterolateral angle of the segment

is provided with a rather large tooth. The second and third segments are very short, the third is longer than the second. The upper antennular flagellum has the fused part of the two rami consisting of three large joints; the free part of the shorter ramus is built of only one very short joint.

The scaphocerite fails to reach the end of the antennular peduncle; it is broadly ovate, being somewhat less than twice as long as broad. The outer margin is about straight. There is no final tooth present at all, only a small notch marks the end of the outer margin. The lamella is broadly rounded anteriorly; its largest breadth lies in the anterior half; it gradually tapers posteriorly.

The oral parts strongly resemble those of *P. maxillulidens*. The mandible has the incisor process provided with three teeth. The spines of the upper lacinia of the maxillula, like in the previous species, are few (4) in number, while the articulation between these spines and the lacinia itself is rather indistinct. The maxilla, first and second maxillipeds show no appreciable differences with those of *P. maxillulidens*. The third maxilliped fails to reach the end of the scaphocerite. The last segment is about $\frac{5}{6}$ of the length of the penultimate and is almost half as long as the antepenultimate. The exopod reaches distinctly beyond the antepenultimate segment.

The first pereopod reaches with carpus and chela beyond the scaphocerite. The chela is very slender. The fingers are $\frac{2}{3}$ of the length of the palm; they are unarmed and narrow regularly towards the top. The two fingers together are about as high as the palm. The palm is elongate. The carpus is about as long as the chela and slightly shorter than the merus. The second legs are strongly unequal. Both reach with the chela and part of the carpus beyond the scaphocerite. The larger leg is very heavy. The fingers are slightly less than half as long as the palm; they are inwardly curved. The upper margin of the dactylus forms a rectangle with the top broadly rounded. The cutting edge bears a large hammer-shaped tooth which fits in a large pit in the lower finger. Slightly behind the apex of the dactylus the cutting edge shows some small denticles. The fixed finger has the cutting edge provided with the above mentioned pit; at the inner side of the base of this pit a strong narrow tooth is present. The palm is swollen, especially in the basal part. It is covered with a number of small scale-like tubercles. The carpus is about $\frac{1}{4}$ of the length of the palm; it is short and conical. The merus, which is about as long as the ischium, is about $\frac{1}{3}$ of the length of the palm. There sometimes are some small tubercles visible at the lower

margin of the merus. The smaller second leg has the fingers slightly shorter than $\frac{1}{3}$ of the length of the palm. The fingers are straight. The cutting edge of the dactylus is provided over its whole length with denticles which are largest and most distinct anteriorly. The cutting edge of the fixed finger is straight. The palm is somewhat compressed; it is broadened at the base, and is provided with similar scale like tubercles as are present on the palm of the larger leg, but they are fewer in number. The carpus measures $\frac{1}{4}$ of the length of the chela. The merus is about as long as the ischium and measures $\frac{1}{3}$ of the length of the chela. The third leg reaches with the propodus and part of the carpus beyond the scaphocerite. The dactylus is short and distinctly bifid; it bears no tooth at its base. The propodus is about four times as long as the dactylus and bears some spines on the posterior margin. The carpus is $\frac{2}{3}$ as long as the propodus. The merus is somewhat longer than the ischium and about as long as the propodus. The fifth leg strongly resembles the third.

The pleopods in my specimens, all of which are females, are normal in shape.

The uropods are broadly ovate. The exopod has the outer margin ending in a tooth, which at its inner side bears a movable spine. The posterior margin of the exopod is broadly rounded and does not extend far beyond the end of the outer margin.

Size: The specimens at my disposal, among which are two ovigerous females, measure 8 to 9 mm. The eggs are not very numerous and are 0.4 to 0.6 mm in diameter.

Material examined: The U.S. National Museum possesses 5 female specimens of this species from: Tortugas, Florida, Aug. 8, 1930, W. L. Schmitt coll.

Type: The largest specimen, an ovigerous female is selected as the holotype (U.S.N.M. Cat. No. 85365), the other specimens are paratypes.

Remarks: The species resembles very much *P. maxillulidens*, especially in the shape of the rostrum, the telson, and the mouthparts; it differs, however, by having the scaphocerite without a final tooth, by the more slender chelae of the first legs, and by having the dactyli of the last three legs distinctly biunguiculate.

I take pleasure in naming this species after Dr. Waldo L. Schmitt, who collected the present material and who did so much to further our knowledge of Decapod and Stomatopod Crustacea.

***Periclimenaeus pearsei* (Schmitt)**

Pl. 28, figs. a-r

Coralliocaris pearsei Schmitt, 1932, Pap. Tortugas Lab. Carnegie Inst., vol. 28, p. 123, fig. 1; Pearse, 1932, Pap. Tortugas Lab. Carnegie Inst., vol. 28, p. 121; Arndt, 1933, Mitt. zool. Mus. Berlin, vol. 19, p. 251.

Description: The rostrum is directed obliquely downwards, it is short and does not reach beyond the eyes. The upper margin bears three to five, generally four teeth, which all are placed in advance of the posterior limit of the orbit. The tip of the rostrum is straight or slightly turned up. The rostrum may be somewhat more slender than figured here. The lower margin is unarmed and convex. The carapace is smooth, often swollen in the median part, and provided with antennal spines only. The antennal spine is strong and placed close to the lower orbital angle; the latter, however, is hard to see. A distinct postorbital ridge descends into the antennal spine. The anterolateral angle of the carapace is broadly rounded and slightly anteriorly produced.

The abdomen is smooth. The pleurae of the first five segments are rounded. The sixth abdominal segment is 1.2 times longer than the fifth and 0.6 times as long as the telson. The telson has the two pairs of dorsal spinules very small. The anterior pair stands close to the anterior margin of the telson, the other pair is situated about midway between the anterior pair and the posterior margin of the telson. Both pairs, and especially the anterior, are placed some distance from the lateral margin of the telson. The posterior margin of the telson bears three pairs of spines, the inner two of which are of about equal length.

The eyes have the cornea shorter and narrower than the eyestalk. No ocellus is present.

The basal segment of the antennular peduncle has the stylocerite short and very broad; it ends in a more or less sharp point, which attains about the middle of the basal segment. The lateral margin of the segment forms a blunt angle at the level of the tip of the stylocerite. Anteriorly of this angle the margin is concave and ends in a distinct anterolateral spine, which reaches about to the middle of the second segment. The second and third segments are of about the same shape. The upper antennular flagellum has the two rami fused for three or four joints (in the figure too many joints are drawn), this fused portion, however, is much longer and the segments are more elongate than in most other species. The free part of the shorter ramus consists of about three joints and is about as long as the last of the fused joints.

The scaphocerite is almost as long as the antennular peduncle; it is about twice as long as broad. The outer margin is straight or somewhat convex and ends in a distinct final tooth, which, however, is overreached by the lamella. The lamella is broadest slightly in front of its middle; the anterior margin is rounded. The antennal peduncle reaches practically to the end of the scaphocerite. There is no outer spine near the base of the scaphocerite.

The mandible is very peculiar in that the incisor process is strongly reduced in length; it bears one or two teeth; the distal end of the molar process forms several knobs and is provided with spinules. The maxillula is normal in shape, with the inner lacinia slender; the upper lacinia is broader and provided with spinules; the palp is bilobed. The maxilla, first and second pereopods do not differ from those of *P. schmitti*. The third maxilliped reaches slightly beyond the base of the scaphocerite. The ultimate is about $\frac{2}{3}$ as long as the penultimate, both joints are elongate when compared with those of the previously mentioned species of this genus. The antepenultimate segment is somewhat less than twice as long as the penultimate. The exopod overreaches the antepenultimate segment.

The first pereopod reaches with the carpus and chela beyond the scaphocerite. The fingers are slightly shorter than the palm; they are thick and clumsy; the dactylus has the upper margin distinctly convex. The fingers are unarmed. The carpus is 1.5 times as long as the chela and about as long as the merus. The second legs are strongly unequal. They reach with the chela and a small part of the carpus beyond the scaphocerite. The large chela has the fingers strongly curved inwards. The dactylus is constricted near the base and has the upper margin strongly convex; the cutting edge bears a large broad tooth, which, however, is laterally compressed and not so distinctly hammershaped as in the previous species; this tooth fits in a slit in the cutting edge of the lower finger. The distance between the tooth and the apex of the dactylus is extremely small. The cutting edge bears no denticles. The fixed finger is provided with a large tooth at the basal part of the inner side of the above mentioned slit. The palm is smooth and swollen, especially in the basal region. The carpus is short and cupshaped; it measures about $\frac{2}{5}$ of the length of the palm. The merus is about as long as the ischium and somewhat longer than the carpus. There are no spines on any of the joints. The smaller second leg has the fingers $\frac{1}{3}$ of the length of the palm; they are much less high than the palm. The upper margin of the dactylus is strongly convex. The cutting edge of the dactylus bears two small rounded teeth in the proximal part; the

rest of the edge is entire. The cutting edge of the fixed finger is slit-like in the proximal part and bears a tooth at the inner part of the slit. The palm is of about the same breadth throughout its length so that near the base of the fingers the chela suddenly becomes much higher. The palm is smooth and somewhat swollen. The carpus is short and cupshaped; it measures about $\frac{2}{5}$ of length of palm. The merus is slightly shorter than the ischium and somewhat longer than the carpus. All joints are smooth, no spines are present. The third leg reaches with the dactylus beyond the scaphocerite. The dactylus is short and distinctly bifid. The propodus is about six times as long as the dactylus and is provided with posterior spines. The carpus measures $\frac{3}{4}$ of the length of the propodus and about $\frac{3}{5}$ of that of the merus. The fifth leg is somewhat more slender than the third and misses the posterior spinules on the propodus; there are only some long hairs there.

The first pleopod of the male has the endopod ovate, with setae all around the margin. The second pleopod of the male has the appendix masculina very short and provided with some long hairs; the appendix interna is distinctly longer than the appendix masculina. The other pleopods are normal.

The uropods are broadly ovate. The exopod has the outer margin ending in a distinct tooth, provided at the inner side with a movable spine. The posterior margin of this exopod is broadly rounded and does not extend much beyond the final tooth.

The females generally are larger than the males and have the carapace much more swollen.

Size: The largest male observed by me measures 15 mm. Ovigerous females of 14 to 20 mm were examined. The eggs are numerous; they measure 0.5 to 0.6 mm in diameter.

Colour: According to colour notes made on several of the animals seen by me, the present species is coloured in life as follows: The whole body is pale translucent white. The female is a little more ochre yellow, which, however, is showing on the sides only. The fingers of the large chela are china white, but not opaquely so. The alimentary tract in both male and female is pale ochraceous buff or pale buff yellow. The ovaries of the female are pale rose pink or wine purple. The eggs are fawn colour.

Material examined: The U.S. National Museum possesses 15 specimens of this species, all collected at Tortugas, Florida (25 fms, June 11, 1925, W. L. Schmitt coll.; from soft black sponge, June 18, 1931, A.S. Pearse coll. (holo- and paratype); from black sponge, July

2, 1931, A.S. Pearse coll.; from a black sponge, which looked like a commercial sponge, of 6 to 8 inches in diameter, July 4, 1931, A.S. Pearse coll.; Bird Key Reef, July 5, 1931, A.S. Pearse coll.; from black sponge, July 5, 1931, A.S. Pearse coll.; July 5, 1931, A.S. Pearse coll.).

Distribution: The species thus far is known only from Tortugas, Florida, where it lives in the black sponge, *Spongia officinalis* L. It seems to live in couples as of the eight lots of specimens seen by me, seven consisted of a male and a female (in six cases the female was ovigerous, in one of July 4, 1938, the female carried no eggs); the eighth lot consisted of a single specimen. The species is mentioned in literature by Pearse (1932) and Schmitt (1932), the first author mentioned, the latter described the species.

Type: Both the holo- and paratypes are deposited in the U.S. National Museum (Tortugas, Fla., from soft black sponge, June 18, 1931, A. S. Pearse coll.).

Remarks: The present species is most closely related to the Pacific *Periclimenaeus hancocki*, with which species it agrees in almost every detail. The differences, however small as they may be, seem to be constant (these differences are pointed out in the key). It is very desirable, however, that more material of *P. hancocki* be examined to settle the question finally, as I had only one specimen of the latter species at my disposal. My *P. pearsei* material, however, is rather extensive. The character of the short and swollen dactylus of the first leg also may be used for distinguishing the present species from all other Atlantic forms.

Periclimenaeus hancocki, new species

Pl. 29, figs. a-k

Description: The rostrum is short and reaches about to the end of the first segment of the antennular peduncle. It is directed slightly downwards. The upper margin bears five teeth, all of which are placed on the rostrum proper, in front of the posterior limit of the orbit; the teeth are regularly divided over the rostrum. The tip of the rostrum is straight. The lower margin bears no teeth and is about straight. The carapace is smooth and is provided with antennal spines only. There is a faint postorbital ridge. The antennal spine is strong and placed close to the lower angle of the orbit. The anterolateral angle of the carapace is anteriorly produced and broadly rounded.

The abdomen is smooth, and has the pleurae of the first five segments rounded. The sixth segment is 1.2 times as long as the fifth, and about half as long as the telson. The two pairs of dorsal spines of the telson are long and slender. The first pair is placed close to the anterior margin of the telson; the second pair halfway between the first pair and the posterior margin of the telson. The second pair is placed much closer to the lateral margin of the telson than the first. The posterior spines are placed in one row on the posterior margin. The outer spines are short, the intermediate and inner spines are longer and are subequal in size.

The eyes have the cornea rounded, shorter and narrower than the stalk. No ocellus is visible.

The basal segment of the antennular peduncle has the stylocerite broad and ending in a small point; it reaches beyond the middle of the basal segment. The outer margin of the basal segment shows a rounded angle near the top of the stylocerite, anteriorly of this angle the margin is concave and finally ends in a strong anterolateral tooth, which reaches beyond the middle of the second segment. The second and third segments are of about the same size. The upper antennular flagellum has the two rami fused for three joints; the free part of the shorter ramus consists of three joints too; but it is shorter than the fused part.

The scaphocerite fails to reach the end of the antennular peduncle. It is 2.5 times as long as broad. The outer margin is somewhat convex and ends in a strong final tooth, which, however, is distinctly overreached by the lamella. The lamella has its greatest breadth in the anterior half and its anterior margin is broadly rounded. The antennal peduncle reaches almost to the end of the scaphocerite; it bears no external spine in the basal part.

The mandible has the incisor process simple and ending in a rather blunt point; there are no teeth on the process. The molar process ends in a few larger and many smaller teeth; a row of spinules is present. The maxillula, maxilla, first and second maxillipeds are similar in shape to those of *P. ascidiarum*. The third maxilliped reaches to the end of the first segment of the antennular peduncle. The ultimate segment is about $\frac{2}{3}$ as long as the second and $\frac{2}{5}$ of the length of the antepenultimate segment. The exopod reaches beyond the end of the antepenultimate segment.

The first pereopod reaches with the carpus and the chela beyond the scaphocerite. The chela is short and broad; the fingers are as long as the palm and unarmed. The carpus is slightly longer than the chela and slightly shorter than the propodus. The second legs are strongly unequal; they reach with the chela and part of the carpus beyond the scaphocerite. The larger leg has the fingers $\frac{2}{5}$ as long as the palm; they are curved inward and placed thereby obliquely on the palm. The dactylus has the upper margin strongly convex; its cutting edge bears one large broad tooth, which with its posterior end fits in a pit of the cutting edge of the fixed finger. There are no denticles on the cutting edge of the dactylus. The fixed finger bears a tooth at the inner side of the pit, but otherwise is unarmed. The palm is swollen, especially in the posterior region. The carpus is short and cupshaped; it is $\frac{1}{3}$ of the length of the palm and about as long as the merus. The ischium is slightly longer than the merus. All joints are smooth. The smaller leg has the fingers about $\frac{2}{5}$ of the length of the palm; they are straight and lie in the same plane as the palm. The dactylus is semicircular with the upper margin strongly convex; the cutting edge bears no teeth and fits in an indistinct slit in the edge of the fixed finger. The fixed finger bears a tooth in the basal part of its inner side. There are no denticles on the cutting edge of either dactylus or fixed finger. The carpus is about as long as the fingers. The merus is about as long as the ischium and half as long as the palm. All the joints are smooth. The third leg reaches somewhat beyond the scaphocerite. The dactylus is short and distinctly bifid; it is about $\frac{1}{4}$ of the length of the propodus. The posterior margin of the propodus bears a few spinules. The carpus is about 0.6 times as long as the propodus and half as long as the merus.

The pleopods in my female specimen are normal in shape.

The uropods have the outer margin of the exopod ending in a tooth, which at its inner side is provided with a movable spine. The posterior

margin of the exopod is rounded and produced slightly beyond the end of the outer margin.

Size: The female specimen examined by me is 6 mm long.

Material examined: The type and only specimen studied by me was collected by the 1935 Allan Hancock Expedition:

Panama: Piñas Bay. 32 fms, soft mud, Jan. 29, 1935, Sta. 441-35.

The specimen is preserved in the collection of the U.S. National Museum, Washington, D.C. (Cat. No. 90172).

Remarks: The closest relative of this species is *P. pearsei*, under which species the relation of the two forms is already discussed (vid. p. 96).

This interesting species is named for Captain Allan Hancock, who through his well known expeditions on the *Velero III*, contributed substantially to the increase of our knowledge of the fauna of the American west coast.

Periclimenaeus perlatus (Boone)

Pl. 30, figs. a-1; pl. 32, fig. a

Corallocaris perlatus Boone, 1930, Zoologica, New York, vol. 12, p. 45, fig. 8.

Description: The rostrum is high and slightly down curved. It almost reaches the end of the antennular peduncle. The upper margin is convex and bears 7 to 9 (in my immature specimen, 5) slender teeth (not including the straight tip of the rostrum). These teeth are regularly divided over the rostrum. The first tooth is placed slightly in advance of the posterior margin of the orbit. The distal teeth are longer than the proximals, though the ultimate tooth may be short again. The lower margin of the rostrum is straight or slightly convex. The carapace is smooth. It is provided with antennal spines only. These spines are very strong and placed close to the narrowly rounded lower orbital angle. There is no distinct postorbital ridge. The anterolateral angle of the carapace is rounded, and slightly anteriorly produced.

The abdomen is smooth and has the pleurae of the first five segments rounded. The fifth and sixth segments are of equal length. The telson is twice as long as the sixth segment. The dorsal spines are large. The first pair is placed close to the anterior margin of the telson, and a small distance from the lateral margins. The second pair is placed just in advance of the middle of the telson. Of the three posterior pairs of spinules the outer pair is almost as strong as the dorsal pairs and placed at $\frac{3}{4}$ of the length of the telson, much in advance of the other posterior spinules, which are of about equal size.

The eyes are slender. The cornea is globular, it is about as broad as, but distinctly shorter than the stalk. No ocellus is observed by me.

The basal segment of the antennular peduncle has the stylocerite broad and pointed; it reaches about the middle of the basal segment. The outer margin of the segment has a bluntly rounded angle at the level of the tip of the stylocerite; the anterior part of the margin is somewhat concave and ends in a strong anterolateral tooth, which reaches beyond the middle of the second peduncular segment. The second and third segments are of about the same size. The upper antennular flagellum has the two rami fused for nine (in my immature specimen only five) joints; the free part of the shorter ramus consists of three joints and is about $\frac{1}{4}$ to $\frac{1}{5}$ as long as the elongate fused part.

The scaphocerite reaches about to the end of the antennular peduncle. It is about 2.5 times as long as broad. The outer margin is convex and ends in a strong tooth, which is overreached by the lamella. The lamella has its largest breadth proximally in the middle; its anterior margin is rounded. The antennal peduncle reaches almost as far forwards as the final tooth of the scaphocerite. A small tooth is present near the outer side of the base of the scaphocerite.

The mandible has the incisor process well developed; the end is somewhat emarginate and produced into one distinct tooth. The molar process bears some knobs and spinules. The maxillula, maxilla, first and second maxillipeds are as in *P. ascidiarum*. The third maxilliped reaches about to the middle of the scaphocerite. The last segment is 0.6 times as long as the penultimate and slightly less than half as long as the antepenultimate segment. The exopod reaches slightly beyond the antepenultimate segment.

The first legs are extremely slender, they reach with the larger part of the merus beyond the scaphocerite. The fingers are short, measuring about $\frac{2}{5}$ of the length of the palm. They are unarmed. The carpus is almost twice as long as the chela, about $\frac{3}{4}$ as long as the merus, and as long as the ischium. In my immature specimen the first legs are relatively less slender; they reach with only a small part of the merus beyond the scaphocerite; the fingers are about half as long as the palm; the carpus is only slightly longer than the chela and $\frac{4}{5}$ of the length of the merus. The second legs are strongly unequal. In my largest specimen the legs are missing; therefore a description is given here of the second legs of the smaller, immature specimen. Both legs reach with part of the carpus beyond the scaphocerite. The fingers of the larger leg are about $\frac{1}{3}$ of the length of the palm; they are placed obliquely on the palm, being

curved somewhat inwards. The upper margin is strongly convex. The cutting edge is provided with a large hammer-shaped tooth which fits in a cavity in the cutting edge of the fixed finger. The rest of the cutting edge is unarmed. The cutting edge of the fixed finger bears a tooth near the base of the above mentioned pit; here too the rest of the margin is unarmed. The palm is somewhat swollen, especially so in the proximal part. Tubercles are present on the surface of the palm and the bases of the fingers; they are most numerous anteriorly, though in comparison with the adult specimen the number and size of tubercles is small. The carpus is conical; it is about $\frac{1}{3}$ of the length of the palm. The lower part of the anterior margin is produced in a slender spine-like process. The merus is about 1.3 times as long as the ischium and 0.4 times as long as the palm. Ischium, merus, and carpus are smooth. The smaller leg has the fingers about $\frac{2}{5}$ of the length of the palm. The dactylus has the upper margin convex and the cutting edge provided with a broad compressed tooth which fits in a slit of the fixed finger. No denticles are present on either of the cutting edges. The palm is slightly swollen. It is provided with scattered small tubercles in the anterior part. The carpus is half as long as the palm. The merus is 1.2 times as long as the carpus and about as long as the ischium. Boone (1930) described the second legs in adult specimens as follows: "The second legs are conspicuously unequal in both sexes. The left one is normally the larger; in the male type it is approximately of as great size as the body appears with the telson bent under the body. In the female the inequality is conspicuous but the great chela is only two-thirds the size of that of the associated male, while the body of the female is much stouter than that of the male. The male great cheliped has the merus compressed cylindrical when extended reaching beyond the body of the animal to about midway the rostrum; the carpus short, convex, narrowed proximally, dilated distally, the under surface produced to a narrowed ridge which terminates distally in a sharp tooth, the lower distal face excavate fitting upon the rounded end of the huge propodus. The propodus is very large, convex proximally, thick and high, cylindrical, more laterally compressed near the base of the finger but still quite thick, the propodal finger bent inward with the tip slightly upward curved and projecting beyond the tip of the hinged finger, the propodal finger has visible from the inner and outer faces a small triangulate subbasal tooth immediately beyond which it is concavely excavate for the reception of the huge blunt tooth of the hinged finger. The hinged finger is high, laminate with its curved triangulate tip closing inside the propodal finger, a short distance

from the base of the latter. There is one large truncated tooth. The entire surfaces of the propodus, the propodal finger and the proximal part of the hinged fingers are covered with numerous, short, conical, sharp spinose granules. These are visible to the unaided eye and form a conspicuous field-character. On the under side of the proximal part of the propodus these spines are arranged in regular transverse rows, giving them a brocaded or slightly corrugated appearance. The propodus and small cheliped of the male is by actual measurement two-fifths as long as that of the large one, but this measurement gives no true idea of actual disparity between the two because the palm of the great chela is enormously dilated while that of the small cheliped is much less so, having a more laterally compressed aspect especially on the distal half of the palm and the fingers, which are slightly incurved; the fingers are short, subequal; almost the entire cutting edge of the upper finger forming a convex lobe which is separated from the acute finger tip and fits into the concavity of the lower finger, the tip of the latter closing between this convex lobe and the apex of the upper finger. The entire surface of the small cheliped is covered with spiny granules, as in the larger cheliped." The third leg reaches in my immature specimen with almost the entire propodus beyond the scaphocerite. The dactylus is short and distinctly bifid. The propodus is about 6 times as long as the dactylus. There is a row of spines on the posterior margin. The carpus is about 0.7 times as long as the propodus and about half as long as the merus. The fourth and fifth legs are more slender. In my adult female the fourth leg reaches slightly beyond the scaphocerite. This leg is figured here as both third legs are missing in that specimen.

The pleopods of the female specimen are normal. The pleopods of the immature male, strongly resemble those of *P. wilsoni*.

The uropods are broadly ovate. The outer margin of the exopod ends in a tooth, which at its inner side bears a movable spine. The posterior margin of the exopod is broadly rounded and reaches only slightly beyond the end of the outer margin.

Size: The immature male observed by me measures 9 mm. My ovigerous female is 22 mm long. The eggs are numerous and small, measuring 0.4 to 0.5 mm in diameter.

Material examined: The Allan Hancock 1939 Expedition collected a juvenile male specimen of this species from:

Panama: Caledonia Bay. Shoal, reef, April 27, 1939, Sta. A 56-39. The U. S. National Museum possesses an ovigerous female from Tortugas, Florida (South of S.W. Channel Buoy, 20 fms, boat dredge, Aug. 16, 1924, W. L. Schmitt coll.).

Distribution: The species inhabits coastal waters and is known from three points in the West Indies; namely Tortugas, Haiti and Panama. The only record in literature is: Gonave Bay, Haiti (Boone, 1930). Boone notes that the species inhabits sponges, where they live in pairs inside the cavities.

Type: Type locality is Gonave Bay, Haiti. The type lot, two adult males and four ovigerous females, are deposited in the collections of the Department of Tropical Research of the New York Zoological Society.

Remarks: The present species is most closely related to *P. wilsoni*. The differences are mentioned under that species.

There are some discrepancies in the figure given by Miss Boone. The shape of the first legs as shown in the figure does not agree with the description of Boone, neither with the first legs in my specimens. As the latter agree with Boone's description, it is clear that the figure of Boone is incorrect in this respect. Furthermore the carpus of the larger second leg is shown to be thickly covered with tubercles; this is not so in my specimen, neither is it mentioned by Boone in the description; the arrangement of the tubercles on the large chela as described by Boone is not shown in her figure.

***Periclimenaeus wilsoni* (Hay)**

Pl. 31, figs. a-m; pl. 32, figs. b-c

Coralliocaris wilsoni Hay, 1917, Proc. Biol. Soc. Wash., vol. 30, p. 71;
Hay & Shore, 1918, Bull. U.S. Bur. Fish., vol. 35, p. 394, text-
fig. 13, pl. 27, fig. 8.

Periclimenes (Periclimenaeus) wilsoni Armstrong, 1940, Amer. Mus.
Novit., n. 1096, p. 6, fig. 3G.

?*Periclimenes (Periclimenaeus) wilsoni*? Gurney & Lebour, 1941,
Journ. Linn. Soc. Lond. Zool., vol. 41, p. 150, fig. 17a-q.

Description: The rostrum is about straight or somewhat down-curved. It reaches almost the end of the antennular peduncle. The upper margin is somewhat convex and bears 10 to 12 teeth, which are regularly divided over the whole length of the rostrum; the first of these teeth stands just over or slightly behind the posterior limit of the orbital margin. The lower margin of the rostrum is straight or concave and unarmed. The carapace is smooth and provided with an antennal spine only. The antennal spine is placed close to the acute lower orbital angle. There is no distinct postorbital ridge. The anterolateral angle of the carapace is somewhat anteriorly produced and broadly rounded.

The abdomen is smooth. The pleurae of the first five segments are broadly rounded. The sixth segment is about as long as the fifth and half as long as the telson. The two pairs of dorsal spines of the telson are of moderate size. The anterior pair is placed close to the anterior margin of the telson, the posterior pair stands just halfway between the anterior pair and the posterior margin of the telson. Both pairs are removed some distance from the lateral margin of the telson. The posterior margin bears the usual three pairs of spines. The inner and intermediate spines are of about the same length. The outer spines are much shorter and are placed somewhat in advance of the intermediate spines, the tips of the outer spines reach the base of the intermediates.

The eyes have the cornea about as broad as, but shorter than the eyestalk.

The antennular peduncle has the stylocerite very broad, short and pointed, it almost reaches the middle of the basal segment. The outer margin of the basal segment possesses a blunt angle near the tip of the stylocerite. Anteriorly of this angle the margin is concave and ends in a strong final tooth which reaches about to the middle of the second segment of the peduncle. The second and third segments are of about the same size. The upper antennular flagellum consists of a fused part of 6 to 9 joints; the free part of the shorter ramus consists of two small joints.

The scaphocerite fails to reach the end of the antennular peduncle. It is about 2.5 times as long as broad. The outer margin is straight and ends in a distinct, though not very large tooth, which is distinctly overreached by the lamella. The lamella is broadest in the proximal half; its anterior margin is rounded. The antennal peduncle reaches almost to the end of the scaphocerite. No spine is present near the exterior part of the base of the scaphocerite.

The mandible has the incisor process ending in two small teeth; the molar process ends in blunt knobs; some spinules are present. The maxillula has the inner lacinia slender; the upper lacinia is broader and bears spines at the top. The palp is slightly bilobed. The maxilla has the inner lacinia unclenched; the scaphognathite is very slender. The first and second maxillipeds do not show differences with those of *P. ascidiarum*. The third maxilliped reaches about to the end of the antennal peduncle. The ultimate joint is 0.6 times as long as the penultimate and slightly less than half as long as the antepenultimate. The exopod reaches beyond the end of the antepenultimate segment.

The first pereopod reaches with the carpus and chela beyond the scaphocerite. The chela is rather thickset. The fingers are distinctly shorter than the palm. They are unarmed. The carpus is 1.3 times as long as the chela, and about as long as the merus. The second legs are strong, the left and right are distinctly unequal in shape. They reach with the chela and part of the carpus beyond the scaphocerite. The larger second leg has the fingers inwardly curved. The fingers are somewhat less than half as long as the palm. The dactylus has the upper margin distinctly convex. The cutting edge is provided with a large hammer-shaped tooth, which fits in a pit of the fixed finger. The fixed finger has the edge provided with a distinct tooth at the basal part of the inner margin of the pit. The palm is swollen and is provided with tubercles, which also are present on the base of the finger. The tubercles on the posterior lower part of the palm are arranged in rows or in a honeycomb pattern. The carpus is smooth, short (being about $\frac{1}{4}$ of the palm) and cup-shaped, in the lower part it ends in a pointed process. The merus measures about 0.3 times the length of the palm, it is longer than the ischium. A row of small tubercles is present on the lower margin of the merus. The smaller leg has the fingers somewhat more than $\frac{1}{3}$ as long as the palm. The dactylus has the upper margin strongly convex, the cutting edge bears a broad but laterally compressed tooth, which fits in a slit in the cutting edge of the fixed finger; there are no denticles on either of the cutting edges. The palm is somewhat swollen and is provided in the anterior part with scattered tubercles, which vary strongly in number. The carpus is short and cup-shaped, it is about as long as the fingers. The merus is about as long as the ischium and longer than the carpus. The third leg reaches with the larger part of the propodus beyond the scaphocerite. The dactylus is short, broad and distinctly bifid. The propodus is somewhat more than five times as long as the dactylus; its posterior margin is provided with some spinules, which are placed over its entire length. The carpus is smooth and measures $\frac{3}{4}$ of the length of the propodus. The merus is somewhat longer and broader than the propodus, it is more than 1.5 times as long as the ischium; both joints are smooth. The fifth legs are more slender than the third.

The endopod of the first pleopod of the male is elongate, triangular in shape, with the inner margin about straight. The second pleopod has the appendix masculina extremely short, much shorter than the appendix interna.

The uropods are broadly ovate. The outer margin of the exopod ends in a tooth, which at its inner side is provided with a movable spine. The posterior margin of the exopod is broadly rounded and not much

produced behind the final tooth of the outer margin.

A specimen of 7 mm from Tortugas, which I consider to be a juvenile of the present species has the rostrum reaching to the end of the first segment of the antennular peduncle and provided with only seven dorsal teeth. The second legs are strongly unequal and show the general shape of those of the adults; they are smooth, however, only the merus of the larger leg possessing a ventral row of distinct tubercles. The dactyli of the last three legs have the additional tooth not yet developed, so that they look simple.

Size: The largest male (holotype) examined measures 20 mm. Ovigerous females are 16 to 20 mm long. The eggs are numerous and 0.5 to 0.6 mm in diameter.

Material examined: In the collection of the U.S. National Museum the following material of this species is present: North Carolina (Fishing grounds off Beaufort, in large sponge, Aug. 1, 1914, *Fish Hawk* Sta. 8198 (?) (holo- and paratypes), Florida, Tortugas (In channel between Middle Ground and White Shoal, 10 fms, Aug. 8, 1930, W. L. Schmitt coll., Sta. 45-30; South of Tortugas, 40 fms, Aug. 4, 1931, W. L. Schmitt coll.; South of Loggerhead Key, No. 2 Red Buoy, 40 fms, Aug. 4, 1931, W. L. Schmitt coll.).

Distribution: The species is known to inhabit sponges in the shallow coastal waters from North Carolina and Florida. The records in literature are: Off Beaufort, North Carolina! (Hay, 1917; Hay & Shore, 1918). The Beaufort specimens were found in large sponges.

Type: The type material of *Coralliocaris wilsoni* (1 adult male, which is the holotype, and 2 ovigerous females, the paratypes) is preserved in the U.S. National Museum. Type locality is off Beaufort, N. Carolina.

Remarks: In the description of this species by Hay (1917) and Hay & Shore (1919) and the figures given by the authors some errors are made. In fig. 13 of Hay & Shore's article the rostrum is shown with the teeth too short, further two pairs of spines of the telson are not shown, namely the anterior dorsal and the outer posterior pairs, also the tuberculation of the second legs is omitted. In the description too the telson is said to have one dorsal and two posterior pairs of spines, and nothing is mentioned about the tuberculation of the second legs.

The species has its closest relative in American waters in *P. perlatus* (Boone), which species at once may be distinguished by the shape of the telson and the first legs. The only other species which comes close to *P. perlatus* and *P. wilsoni* is the indo-westpacific *P. robustus* Bor-

radaile, the type of the present genus. It resembles most *P. wilsoni*, but differs from that species in the shape of the second legs. The larva and postlarva from Bermuda brought by Gurney & Lebour (1941) with some doubt to the present species, probably do not belong here. Too little is known at present from the development of the species of his genus to make it possible to find the real identity of these two stages.

***Periclimenaeus bermudensis* (Armstrong)**

Pl. 32, figs. d-g; pl. 33, figs. a-i

Periclimenes (*Periclimenaeus*) *bermudensis* Armstrong, 1940, Amer. Mus. Novit., n. 1096, p. 4, figs. 2, 3 A-F.

Description: The rostrum is directed slightly downwards, it reaches about to the end of the first segment of the antennular peduncle. The upper margin bears 7 or 8 slender teeth which are regularly divided over the margin, the first tooth stands slightly in front of the posterior limit of the orbit. The proximal teeth are smaller than the distals. The lower margin is convex. The carapace is smooth and is provided with antennal spines only. The antennal spine is placed somewhat below the lower orbital angle, which ends in a blunt point. No distinct postorbital ridge is visible. The anterolateral margin of the carapace is broadly rounded and not anteriorly produced.

The abdomen is smooth and has the pleurae of the first five abdominal segments rounded. The sixth abdominal segment is as long as the fifth, and about half as long as the telson. The dorsal surface of the telson is armed with two pairs of long spines. The anterior pair is placed in the anterior quarter of the telson, a distinct distance removed from the lateral margin. The second pair stands in about the middle of the telson very close to the lateral margins. Of the three posterior pairs of spines, the outer pair is as large as the dorsal spines and is placed some distance in advance of the two other pairs, its top just failing to reach the base of the intermediate spines. The intermediate and inner spines are of about equal length.

The eyes are rather slender. The cornea is somewhat broader and shorter than the stalk. A distinct ocellus is present.

The basal segment of the antennular peduncle has the stylocerite broad and rather short, ending in a minute point. As in the other species of this genus the outer margin of the basal segment forms a blunt angle at the level of the tip of the stylocerite. The distal part of the outer margin is slightly concave and ends in a strong anterolateral tooth, which reaches the end of the second segment of the peduncle. This second

segment is somewhat shorter and broader than the third. The upper antennular flagellum has the two rami fused for four or five joints, the free part of the shorter flagellum consists of three or four joints and is slightly shorter than the fused part.

The scaphocerite almost reaches the end of the antennular peduncle. It is 2.5 times as long as broad. The outer margin is straight or somewhat convex and ends in a very strong final tooth, which reaches about to the end of the lamella. The antennal peduncle slightly overreaches the middle of the scaphocerite. There is no external spine near the base of the scaphocerite.

The mandible is remarkable in that the incisor process is strongly reduced in size and only is visible as a small rounded process on the dorsal margin of the molar process. The molar process is normal in shape, ends in some blunt teeth and bears some spinules between these teeth. The maxillula has the inner lacinia slender, the upper lacinia ends in a number of spines; the palp is distinctly bilobed. The maxilla has the inner lacinia distinctly cleft, the palp is well developed, the scaphognathite is large and not very broad. The first and second maxillipeds do not differ essentially from those of *P. ascidiarum*; the first maxilliped, however, shows a distinct notch between the endites of the basis and coxa, while the epipod is somewhat smaller. The third maxilliped is slender, it reaches beyond the end of the antennal peduncle, but fails to reach the end of the scaphocerite. The last segment is narrow, it is $\frac{2}{3}$ of the length of the penultimate, and half as long as the antepenultimate segment. The exopod reaches slightly beyond the end of the antepenultimate segment.

The first legs reach with the chela and a large part of the carpus beyond the scaphocerite. The chela is short and thick. The fingers are somewhat longer than the palm, they are depressed and gaping (more on the inside than on the outside). Minute pectinations are visible at the cutting edges of the fingers. The carpus is somewhat longer than the chela and somewhat shorter than the merus. The second legs are strongly unequal. They reach with the chela and part of the carpus beyond the scaphocerite. The larger leg has the fingers not (or very indistinctly) curved inwards. They measure about $\frac{2}{3}$ of the length of the palm. In contradistinction to all other American species of this genus, the hammer-shaped tooth is not placed on the dactylus but is on the fixed finger, while a deep pit for the reception of this tooth is present on the cutting edge of the dactylus. A very small tooth is present on the cutting edge of the dactylus slightly behind the pit, the rest of the edge is smooth. Except

for the large tooth mentioned above, the cutting edge of the fixed finger is unarmed. The palm is greatly swollen, especially in the posterior part. Numerous very small tubercles are present on the surface of the palm especially in the anterior region; in the ventral posterior region these tubercles are arranged more or less honeycomblike. The carpus is short and cupshaped, the anterior margin bears dorsally a large blunt tooth. The carpus is about $\frac{1}{4}$ of the length of the chela; it is smooth. The merus is about half as long as the palm, its lower surface bears some tubercles. The ischium is hardly more than half as long as the merus. The smaller second leg has the fingers slender and much longer than the palm. The cutting edges of the fingers are unarmed throughout their length (in my largest specimen, however, the fixed finger possesses a low broad tooth in the proximal part). The palm is somewhat swollen and is covered by numerous small tubercles, which also are visible at the base of the fingers. The carpus, merus and ischium are of the same shape as in the larger leg. The third leg reaches with part of the propodus beyond the scaphocerite. The dactylus is short and broad and distinctly bifid. The propodus is more than five times as long as the dactylus. The posterior margin of the propodus bears a row of several spines all over its length. The carpus measures $\frac{2}{3}$ of the propodus. The merus is slightly longer and broader than the propodus. The fifth leg is more slender than the third; the posterior margin of its propodus bears no spinules.

In my material, which consists of ovigerous females only, the pleopods show the usual shape.

The uropods are broadly ovate. The outer margin of the exopod ends in a distinct tooth, which at its inner side bears one strong movable spine. The posterior margin of the exopod is broadly rounded and does not surpass the end of the outer margin.

Size: No males have been seen by me neither are they mentioned in literature. Ovigerous females of 19 to 29 mm were examined. The eggs are rather numerous, they are 0.4 to 0.5 mm in diameter.

Material examined: In the U.S. National Museum three specimens of this species are present from: Bahama Islands (Nassau, New Providence, 1874, E. Palmer coll.), Tortugas, Florida (Not far from Nun Buoy, course S. x W., 65 feet, June 20, 1931, W. L. Schmitt coll., Sta. 5-31).

Distribution: The species is known from coastal waters from Bermuda, the Bahamas and Tortugas. The only record of it in literature is: The Reach, St. Georges Island, Bermuda (Armstrong, 1940). Armstrong reports the species to be living inside black sponges.

Type: Type locality is The Reach, St. Georges Island, Bermuda. The type specimens (four in number) are preserved in the collection of the American Museum of Natural History, New York, N.Y.

Remarks: The present species is quite distinct from any of the American members of the genus. The only species which shows a close resemblance to the present form is the indo-westpacific *Periclimenaeus fimbriatus* Borradaile. *P. fimbriatus* and *P. bermudensis* differ from all other species of *Periclimenaeus* known at present, having the large tooth of the larger second leg on the fixed finger and not on the dactylus, and the pit in which this tooth fits in the dactylus instead of in the fixed finger. *P. bermudensis* differs from *P. fimbriatus* as already remarked by Armstrong (1940, p. 6) by the shape of the end of the propodus of the last three legs; by the shape of the telson and the arrangement of its dorsal spines.

***Periclimenaeus caraibicus*, new species**

Pl. 32, figs. h-j; pl. 34, figs. a-h

Description: The rostrum is straight or directed slightly downwards. It reaches to the end of the second segment of the antennular peduncle. The upper margin bears six teeth, which are regularly divided over the anterior part of the rostrum, though the proximal teeth are placed somewhat closer together than the distals. The first tooth is placed distinctly in advance of the posterior limit of the orbit. The lower margin of the rostrum is straight or slightly convex; it possesses a distinct tooth some distance behind the apex. The carapace is smooth; it is provided with strong antennal and small supraorbital spines. The supraorbital spine is a small pointed tubercle, which is placed some distance behind the orbit. The antennal spine is very strong and is placed close to the rounded lower angle of the orbit. An indistinct postorbital ridge extends from the antennal spine in the direction of the postorbital spine. The anterolateral angle of the carapace is broadly rounded and slightly anteriorly produced.

The abdomen is smooth, the pleurae of the first five segments are broadly rounded. The fifth and sixth segments are of about the same length and about half as long as the telson. The dorsal spines of the telson are very long and slender. The anterior pair is placed close to the anterior margin of the telson, the second pair in about the middle of the telson. The posterior spines are placed in one row, the outer spines are short, the other two pairs are longer and subequal in length.

The eyes are elongate. The cornea is much shorter and slightly narrower than the eyestalk. I did not observe an ocellus.

The basal segment of the antennular peduncle has the stylocerite broad and ending in a sharp point, it almost reaches to the middle of the segment. Like in most other species of this genus a blunt angle is visible at the outer margin of the segment near the tip of the stylocerite. The anterior part of the outer margin is slightly concave and ends in a strong anterolateral tooth, which reaches to the end of the second peduncular segment. The third segment is longer than and about as broad as the second. The upper antennular flagellum has the two rami fused for five joints. The free part of the shorter ramus consists of three joints, it is about $\frac{1}{3}$ of the length of the fused part.

The scaphocerite just reaches the end of the antennular peduncle. It is 2.5 times as long as broad. The outer margin is slightly concave and ends in a strong final tooth, which distinctly overreaches the lamella. The anterior margin of the lamella is broadly rounded. The lamella is broadest in the distal part. The antennal peduncle reaches almost the end of the lamella. There is no outer spine near the base of the scaphocerite.

The mandible has the end of the incisor process rounded and crenulated by the presence of about 10 small blunt teeth. The molar-process bears teeth and spinules. The maxillula has both laciniae rather heavy, the upper is provided with many spinules and hairs, the lower with hairs only; the palp is indistinctly bilobed. The maxilla, first and second maxillipeds show no difference with those of *P. ascidiarum*. The third maxilliped reaches about to the middle of the scaphocerite. The last joint is somewhat more than half as long as the penultimate joint and about $\frac{1}{3}$ of the antepenultimate. The exopod reaches slightly beyond the end of the antepenultimate joint.

The first leg is slender, it reaches with part of the merus beyond the scaphocerite. The fingers in my specimen are somewhat more than half as long as the palm. The cutting edges are unarmed. The carpus is 1.4 times as long as the chela and about as long as the merus. The second legs are strongly unequal. They reach with part of the carpus beyond the scaphocerite. The larger leg has the fingers $\frac{2}{5}$ of the length of the palm, they are curved slightly inwards. The upper margin of the dactylus is distinctly convex; the cutting edge is provided with a hammer-shaped tooth, which fits in a concavity of the cutting edge of the fixed finger. The distance between the large tooth and the apex of the finger is small and bears no denticles. The fixed finger bears at its cutting

edge the concavity for the reception of the tooth of the dactylus; at the outer side of the basal part of this concavity a strong tooth is present. There are no denticles on this edge. The palm is swollen especially in the proximal part. Its surface is covered with many small tubercles. The carpus is short and cupshaped, it is about $\frac{1}{4}$ of the total length of the chela. The merus is slightly longer than the carpus and distinctly longer than the ischium. On the lower surface of both merus and ischium some tubercles are visible. The smaller leg has the fingers $\frac{2}{3}$ of the length of the palm, they are much more compressed than in the larger leg. The cutting edges of both fingers are devoid of denticles. A low and broad tooth is present on the edge of the dactylus; this tooth fits in a slit in the edge of the fixed finger; a distinct tooth is present at the outer basal part of this slit. The palm is less swollen than in the larger leg and bears less spinules. The carpus is about half as long as the palm. Carpus, merus and ischium are like those in the larger leg. As my specimen is small and perhaps not fully mature, the second legs probably have not yet attained their final size and shape. The third leg reaches with the propodus beyond the scaphocerite. The dactylus is rather slender and distinctly bifid. Except for the two distinct teeth, the posterior margin of the dactylus bears some small denticles. The propodus is about 3.5 times as long as the dactylus, its posterior margin bears many spinules all over its length. The carpus is 0.6 times as long as the propodus. The merus is about as long as the propodus. Neither carpus, merus nor ischium bears posterior spinules. The fifth leg is more slender than the third, and the propodus does not bear any spinules.

The pleopods in my female specimen are normal in shape.

The uropods are broadly ovate. The outer margin of the exopod ends in a tooth, which at its inner side is provided with two slender spinules, separated from it by a small distance. The posterior margin of the exopod is broadly rounded and reaches only slightly beyond the end of the outer margin.

Size: My only (female) specimen is 7 mm long. It probably has not yet attained its full size.

Material examined: The type and only specimen examined in this work came from the 1939 Allan Hancock Expedition:

British West Indies: Tobago, Buccoo Reef. Shore, coral reef, April 20, 1939, Sta. A 41-39.

The type is deposited in the collection of the Allan Hancock Foundation at Los Angeles, Calif. Holotype, AHF no. 396.

Remarks: The only relative of this species in American waters known thus far is *P. spinosus* from Costa Rica. The differences between the two species are mentioned in the key. Both species belong to that group of the genus *Periclimenaeus*, which is characterized by the small supraorbital spine, the crenulated incisor process of the mandible, the slender first legs and the additional denticles on the dactyli of the last three pereopods. This group contains the indo-westpacific species: *Periclimenaeus arabicus* (Calman), *P. gorgonidarum* (Balss), and *P. rhodope* (Nobili). The present species is distinguished from those species by the lack of spinules on the posterior margin of the merus of the third legs, from *P. arabicus* by having a lower tooth on the rostrum, from both this species and *P. gorgonidarum* in the absence of spinules on the carpus of the third leg.

***Periclimenaeus spinosus*, new species**

Pl. 35, figs. a-l

Description: The rostrum is directed slightly downwards. It reaches almost the end of the basal segment of the antennular peduncle. Its upper margin bears five teeth all of which are placed on the rostrum proper before the posterior limit of the orbit. The teeth are placed regularly on the rostrum. The tip of the rostrum is curved upwards. The lower margin is almost straight and is provided with one tooth in the anterior part. The carapace is smooth and provided with antennal and supraorbital spines. The supraorbital spine is small and looks more like a pointed tubercle, it is placed a short distance behind the orbit. The antennal spine is rather strong, it is placed close to the narrowly rounded lower angle of the orbit. A postorbital ridge starts from the antennal spine in the direction of the supraorbital spine, it becomes inconspicuous dorsally. The anterolateral angle of the carapace is rounded and anteriorly produced.

The abdomen is smooth. The pleurae of the first five segments are rounded. The fifth and sixth segment are of about the same length, together they are as long as the telson. The two pairs of dorsal spines on the telson are long and slender, the first pair is placed near the anterior margin of the telson, and is removed a small distance from the lateral margin. The second pair is situated in the middle of the telson, on the lateral margin. The six posterior spines are placed in one row on the posterior margin of the telson. The inner and intermediate pairs are of the same length, the outer pair is shorter.

The eyes have the cornea rounded; the latter is shorter and narrower than the stalk. No ocellus is observed.

The basal segment of the antennular peduncle has the stylocerite short, broad and ending in a sharp point. It reaches about to the middle of the segment. The outer margin of the basal segment has the angle near the apex of the stylocerite bluntly rounded; the anterior part of the margin is concave and ends in a strong anterolateral tooth, which reaches about to the end of the second peduncular segment. The second segment is somewhat shorter than the third. The upper antennular flagellum has the two rami fused for three joints. The free part of the shorter ramus consists of two joints and is slightly more than half as long as the fused part.

The scaphocerite reaches to the end of the antennular peduncle. It is slightly more than twice as long as broad. The outer margin is concave and ends in a strong final tooth, which distinctly outreaches the lamella. The lamella is broadest in the anterior half; the anterior margin is broadly rounded. The antennal peduncle reaches distinctly beyond the middle of the scaphocerite, but fails to attain the end of it. There is no exterior spine on the basal part of the antennal peduncle.

The mandible has the end of the incisor-process crenulated by the presence of numerous rounded teeth. The molar process ends in several larger and smaller sharp teeth, a few spinules are present. The maxillula is like that in *P. caraibicus*. The maxilla has the inner lacinia cleft, though not very deep; the palp is normal; the scaphognathite is rather slender. The first and second maxillipeds are similar to those in *P. caraibicus*. The third maxilliped reaches about to the end of the scaphocerite. The last joint is about $\frac{2}{3}$ as long as the penultimate. The antepenultimate segment is almost twice as long as the penultimate. The exopod reaches slightly beyond the end of the antepenultimate segment.

The first pereopod reaches with the carpus and chela beyond the scaphocerite. The chela is slender. The fingers are $\frac{3}{5}$ of the length of the palm, and have the cutting edges unarmed. The carpus is 1.2 times as long as the chela, and slightly shorter than the merus. The second legs are different in size, but of about the same shape, they reach with about the chela beyond the scaphocerite. The larger leg has the fingers $\frac{3}{5}$ of the length of the palm. The dactylus is elongate, its cutting edge is provided with a large but compressed tooth, which fits in a slit in the cutting edge of the fixed finger. At the outer side of the basal part of this slit a distinct tooth is visible. There are no denticles on the cutting edges of either the dactylus or the fixed finger. The palm is smooth and

slightly swollen. The carpus measures $\frac{1}{3}$ of the length of the chela, it is short and conical. The merus and ischium each are of about the same length as the carpus. None of these joints bears spines or denticles. The smaller leg differs from the larger in size only. The third leg reaches beyond the scaphocerite. The dactylus is slender, it is slightly less than half as long as the propodus. It is distinctly bifid, while its posterior margin, apart from the two teeth, is provided with numerous small denticles. The posterior margin of the propodus bears numerous spinules, which are placed over its whole length. The carpus is $\frac{5}{8}$ of the length of the propodus. The merus is about as long as the latter joint and bears some few minute spinules on its posterior margin. The ischium is $\frac{2}{3}$ of the length of the merus. The fifth leg has the denticles on the posterior margin of the dactylus confined to the region between the two teeth. The spinules on the propodus are few and only to be seen in the anterior part, while no spinules are present on the merus.

The first pleopod of the male has the endopod elongate triangular, provided with some strong setae. The second pleopod has the appendix masculina extremely short, far much shorter than the appendix interna.

The uropods are broadly ovate. The exopod has the outer margin ending in a tooth, which at its inner side is provided with a long slender spine. The posterior margin of the exopod is broad and only slightly produced posteriorly.

Size: The type and only specimen examined by me is a male of 7 mm length.

Material examined: The present specimen was collected by the 1934 Allan Hancock Expedition from:

Costa Rica: Near South Viradores Islands, Port Culebra. Shallow water, coral, Feb. 25, 1934, Sta. 258-34.

Type: The holotype (the only specimen of this species known at present) is preserved in the collection of the U.S. National Museum at Washington, D.C. (Cat. No. 90173).

Remarks: The species is most closely related to *P. caraibicus*. The differences between the two forms have already been set forth in the key.

Genus PONTONIA Latreille, 1829

Definition: The body is dorsoventrally depressed. The rostrum too is depressed, if teeth are present, these always are very small, placed near the tip of the rostrum and very few (1 or 2) in number. The carapace is smooth. Hepatic and supraorbital spines are absent. The antennal spines may be present or absent.

The pleurae of the first five abdominal segments are rounded.
The scaphocerite is well developed.

The mandible bears no palp. The inner lacinia of the maxillula generally is broadened. Exopods are present on all maxillipeds.

The first legs have the carpus unsegmented. The second legs are strong, the left and right may be equal or unequal in shape and size. The last three legs have the dactylus bifid (seldom simple). No basal tubercles are present on the dactylus, though the posterior margin of it may be convex.

The pleopods are of the normal type. The first pleopod of the male has no appendix interna. The second pleopod of the male has the endopod provided with an appendix interna and an appendix masculina. The exopod of the uropods has the outer margin ending in a bluntly rounded angle, which is provided with a movable small spinule.

The species of *Pontonia* are associated with Ascidia, Lamellibranchia and Gastropoda and live endozootic in these hosts.

Type: The type species is *Alpheus Tyrhenus* Risso, 1816 (non *Astacus Tyrrenus* Petagna, 1792), which species has to be named *Pontonia pinnophylax* (Otto).

Remarks: The genus is distributed in the tropical and subtropical regions of the world. From American waters at present 10 species are known, 7 from the west and 4 from the east coast (one of the species is reported from both coasts). Six of these species are new to science.

Rathbun (1902, 1904) placed both *Pontonia domestica* and *Pontonia margarita* in the genus *Conchodytes*; both, however, are good species of *Pontonia*, as is already pointed out by Kemp (1922) for the latter species.

KEY TO THE AMERICAN SPECIES OF PONTONIA³

- | | |
|--|---|
| 1. Antennal spine present. Final tooth of scaphocerite very small and short. Both upper and lower margin of rostrum with a small tooth near apex | 2 |
| 1 ¹ . Antennal spine absent. Final tooth of scaphocerite long and slender. No teeth present on lower margin of rostrum. | 8 |
| 2. Dorsal spines of telson very small and rather inconspicuous. | 3 |
| 2 ¹ . Dorsal spines of telson well developed, often large. | 5 |

³ Not included in this key is *Pontonia unidens* Kingsley, a species incerta (vid. p. 150).

3. Eyes, when extended laterally, not reaching antennal spines. Scaphocerite with a distinct, though small, final tooth. Dactyli of third and fifth legs of equal shape. In lamellibranchs. 4
 3¹. Eyes, when extended laterally, reaching beyond antennal spines. Scaphocerite without final tooth. Dactyli of third and fifth legs different in shape. In Gastropods. Western. *chimaera*
4. Dactyli of last three legs slender, with posterior margin about straight. Western. *pinnae*
 4¹. Dactyli of last three legs very broad, with posterior margin convex. Eastern. *domestica*
5. Dactyli of last three legs slender, with posterior margin about straight. 6
 5¹. Dactyli of last three legs broad, with posterior margin distinctly convex. Eastern and western. *margarita*
6. Dorsal spines of telson very long and slender, anterior pair reaching beyond base of posterior pair. Western. *longispina*
 6¹. Dorsal spines of telson rather short; anterior pair reaching at most to the middle of the distance between both pairs. 7
7. Dactyli of last three legs always distinctly bifid. Anterolateral angle of basal segment of antennular peduncle in adult specimens rounded, without a tooth. Eastern. *mexicana*
 7¹. Dactyli of last three legs simple or with a small accessory claw. Anterolateral angle of basal segment of antennular peduncle with a distinct tooth. Western. *simplex*
8. Anterior pair of dorsal spines of telson failing to reach the base of posterior pair. Second legs equal in size and shape. Western. *pusilla*
 8¹. Anterior pair of dorsal spines of telson reaching to or beyond the base of posterior pair. Second legs unequal in size and shape (of *P. miserabilis* the second legs are unknown). 9
9. First legs slender (Pl. 46, fig. e). Third leg with merus broadened and much longer than ischium. Western. *californiensis*
 9¹. First legs short and heavy compared with those of *P. californiensis* (Pl. 47, fig. g). Third leg slender, with the merus slightly longer than ischium. Eastern. *miserabilis*

Pontonia pinnae Lockington

Pl. 36, figs. a-l; pl. 37, figs. a-i

Pontonia pinnae Lockington, 1878, Bull. Essex Inst., vol. 10, p. 163;
Kemp, 1922, Rec. Indian Mus., vol. 24, p. 287.

Pontonia margarita Boone, 1930, Bull. Vanderbilt Mar. Mus., vol. 3,
p. 148, pl. 52 (*Conchodytes margarita* on p. 20); p.p. Boone,
1931, Bull. Amer. Mus. Nat. Hist., vol. 63, p. 180, fig. 20,
non *Pontonia margarita* Smith, 1869a.

Pontonia pinnae Steinbeck & Ricketts, 1941, Sea of Cortez, p. 446,
pl. 21, fig. 5.

Description: The rostrum is strongly depressed and flat. It reaches to the middle of the second segment of the antennular peduncle (sometimes it almost reaches the end of the peduncle) and is directed somewhat downwards. The upper surface is flat, the lower bears a carina in the distal part. Both upper and lower surface bear a very small tooth close to the tip of the rostrum. Some hairs are placed between the upper tooth and the tip. The carapace is smooth and provided with strong antennal spines, which are placed a rather large distance below the narrowly rounded lower orbital angle. No other spines are present. The anterolateral angle of the carapace is broadly rounded and anteriorly produced.

The abdomen has the pleurae of the first five segments broadly rounded, that of the sixth ends in a strong spine, which reaches over the base of the uropods. The sixth segment is somewhat longer than the fifth and 0.6 times as long as the telson. The dorsal surface of the telson is provided with two small pairs of spines, the anterior of which is placed in the middle of the length of the telson, the second pair lies closer to the posterior margin than to the anterior pair. The posterior margin is provided with six short spines, which lie in one row and are of about equal size.

The eyes have the cornea rounded and much shorter and narrower than the eyestalk. No ocellus is observed. The eyes largely fail to reach the antennal spine, when extended outwards.

The basal segment of the antennular peduncle has the stylocerite broad and somewhat pointed. The anterolateral angle of the segment is rounded and anteriorly produced. The second and third segments are short and broad, the second being slightly longer than the third. The upper antennular flagellum is short and thick and curved backwards. The fused part of the two rami consists of six or seven joints, the free

part of the shorter ramus consists of two joints and is extremely short. The lower flagellum is shorter than the peduncle.

The scaphocerite is oval in shape; it is about 1.5 times as long as broad. The outer margin is convex, the final tooth is very short, inwardly curved and slightly overreached by the lamella. The antennal peduncle reaches distinctly beyond the middle of the scaphocerite, but fails to attain its end. No exterior spine is present near the base of the scaphocerite.

The mandible has the incisor process well developed and ending in four teeth; the molar process bears some blunt knobs. The maxillula has the inner lacinia very much broadened, the upper lacinia is normal in size and bears numerous spinules and hairs at its distal end; the palp is bilobed. The maxilla has the endite distinctly divided into two lobes; the palp is much broadened in the basal part and ends in a narrow tip; the scaphognathite is large and not very broad. The first maxilliped has the endites of the coxa and basis not separated by a notch; the palp is well developed; the exopod bears a narrow, but distinct caridean lobe; the epipod is not bilobed. The second maxilliped has the normal Palaemonid shape, the exopod is slender, the epipod large. The third maxilliped fails to reach the end of the antennal peduncle. The basal joints are somewhat broadened. The last joint is slightly shorter than the penultimate, but distinctly less than half as long as the antepenultimate. The exopod reaches slightly beyond the antepenultimate segment. A rudimentary arthrobranch is present. In the male the third maxilliped is somewhat more slender than in the female.

The first pereopods are slender, they reach with about half the carpus beyond the scaphocerite. The fingers are about as long as or longer than the palm, they are unarmed. The carpus is about 1.5 times as long as the chela and quite as long as the merus. The second legs are unequal in size. They reach with part of the carpus beyond the scaphocerite. The larger leg has the fingers about half as long as the palm. The dactylus is less high than the fixed finger, it bears one large tooth slightly behind its middle. The cutting edge of the fixed finger bears two large teeth, one slightly before, the other slightly behind the tooth of the dactylus. The posterior tooth of the fixed finger bears small denticles at the top. There is a hole at the inner side of the cutting edge of the fixed finger, in which the tooth of the dactylus reaches with its tip. The palm is swollen, it is smooth to the naked eye, but minutely rugose when examined with a lens. The carpus is short and triangular, it is less than

half as long as the palm. The merus and ischium are equal in length, they are about as long as the carpus. All joints are smooth and unarmed. The smaller leg strongly resembles the larger, the only difference is the shorter palm, which is slightly longer than the fingers and less than twice as long as the carpus. The third leg reaches with a small part of the propodus beyond the scaphocerite. The dactylus is longer than high and distinctly biunguiculate. There are, except for the two claws, no other teeth on the dactylus. The propodus is about five times as long as the dactylus. Except for one or two spines near the base of the dactylus, the posterior margin of the propodus is unarmed. The carpus measures $\frac{3}{5}$ of the length of the propodus, while the merus is about as long as the latter joint. The fifth leg is somewhat more slender than the third, but otherwise it does not differ from that leg.

The male has the endopod of the first pleopod elongate, part of the inner margin is beset with short stiff bristles, part of the outer margin with longer hairs, the top, however, is naked and tongue-shaped. The endopod of the second pleopod of the male has the appendix masculina slightly longer than the appendix interna.

The uropods are broadly ovate. The outer margin of the exopod ends in a movable spine.

A very young specimen, which I refer with considerable doubt to the present species, was collected in January 1934 by Dr. Waldo L. Schmitt in Panama. The exact locality is not known, it is either in the Archipelago de las Perlas (Panama Bay) or at Chamé Point (S.W. of the Pacific entrance of the Panama Canal on the Pacific coast of Panama). This specimen, 8 mm long, differs strongly from the adult specimens of *P. pinnae* at my disposal. The rostrum is much more slender, being very narrow and reaching to the end of the basal segment of the antennular peduncle. As usual in young specimens the sixth abdominal segment is elongate, being almost twice as long as the fifth. The telson is more slender, the spines are relatively somewhat longer than in the adults. The eyes reach beyond the antennal spine when extended sideways. The scaphocerite is less broad than in the adult. Also the large chelipeds are distinctly more elongate. The last three legs have the two claws relatively longer than in the fullgrown specimens.

Size: The largest male observed by me measures 36 mm. Ovigerous females of 25 to 43 mm were examined. The eggs are numerous and small, measuring 0.5 to 0.7 mm in diameter.

Material examined: The collection of the Allan Hancock Foundation contains specimens from the following localities:

Lower California, Mexico: Espiritu Santo Island. Feb. 20, 1932, Sta. 20-32. Middle of Ballenas Bay, shore, rock, Feb. 23, 1936, Sta. 512-36. Ballenas Bay, shore, sand, rock, in *Pinna* sp., March 21, 1936, Sta. 608-36; San Francisco Island, North Bay. Shore, rock, sand, Feb. 25, 1936, Sta. 518-36; Agua Verde Bay. West part of Bay, shore, side reef, Feb. 27, 1936, Sta. 522-36; Concepción Bay, Coyote Bay. Shore, sand, rock, March 16, 1937, Sta. 689-37.

Sonora, Mexico: Ensenada de San Francisco. Beach, seine, Feb. 7, 1940, Sta. 1089-40; Guaymas. Shore, shingle, Jan. 23, 1940, Sta. 1041-40. Jan. 1941, T. Burch coll.

Guerrero, Mexico: Acapulco Harbor. Commensal in *Pinna* sp., Sept. 1, 1946, *Zaca* Expedition Sta. 1547-46 (=Hubbs 46-229). Near wreck, Sept. 13, 1946, *Zaca* Expedition Sta. 1561-46 (=Hubbs 46-244).

The U.S. National Museum possesses material of this species from: Lower California, Mexico (E. of El Mogote, La Paz Bay, low water, sand flats, Feb. 6, 1940, R. Hawkins coll. no. U.H. 04067; Concepción Bay, commensal in *Pinna* sp., March 29, 1940, E. F. Ricketts coll.), Sonora, Mexico (Guaymas Bay, Jan. 31, 1923, F. Yost coll.; San Ramon Bay near Empalme, S. of Guaymas, in *Pinna* sp., 1946, A. Sorensen coll.), Taboga Island, Gulf of Panama (4 fms, in pearl oyster, Feb. 29, 1948, P. S. Galtsoff coll.), Islas de Cañas, Gulf of Panama (in living *Pinna*, Feb. 12, 1948, P. S. Galtsoff coll.), Archipelago de las Perlas, Panama, (Pedro Gonzales Island, north side near Cocal, from mantle chamber of *Pinnae* sp., Feb. 28, 1944, J. P. E. Morrison coll. no. R. 2705). In the American Museum of Natural History I examined 2 specimens of this species from Saboga Island, Archipelago de las Perlas, which were mentioned by Boone (1931) as *P. margarita*.

Distribution: The species is known to inhabit the mantle cavity of *Pinna rugosa* Sowerby⁴ in shallow coastal waters of West America from the Gulf of California south to Panama. The records in literature are: Gulf of California (Kemp, 1922), San Gabriel Bay and Pt. Lobos, Espiritu Santo Island, Gulf of California (Steinbeck & Ricketts, 1941), San José Island (Lockington, 1878), Concepción Bay! (Steinbeck & Ricketts, 1941), Mulege Bay (Lockington, 1878), Angeles Bay, Gulf of California (Lockington, 1878; Kemp, 1922), Punta Arenas, Costa Rica (Boone, 1930, 1931), Saboga Island, Archipelago de las Perlas, Panama! (Boone, 1931).

⁴ Interesting is the record of this species from a pearl oyster from Taboga Island.

Type: The type locality is the Gulf of California, the type material came from three localities: Angeles Bay, Mulege Bay and San José Island. The whereabouts of the type specimens is not known to me, but the material probably was deposited in the collection of the California Academy of Science at San Francisco and then may have been destroyed during the large fire of 1906.

Remarks: This species is closely related to *Pontonia margarita*, from which it differs by its size, and various characters mentioned in the key and the description of the latter species. Boone's (1930 and 1931) description and figure of "*Pontonia margarita*" clearly are made after a specimen of *Pontonia pinnae*, her 1931 material, however, partly consists of *Pontonia margarita*.

Pontonia domestica Gibbes

Pl. 38, figs. a-j

Pontonia occidentalis Gibbes, 1848, Tuomey's Rep. Geol. S. Carolina, App., p. xvi. (nom. nud.)

Pontonia domestica Gibbes, 1850a, Proc. Amer. Ass. Adv. Sci., vol. 3, p. 196; Kingsley, 1878a, Bull. Essex Inst., vol. 10, p. 65; Kingsley, 1878b, Proc. Acad. Nat. Sci. Phila., 1878, p. 95; Howard, 1883, South Carolina, p. 294; (?) Borradaile, 1898a, Ann. Mag. Nat. Hist., ser. 7, vol. 2, p. 389; Kingsley, 1899, Amer. Nat., vol. 33, p. 718; Rathbun, 1902a, Bull. U.S. Fish Comm., vol. 20, pt. 2, p. 122 (referred to *Conchodytes*).

Conchodytes domesticus Cary & Spaulding, 1909, Contr. mar. Fauna Louisiana Coast, p. 11.

Conchodytes domestica Borradaile, 1917, Trans. Linn. Soc. Lond. Zool., ser. 2, vol. 17, p. 393.

Description: The rostrum is depressed, rather narrowly triangular and somewhat downwards curved. It reaches about to the middle of the second segment of the antennular peduncle, its tip is acute, both in dorsal and lateral view. The upper surface is flat, the lower bears an inconspicuous longitudinal carina. There are a dorsal and a ventral tooth placed close to the apex, but these teeth are very inconspicuous. Between the upper tooth and the apex of the rostrum some long hairs are present. The carapace has the lower orbital angle bluntly triangular and slightly produced forwards. The antennal spine is removed a considerable distance from the lower orbital angle. It is strong and pointed. The anterolateral angle of the carapace is broadly rounded and anteriorly produced.

The abdomen has the first five pleurae broadly rounded. Of the sixth segment, the pleurae as well as the posterolateral angle end in slender sharp spines. The sixth segment is slightly longer than the fifth. The telson is 1.4 times as long as the sixth segment. The two pairs of dorsal spines of the telson are extremely small and almost invisible, even under a strong magnification. The anterior pair is placed about in the middle of the telson and the posterior pair is situated slightly closer to the posterior margin of the telson than to the anterior pair. Both pairs are placed on the lateral margins of the telson. The posterior margin of the telson bears the usual 6 spines, which are placed in one row. The outer pair is short, the inner and intermediate pairs are longer than the outer and of about equal size.

The eyes have the cornea shorter and narrower than the stalk. When extended laterally the eyes fail to reach the antennal spine.

The antennal peduncle has the stylocerite broad and rather bluntly pointed. The anterolateral angle of the segment is produced forwards and rounded. The third segment is somewhat longer than the second. The upper antennular flagellum has the two rami fused for about 7 to 10 joints, the free part of the shorter ramus consists of 2 or 3 joints and is very short.

The scaphocerite is broadly oval, being less than twice as long as broad. The outer margin is somewhat convex, but about straight in the middle. The final tooth is small and distinctly overreached by the lamella. The antennal peduncle reaches beyond the middle of the scaphocerite. No external spine is present near the base of the scaphocerite.

The mandible and maxillula are exactly as in *P. pinnae*. The maxilla differs only from that of the latter species by having the incision in the inner lacinia less deep. The first and second maxillipeds too are like those of *P. pinnae*. The third maxilliped fails to reach to the end of the scaphocerite. The penultimate joint is about 1.2 times as long as the ultimate and about half as long as the antepenultimate joint. The exopod reaches somewhat beyond the end of the antepenultimate segment. A small arthrobranch is present.

The first leg reaches with the carpus beyond the scaphocerite. The fingers are somewhat longer than the palm. The carpus is $\frac{7}{4}$ of the length of the chela and as long as the merus. The second legs are very strong. They are unequal in size (seldom almost equal) and slightly unequal in shape. They reach with the carpus beyond the scaphocerite. In one leg the fingers are about half as long as the palm, the fixed finger is somewhat higher than the dactylus and bears two large teeth on its

cutting edge; the anterior of these teeth is triangular and placed in about the middle of the edge, the posterior tooth is truncate and has the upper margin crenulate. The dactylus bears one tooth. The palm has the upper and lower margin somewhat compressed, but not carinate. The surface of the palm is smooth to the naked eye, but minutely roughened when looked at with a strong lens. The carpus is short and conical measuring about $\frac{1}{3}$ of the length of the palm; the upper part of the outer surface shows a shallow depression, the lower margin ends anteriorly in a rounded knob. The merus is about 1.2 times as long as the carpus, while the ischium is about as long as the latter joint. The other second leg is as large as the first and resembles it very much, the only important difference is that the fingers are relatively somewhat longer, the fixed finger is higher in comparison to the dactylus and the teeth are somewhat smaller; furthermore the carpus is somewhat more slender. The third leg reaches with part of the propodus beyond the scaphocerite. The dactylus is short and broad, it is distinctly bifid. The posterior margin proximal of the additional tooth is somewhat convex. The propodus is about 4 times as long as the dactylus, it bears a few spinules in the extreme distal part of its posterior margin. The carpus is $\frac{2}{3}$ as long as the propodus and half as long as the merus. The fifth leg is very similar to the third, it only is smaller and relatively stouter.

The endopod of the first pleopod of the male has the same general shape as that of *Pontonia pinnae*, but the hairs on both margins reach somewhat farther distally, so that consequently the naked part of the top is smaller. The appendix masculina of the second pleopod of the male is somewhat shorter than the appendix interna.

The uropods are broadly ovate in shape. The outer margin of the exopod ends in a blunt angle, which bears a movable spine at the top.

Size: The largest male observed by me measures 32 mm. No ovigerous females are represented in the material examined by me.

Material examined: In the U.S. National Museum specimens of this species are present from the following localities: Florida (Ferguson's Pass⁵), out of *Pinna seminuda* Lam., H. Hemphill coll.; Caxambas, Collier Co., Feb. 12, 1919, S. P. Mott coll.; Eagle Harbor, Port St. Joe, Gulf Co., from living *Pinna*, Jan. 25, 1936, R. O. Smith coll.), Louisiana (Chandeleur Islands, St. Bernard Parish, L. R. Cary coll.).

Distribution: The species is known from Madeira, the Bahamas and the coast of the United States from South Carolina to Louisiana.

⁵ The exact position of this locality is unknown to me, but in all probability it is situated on the west coast of Florida.

The records in literature are: Porto Santo, Madeira (Borradaile, 1917), Bahamas (Kingsley, 1878b), South Carolina (Gibbes, 1848, 1850a; Howard, 1883), Florida (Kingsley, 1878), Chandeleur Islands, Louisiana! (Cary & Spaulding, 1909). The species is known to inhabit *Pinna seminuda* Lam. (Gibbes, 1850a) and *Pinna muricata* L. (Gibbes, 1850a; Cary & Spaulding, 1909). Borradaile (1917) reports it from a species of *Pecten*.

Type: The type locality is "South Carolina." The type, if extant, should be in the Charleston Museum.

Remarks: Gibbes (1848) in Tuomey's Geology of South Carolina gives a list of the Crustacea of that state. In this list he includes *Pontonia occidentalis*, without any description or remark. As, however, no other species of *Pontonia* is known from South Carolina and Gibbes himself is the author of the present species, it is certain that *Pontonia occidentalis* and *Pontonia domestica* belong to one species and that Gibbes changed his mind after 1848 in connection with the name he liked to give to the species.

Miss Rathbun (1902) placed the present species in the genus *Conchodytes*, but it distinctly is a *Pontonia*. The posterior margin of the dactylus, though being somewhat convex does not show the protuberance present in *Conchodytes*.

The species is closely related to *P. margarita* on account of the shape of the dactyli of the last three legs, but it shows more resemblance to *P. pinnae* in the size of the eyes and that of the dorsal spines on the telson, which even are still smaller than in that species.

Pontonia chimaera, new species

Pl. 39, figs. a-p

Description: The rostrum is depressed and curved downwards, it reaches to the end of the basal segment of the antennular peduncle. It is narrow, has the upper surface flat and the lower provided with a longitudinal carina. The tip is truncated. A very small tooth is placed close to the tip on the upper as well as on the lower surface of the rostrum. As usual some hairs are present between the upper tooth and the apex. The carapace has the antennal spine well developed and pointed, it is placed some distance from the broadly rounded lower orbital angle. The anterolateral angle of the carapace is rounded and anteriorly produced.

The abdomen has the pleurae of the first five segments rounded. The sixth segment is 1.4 times as long as the fifth and 0.6 times as long

as the telson. The two pairs of dorsal spinules are extremely small. The anterior pair is placed in about the middle of the telson, the posterior pair is situated closer to the posterior margin of the telson than to the anterior pair. Both pairs are situated close to the lateral margin of the telson. The three pairs of posterior spines form one row on the posterior margin. The outer pair is very small and almost invisible, the two other pairs are longer and of about equal length.

The eyes reach beyond the antennal spines when extended laterally. The cornea is somewhat narrower and distinctly shorter than the stalk.

The antennular peduncle has the stylocerite rather broad and pressed against the segment proper, it reaches about to the middle of the segment. The anterolateral angle of the segment is rounded. The third segment is somewhat longer than the second. The upper flagellum is short and recurved, the fused part of the two rami consists of five joints, the free part of the shorter ramus is short and broad, consisting of two joints.

The scaphocerite is oval, it is slightly more than twice as long as broad. The outer margin is slightly convex, it entirely lacks the final tooth. The antennal peduncle reaches beyond the middle of the scaphocerite. There is no outer spine in the basal part of the peduncle near the base of the scaphocerite.

The mandible has the incisor process ending in three teeth, the inner margin of this process bears some minute teeth in the distal part. The molar process bears some blunt teeth and a row of spinules at the end. The maxillula strongly resembles that of the other *Pontonia* species, but has the two laciniae slightly more slender. The maxilla is like that of *P. pinnae*, but has the inner lacinia not cleft. The first maxilliped is somewhat less elongate than in *P. pinnae* and has the epipod somewhat bilobed. The second maxilliped strongly resembles the usual form, but the last two joints are less elongate. The third maxilliped reaches almost the middle of the scaphocerite. It is slender. The last joint is $\frac{3}{4}$ of the penultimate and $\frac{1}{3}$ of the antepenultimate. The exopod reaches beyond the end of the antepenultimate segment. An epipod and a reduced arthrobranch are present.

The first pereopod reaches with part of the carpus beyond the scaphocerite. The fingers are somewhat longer than the palm. The carpus is 1.3 times as long as the chela and 1.1 times as long as the merus. The second legs are strong and unequal in shape. Both reach with part of the carpus beyond the scaphocerite. The larger leg has the fingers about half as long as the palm. Like in most other species of *Pontonia* the dactylus bears one large tooth slightly behind the middle, while the fixed

finger has two teeth. Of these two teeth of the fixed finger one is large and truncate, with the upper margin crenulate, it is placed behind the tooth of the dactylus; the other tooth is smaller and triangular, it is placed in front of the tooth of the dactylus. The palm is slightly swollen. The carpus is short and conical, it is slightly less than half as long as the palm and somewhat longer than both ischium and merus. Scattered rather stiff hairs are present on the cheliped, being most dense on the fingers and fewer on the posterior joints. The smaller leg is more slender than the larger. The fingers are $\frac{2}{3}$ of the length of the palm, their dentition is as in the large leg, only the teeth are smaller and less conspicuous. The carpus is rather elongate, it is as long as the fingers and distinctly longer than either carpus or ischium. The pubescence is as in the larger leg. The third leg reaches with part of the propodus beyond the scaphocerite. The dactylus is distinctly bifid and rather broad, the posterior margin proximal of the accessory tooth is straight. The propodus is thrice as long as the dactylus, it bears numerous hairs, but the posterior margin is devoid of spinules. The carpus measures $\frac{2}{3}$ of the length of the propodus. The merus is about as long as the propodus. The fourth leg has the same shape as the third. The fifth leg instead of being more slender than the third as in most species of this genus, is more heavily built than that leg. The dactylus is broader with the teeth larger and more strongly curved. The propodus is about thrice as long as the dactylus, 1.5 times as long as the carpus and somewhat longer than the merus.

The endopod of the first pleopod in the male is similar to that of *P. pinnae*, it is elongate and ends in a naked tongue-like tip. The second pleopod of the male has the appendix masculina slightly shorter than the appendix interna.

Uropods are elongate ovate. The outer margin of the exopod is rounded at the tip and bears no spinule there.

Size: The only specimen at my disposal, a male, measures 12 mm.

Material examined: The U.S. National Museum possesses the only specimen (the holotype) of this species seen by me. It was collected from Panama, Archipelago de las Perlas, north side of Pedro Gonzales Island, west of Cocal. Below intertidal zone, from mantle chamber of a young giant conch shell (*Strombus galeatus* Swainson), March 9, 1944, J. P. E. Morrison coll., No. R. 2765 (U.S.N.M. Cat. No. 85390).

Remarks: This species, though undoubtedly belonging to the group of *Pontonia pinnae*, *P. margarita*, *P. simplex* and *P. longispina* is quite distinct from these species by having the fifth leg more heavy than the

third, furthermore it differs from those species by missing the final tooth of the scaphocerite and the movable spine at the end of the exterior margin of the uropodal exopod.

The species lives within the mantle chamber of *Strombus galeatus* Swainson. This is the only certain record of a Pontonid living associated with a Gastropod.

Pontonia longispina, new species

Pl. 40, figs. a-j

Description: The rostrum is depressed and somewhat curved downwards. It is narrow and resembles in this respect the rostrum of *P. simplex*. The upper surface of the rostrum is flat, the lower bears a median longitudinal carina. The top of the rostrum reaches about to the middle of the second segment of the antennula, it bears the usual small upper and lower tooth close to the apex, while also the hairs between the upper tooth and the apex are present. The carapace is built entirely as in *P. simplex*: the antennal spine is strong and placed some distance from the narrowly produced, but rounded lower angle of the orbit.

The abdomen is smooth and has the pleurae of the first five segments rounded. The sixth segment is 1.3 times as long as the fifth and about 0.6 times as long as the telson. The two pairs of dorsal spines of the telson divide it into three parts, of which the two anterior are of about the same length, while the posterior is somewhat larger. The spines are extremely long and slender, the anterior pair distinctly overreaches the base of the posterior pair. The posterior margin of the telson bears the usual three pairs of spines, the outer of which are rather short, the inner longer and of about equal size.

The eyes have the cornea narrower and shorter than the eyestalk. The eye reaches, when directed laterally, beyond the antennal spine.

The basal segment of the antennular peduncle has the stylocerite rather broad and pointed, it reaches about to the middle of the segment. The anterolateral angle of the basal segment is rounded and bears no conspicuous tooth as in *P. simplex*. The shape of the last two joints and the flagella is as in that species.

The scaphocerite is twice as long as broad and is oval in shape. The outer margin is convex and ends in a small final tooth, which fails to reach the end of the scaphocerite. The antennal peduncle reaches some distance beyond the middle of the scaphocerite. No outer spine is present near the base of the scaphocerite.

The mandible has the incisor process narrowing towards the tip, which ends in three teeth. The inner margin of this process shows some denticles near the apex. The molar process, like in *P. simplex*, ends in some knobs and bears a row of spinules. The other oral parts are very similar to those of *P. pinnae*, except for the third maxilliped. This is slender and reaches about to the end of the antennal peduncle; the last segment measures 0.8 times the length of the penultimate and is about $\frac{1}{4}$ of the length of the antepenultimate segment. The exopod reaches slightly beyond the end of the antepenultimate segment; an epipod and a reduced arthrobranch are present.

The first pereopod reaches with about half the carpus beyond the scaphocerite. The fingers are somewhat longer than the palm. The carpus is 1.4 times as long as the chela and somewhat longer than the merus. The second pereopods are very unequal in shape and size. Both reach with part of the carpus beyond the scaphocerite. The fingers of the larger leg are slightly less than half as long as the palm. As in the previous species the dactylus bears one ventral tooth slightly behind its middle. This tooth fits between two teeth of the cutting edge of the dactylus, the posterior of which bears some denticles at the top. The fixed finger is higher than the dactylus. The palm is somewhat swollen, it is about twice as long as high. The surface is smooth to the naked eye and minutely rugose when examined with a powerful lens. There are no carinae. The carpus is very short and somewhat swollen; it is about $\frac{1}{3}$ of the length of the palm and somewhat shorter than the merus. The ischium is about $\frac{3}{4}$ of the length of the merus. The smaller leg is shorter and more slender than the larger. The fingers are 0.8 times as long as the palm. They are provided in their proximal part with teeth, similar to those of the large chela, but which are less distinct. The palm is slender and twice as long as high. The carpus is 0.8 times to quite as long as the palm; it is distinctly more elongate than in *P. simplex*. The merus is somewhat shorter than the carpus, while the ischium is about as long as the latter joint. The third leg reaches with part of the propodus beyond the scaphocerite. The dactylus is distinctly bifid; it is elongate, being of about the same slenderness as those of *P. simplex*. The propodus is about 3.5 times as long as the dactylus, both dactylus and propodus being hairy; the latter joint moreover possesses some spinules in the distal part of the posterior margin. The carpus is somewhat more than half as long as the propodus. The merus is about as long as, but broader than the propodus. The ischium is more than half as long as the merus. The fifth leg is similar to the third, though it is more slender.

The pleopods are normal in my specimens both of which are females. The uropods are as in *Pontonia simplex*.

Size: The material consists of two females; one non-ovigerous of 18 mm and one ovigerous of 17 mm. The eggs are small and few in my specimen, measuring 0.3 to 0.4 mm in diameter.

Material examined: The 1940 Allan Hancock Expedition collected this species from:

Lower California, Mexico: Angel de la Guardia Island, Puerto Refugio. Shore, rocky reef, Jan. 27, 1940, Sta. 1049-40.

Sonora, Mexico: Bahía Catalina off Guaymas. Shore, shingle, Feb. 9, 1940, Sta. 1092-40.

Type: Holotype is the ovigerous female from Sta. 1049-40. Both types are preserved in the collection of the Allan Hancock Foundation at Los Angeles. Holotype, AHF no. 402.

Remarks: The species is most closely related to *Pontonia simplex*, new species even so much that I at first thought them to be one species. The differences have already been pointed out. These differences are not due to age or sex as I at first thought probable, because the material of *P. simplex*, consisting of four females and three males shows them to be constant. Furthermore the characters do not vary in the material seen, except for the simple or bifid dactylus of the last three legs in *P. simplex*. A study of a larger amount of material of both species is, however, very desirable.

Pontonia mexicana Guérin

Pl. 41, figs. a-k

Pontonia mexicana Guérin, 1856, Sagra's Historia Cuba, Hist. nat., vol. 7, p. xix, pl. 2, fig. 12; Guérin, 1857, Sagra's Historia Cuba, Crust., p. lii, pl. 2, fig. 12.

Pontonia armata Sharp, 1893, Proc. Acad. Nat. Sci. Phila., p. 119 (non H. Milne Edwards 1837).

Pontonia grayi p.p. Rathbun, 1902a, Bull. U.S. Fish Comm., vol. 20, pt. 2, p. 122, fig. 25.

Pontonia mexicana Rathbun, 1902a, Bull. U.S. Fish Comm., vol. 20, pt. 2, p. 122.

Panthonia mexicana Valdés Ragués, 1910, Mis Trab. Acad., p. 181.

Pontonia mexicana Borradaile, 1917, Trans. Linn. Soc. Lond. Zool., ser. 2, vol. 17, p. 391.

Pontonia grayi Borradaile, 1917, Trans. Linn. Soc. Lond. Zool., ser. 2, vol. 17, p. 391; Bouvier, 1918, Bull. Mus. Hist. Nat. Paris, vol. 24, p. 6; Schmitt, 1924a, Bijdr. Dierk., vol. 23, p. 72; Schmitt, 1935, Sci. Surv. Porto Rico, Virgin Isl., vol. 15, p. 166, fig. 29.

Description: The rostrum is depressed and directed slightly downwards. It reaches about to the end of the second segment of the antennular peduncle. It is rather narrow when compared with the rostrum of *Pontonia pinnae*, but it sometimes is broader than in the specimen figured here (fig. b). The upper surface is flat, the lower is provided with a longitudinal median carina. The apex of the rostrum is pointed. There is a small tooth present on the upper as well as on the lower surface of the rostrum, close to the apex. Between the upper tooth and the apex some hairs are present. The carapace has the antennal spine well developed and placed quite a distance from the lower angle of the orbit, which is anteriorly produced into a narrow but rounded lobe. The anterolateral angle of the carapace is anteriorly produced and broadly rounded.

The abdomen has the pleurae of the first five segments broadly rounded, the pleura and the posterolateral angle of the sixth segment end in strong sharp spines. The fifth segment measures $\frac{5}{4}$ of the length of the sixth, while the telson is almost twice as long as the sixth segment. The two pairs of dorsal spines on the telson are well developed, though not very long, they divide the telson in three about equal parts; sometimes the first and the last parts are of about the same length, while the median part, situated between the 2 pairs of spines, is shorter than the other parts. The posterior margin of the telson bears one row of six spines, the outer of which are smallest, but very well distinguishable, while the two other pairs are longer and of about equal length, the intermediate spines, however, being broader than the inner.

The eyes reach, when extended laterally, to the antennal spines. The cornea is shorter and narrower than the stalk.

The basal segment of the antennular peduncle has the stylocerite rather broad and bluntly pointed. The anterolateral angle of the segment is produced forwards and rounded (in a juvenile specimen an indistinct tooth is visible there). The third segment is somewhat longer than the second. The upper antennular flagellum is thick and generally curved backwards or sideways. The fused part of the two rami consists of six or seven joints, the free part of the shorter ramus consists of two joints.

The scaphocerite is broadly oval in shape, it is less than twice as long as broad. The outer margin is convex and ends in a short inwards curved final tooth. The lamella is broad and overreaches slightly the final tooth of the outer margin. The antennal peduncle reaches beyond the middle of the scaphocerite, but fails to reach the end of it. No external spine is present near the base of the scaphocerite.

The oral parts in all respects resemble those of *Pontonia pinnae*, only the maxilla has the upper part of the inner lacinia longer than the lower part. The third maxilliped reaches about to the middle of the scaphocerite. The ultimate joint is somewhat shorter than the penultimate and less than $\frac{1}{3}$ as long as the antepenultimate joint. The exopod reaches somewhat beyond the antepenultimate joint. This maxilliped is more slender than that of *P. pinnae*.

The first pereopod reaches with the larger part of the carpus beyond the scaphocerite. The fingers are much longer than the palm. The carpus is about 1.2 times as long as the chela and of about the same length as the merus. The second legs are strongly unequal, they reach with the whole carpus beyond the scaphocerite. The larger leg has the fingers about half as long as the palm or slightly longer. The dactylus is less high than the fixed finger and bears one large ventral tooth, slightly before its middle. The inner surface of the dactylus has the upper part more or less ridge-like produced. The fixed finger has the cutting edge provided with 2 teeth, one before and one behind the large tooth of the dactylus, the proximal tooth is crenulated. The surface of the palm is minutely rugose, the palm is somewhat swollen, but it shows no carinae. The carpus is short and conical, it is about $\frac{1}{3}$ of the length of the palm. The merus is about $\frac{2}{5}$ as long as the palm and longer than the ischium. The smaller leg has the fingers about as long as the palm. They are armed with similar teeth as in the larger leg, but these teeth are smaller and placed closer to the base of the fingers. The carpus is distinctly more than half as long as the palm. The merus is about $\frac{2}{3}$ as long as the palm and somewhat longer than the ischium. Except for the difference in the relations between the various joints, the smaller leg is very similar to the larger. The third leg reaches with part of the propodus beyond the scaphocerite. The dactylus is slender and distinctly bifid. The posterior margin of it, proximal of the accessory tooth, is about straight. The propodus is about five times as long as the dactylus. Its posterior margin bears only one spine near the base of the dactylus. The carpus is half as long as the propodus, while the merus is as long as the latter joint. The ischium measures about $\frac{2}{3}$ of the length of the merus. The fifth leg is similar in shape to the third.

The first pleopod of the male has the endopod similar to that of *Pontonia pinnae*, it too ends in a naked more or less tongue shaped tip, which, however, bears one hair at the extreme point. The endopod of the second pleopod of the male has the appendix interna somewhat longer than the appendix masculina.

The uropods are broadly ovate. The exopod has the outer margin ending bluntly and provided there with a small movable spinule.

Size: The largest male examined by me measures 20 mm. Oviparous females of 20 to 22 mm are represented in the material. The eggs are numerous and small being 0.5 to 0.6 mm in diameter.

Colour: The following colour notes were made of this species by Mr. Anker Petersen, artist of the Allan Hancock Foundation. "Specimen clear and semitransparent. Dorsal surface of carapace and abdomen entirely overcast with minute bright red dots. Regions clearly outlined with a yellow rim. Chelipeds purplish lilac with open reticulations of pale yellow. Ambulatory legs without color, except for a few light touches of lilac at the joints. Entire ventral side pale cream color. Eggs dark dull-yellow."

Material examined: An ovigerous female was collected by the 1939 Allan Hancock Expedition from:

British West Indies: Tobago Island, Buccoo Reef. Shore, coral reef, from *Pinna*?, April 20, 1939, Sta. A 41-39.

The U.S. National Museum possesses specimens of this species from the following localities: New Providence, Bahama Islands (1886, U.S. Fish Commission Steamer *Albatross*), Tortugas (from *Pinna* sp., July 7, 1932, A. A. Boyden coll.), Jamaica (1910, E. A. Andrews coll.), between San Antonio Bridge and San Geronimo, San Juan, Porto Rico (1899, G. M. Gray coll.; types of *Pontonia grayi* Rathbun).

I furthermore examined two specimens of this species (both preserved dry) in the collection of the Academy of Natural Sciences at Philadelphia. The one specimen originated from Mexico and formed part of the Guérin collection as no. 307, it is the type of the present species. The other specimen also belongs to the Guérin collection (as no. 308), it originates from Cuba and bears the original label with the inscription "*Pontonia armata* var. ? Edw. 2. 359. Cuba." This specimen is mentioned by Sharp (1893) as *Pontonia armata* with the catalogue number 344. Strangely enough, Sharp does not mention the type of *Pontonia mexicana* at all, perhaps it was found later as its catalogue number (3136) is much higher than that of any of the specimens mentioned by Sharp.

In the Rijksmuseum van Natuurlijke Historie at Leiden, Holland, a female specimen of this species with a length of 17 mm is present. This specimen was found between the branches of a specimen of the Ophiuroid *Astrophyton muricatum* (Lam.) from north of Kralendijk, Bonaire (August 30, 1948, P. Wagenaar Hummelinck coll.). This specimen shows an indistinct tooth at the anterolateral angle of the basal segment of the antennular peduncle.

Distribution: Whether the species lives commensal in *Pinna* species or is epizootic on basket stars, or both, is not known with certainty, since there are records of the species from both hosts (see above). It is known from shallow coastal waters of the Bahamas, the whole of the West Indies and the east coast of Mexico. The records in literature are: Mexico! (Guérin, 1856, 1857), Cuba! (Guérin, 1856, 1857!; Sharp, 1893!; Valdéz Raqués, 1910; Bouvier, 1918), Jamaica (Schmitt, 1935), Porto Rico! (Rathbun, 1902a), Caracas Bay, Curaçao (Schmitt, 1924a).

Type: The holotype, a dry ovigerous female specimen is preserved in the collection of the Academy of Natural Sciences at Philadelphia, Pa. The type locality is not mentioned in the original publication, but is given on the label of the type specimen as Mexico. The original label of the type moreover bears the indication "Perbosc" (as far as could be made out from the handwriting), which probably is an indication of a locality, though no such place could be found on any map.

Remarks: In 1902 Rathbun described a new species, which she named *Pontonia grayi*. This species she thought different from *P. mexicana*, because the latter species had "a much shorter and less slender rostrum and smaller antennal scale. It also attains a larger size (length, 35 mm)." Borradaile (1917) also separates the two species (neither of which in all probability he ever saw) on the length of the rostrum. Comparison of Guérin's type and Rathbun's original specimens shows that there is no difference at all between the two forms, except that Guérin's specimen is somewhat larger than those of Rathbun. The rostrum in Guérin's figure is shown too short and the scaphocerite too narrow and too short.

The species is most closely related to *Pontonia simplex* of the west coast of America, from which it differs by lacking the anterolateral spine on the basal segment of the antennular peduncle, and by having the dactyli of the last three legs more distinctly biunguiculate.

Rathbun (1902) brings to the present species "a very small specimen without claws. . . . dredged by the *Fish Hawk* off Vieques Island, in

16 fathoms, station 6092." As will be pointed out, this is no *Pontonia mexicana*, but an undescribed species, which is quite distinct from the present form (*Pontonia miserabilis* new species., p. 148).

Pontonia simplex, new species

Pl. 42, figs. a-m

Description: The rostrum is depressed, but rather narrow like in *P. margarita*, it attains about the middle of the second segment of the antennular peduncle and is directed slightly downwards. The upper surface is flat, the lower bears a distinct median longitudinal carina. On the upper as well as on the lower surface of the rostrum a small tooth is present close to the apex. Some long hairs are present between the upper tooth and the apex. The carapace is smooth and is provided with antennal spines. These are strong; they are placed a considerable distance from the rounded and somewhat anteriorly produced lower angle of the orbit. The anterolateral angle of the carapace is rounded and somewhat anteriorly produced.

The abdomen is smooth and has the pleurae of the first five segments broadly rounded. The sixth segment is 1.2 to 1.4 times as long as the fifth and about $\frac{3}{5}$ as long as the telson. The two pairs of dorsal spines of the telson are well developed, but not very long. These spines are placed so as to divide the telson in three equal parts, sometimes however, the last part, or the first and the last parts are longer than the middle part. The anterior spines by far fail to reach the base of the posterior pair. Both pairs are placed close to the lateral margins of the telson. The posterior spines are placed in one row; the outer pair is short; the inner and intermediate pairs are longer and of about equal length.

The eyes have the cornea slightly narrower and distinctly shorter than the stalk. They resemble those of *Pontonia margarita* in reaching beyond the antennal spine when extended laterally. The stylocerite is broad and pointed; it reaches about to the middle of the basal segment of the antennular peduncle. The anterolateral margin of that segment ends in a distinct though small tooth, which reaches to about the middle of the second segment. The third segment is somewhat longer than the second. The upper antennular flagellum is short and stout; it is not curved backwards in my material as it is in most other species of *Pontonia*. The fused part of the two rami consists of five or six joints; the free part of the shorter ramus is composed of two joints and is extremely short.

The scaphocerite reaches about to the end of the antennular peduncle; it is oval in shape, and is almost twice as long as broad. The outer margin is convex and ends in a small but distinct tooth which almost reaches the end of the scaphocerite. The lamella is broad and resembles that of *P. margarita*. The antennal peduncle reaches somewhat beyond the middle of the scaphocerite. There is no external spine near the base of the scaphocerite.

The mouth parts show no important differences with those of *P. pinnae*. The incisor process of the mandible of the specimen examined by me ends in six small teeth. The third maxilliped reaches slightly beyond the base of the scaphocerite. It is much more slender than that of *P. pinnae* and resembles more that of *P. margarita*. The last joint is only somewhat shorter than the penultimate. The antepenultimate joint is 2.5 times as long as the penultimate. The exopod overreaches the end of the antepenultimate segment. A reduced arthrobranch is present.

The first leg reaches with a small part of the carpus beyond the scaphocerite. The fingers are slender and longer than the palm. The carpus is about 1.2 times as long as the chela and about as long as the merus. The second legs are strong and unequal; they both reach with part of the carpus beyond the scaphocerite. The fingers of the larger leg are half as long as the palm. The dactylus is narrower than the fixed finger and is armed with one large tooth slightly behind its middle. This tooth fits between two large teeth of the fixed finger. The posterior of the latter teeth bears some small denticles at the top; the other tooth is smooth. The palm is smooth, without carinae, though minutely roughened when examined with a powerful lens; it is about twice as long as high. The carpus measures about $\frac{1}{3}$ of the length of the palm; it is short and conical. The merus is slightly longer than both carpus and ischium. The smaller leg is more slender than the larger. The fingers are 0.7 times as long as the palm. The dentition of the fingers is as in the larger leg. The palm is somewhat more than twice as long as high. The carpus is half as long as the palm, about 0.7 times as long as the merus and slightly shorter than the ischium. The general shape of the joints is as in the larger leg. The third leg reaches with part of the propodus beyond the scaphocerite. The dactylus is elongate and simple, or bifid with a very small accessory tooth. It is more than thrice as long as high, the posterior margin is straight or slightly concave. The propodus is 3.5 times as long as the dactylus. Its posterior margin bears some small spinules in the distal part. The carpus is 0.6 times as long as

the propodus, while the merus is as long as the latter joint. The fifth leg is somewhat more slender than the third leg, but it is of the same shape.

The first pleopods are as in *Pontonia pinnae*. The second pleopods of the male have the appendix masculina much shorter than the appendix interna.

The uropods are broadly oval and built as in the other species of *Pontonia*.

Size: The largest male observed by me measures 18 mm. No ovigerous females are present in the material.

Material examined: The 1935 Allan Hancock Expedition collected 7 specimens of this species at the following locality:

Jalisco, Mexico: Tenacatita Bay. Lagoon, *Pinnas*, Feb. 15, 1935, Sta. 487-35.

Type: Holotype is the largest male. The holotype (Cat. No. 90153) and part of the paratypes are preserved in the collection of the U. S. National Museum, Washington, D.C. The other type material is in the collection of the Allan Hancock Foundation, Los Angeles, Calif.

Remarks: The present species much resembles *Pontonia longispina*, but differs from it by having the spines on the telson shorter, by possessing a small tooth at the anterolateral angle of the basal segment of the scaphocerite and by the shorter carpus of the smaller second leg. In the shape of the rostrum, the eyes, and the scaphocerite it much resembles *P. margarita*, but may be distinguished at once by the shape of the last three legs.

Pontonia margarita Smith

Pl. 43, figs. a-i; pl. 44, figs. a-h

Pontonia margarita Smith, 1869a, in Verrill, Amer. Nat., vol. 3, p. 245; Kingsley, 1878a, Bull. Essex Inst., vol. 10, p. 65; Lockington, 1878, Bull. Essex Inst. vol. 10, p. 163.

Coralliocaris Camerani Nobili, 1901, Boll. Mus. Zool. Anat. Comp. Torino, vol. 16, n. 415, p. 3.

Pontonia margarita Rathbun, 1904, Harriman Alaska Exped., vol. 10, p. 34. (referred to *Conchodytes*); Coulon, 1907, Bull. Soc. Étud. Sci. Nat. Elbeuf, vol. 26, p. 189.

Coralliocaris camerani Borradaile, 1917, Trans. Linn. Soc. Lond. Zool., ser. 2, vol. 17, p. 385.

Conchodytes margarita Borradaile, 1917, Trans. Linn. Soc. Lond. Zool., ser. 2, vol. 17, p. 394.

Pontonia margarita Kemp, 1922, Rec. Indian Mus., vol. 24, p. 287.
Non *Pontonia margarita* Boone, 1930, Bull. Vanderbilt Mar. Mus.,
vol. 3, p. 148, pl. 52 (*Conchodytes margarita* on p. 20).

Pontonia margarita p. p. Boone, 1931, Bull. Amer. Mus. Nat. Hist., vol.
63, p. 180, non fig. 20; Chace, 1937, Zoologica, New York, vol.
22, p. 136.

Description: The rostrum is depressed and directed downwards; the upper surface is flat; the lower bears a median longitudinal carina. The tip reaches to the end of the basal segment of the antennular peduncle or at most to the middle of the second segment. The rostrum strongly resembles that of *P. pinnae*, but is narrower. The apex has one very small upper and a slightly larger lower tooth close to it; some hairs are implanted between the upper tooth and the apex. The carapace and abdomen are exactly as in *P. pinnae*.

The telson has the dorsal spines large and placed so that it is divided into three equal parts, sometimes, however, the middle part is shorter than the two others. The posterior spines are placed in one row on the posterior margin, the inner and intermediate spines are of the same length.

The eyes have about the same shape as in the previous species, but are larger. The cornea is narrower and shorter than the eyestalk; it is distinctly rounded. In contradistinction to *P. pinnae*, however, the eyes when extended laterally reach beyond the antennal spines of the carapace.

The antennula very closely resembles that of *P. pinnae*; the stylocerite, however, is smaller and pressed more or less against the basal segment; the anterolateral angle of the basal segment is somewhat narrower.

The scaphocerite is more slender than in *P. pinnae*; it is about twice as long as wide. The outer margin is slightly convex and ends in a rather small inwardly curved final tooth which is far outreached by the lamella. In other respects the antenna is like in *P. pinnae*. In young specimens the scaphocerite is somewhat more slender than in adults, and furthermore has the final tooth more distinct and straight.

The mouth parts do not differ from those of *Pontonia pinnae*. The third maxilliped only is slightly less broad. It reaches about to the base of the scaphocerite or somewhat beyond it. The last segment measures about $\frac{3}{4}$ of the penultimate and is much less than half as long as the antepenultimate. The exopod reaches distinctly beyond the end of the antepenultimate segment. In the male the third maxilliped is somewhat more slender than in the female.

The first leg reaches with half or somewhat more than half the carpus beyond the scaphocerite. The fingers are longer than the palm and are unarmed. The carpus is about 1.5 times as long as the chela and is distinctly longer than the merus. The second legs differ in size, but are very similar in shape. The larger leg has the various parts similar to those in *P. pinnae*, the dentition of the fingers is exactly the same. The palm in *P. margarita*, however, is relatively higher and shorter; it is 1.6 times as long as the fingers and about twice as long as high. It is more compressed than in *P. pinnae*, especially so at the upper and lower margin, which, however, are not carinate as in *P. californiensis*. The carpus is short and conical, and $\frac{1}{3}$ as long as the palm. The merus is somewhat longer than both carpus and ischium. The smaller second leg resembles the larger except for the chela, which has the fingers more elongate, being only slightly shorter than the palm. The third leg reaches with the dactylus or with a small part of the propodus beyond the scaphocerite. The dactylus is bifid, it is much higher than in *Pontonia pinnae*, and has the lower margin somewhat convex. The propodus is thrice as long as the dactylus, it bears only one or two spines near the base of the dactylus. The carpus measures $\frac{2}{3}$ of the length of the propodus and the merus is slightly longer and broader than the propodus. The fifth leg is similar to the third.

The pleopods are as in *P. pinnae*, the endopod of the second pleopod, however, has the appendix masculina slightly shorter than the appendix interna.

The uropods are as in *Pontonia pinnae*. The movable spine at the end of the outer margin of the exopod, however, is very inconspicuous.

Size: The species is smaller than *P. pinnae*. The largest male observed by me is 19 mm long. The ovigerous females examined measure 17-27 mm. The eyes are numerous and small, being 0.5-0.6 mm in diameter.

Material examined: The 1933-1937 Allan Hancock Expeditions collected a very extensive quantity of material of this species from the following localities:

Lower California, Mexico: Espiritu Santo Island, San Gabriel Bay. Shallow water, coral, March 20, 1936, Sta. 604-36; Espiritu Santo Island, Ballenas Bay. Cove south of Bay, shore, sand, rock, Feb. 22, 1936, Sta. 510-36; Middle Point of Bay, shore, rock, Feb. 23, 1936, Sta. 512-36; tide flats, sand, rock, in pearl oysters, March 21, 1936, Sta. 608-36; San Francisco Island. North Bay of Island, rock, sand, in pearl oyster, Feb. 25, 1936, Sta. 518-36; shore, rock, shingle, in pearl

oyster, March 9, 1937, Sta. 652-37; Agua Verde Bay. South shore, diving and netting, March 18, 1936, Sta. 602-36; Puerto Escondido. Shore, shingle, in pearl oyster, March 16, 1936, Sta. 591-36.

Costa Rica: Port Parker. Shore, small island at entrance, Feb. 9, 1935, Sta. 466-35; Playa Blanca. North point, 15 fms, mud, sand and algae, Feb. 8, 1935, Sta. 461-35. Shore, shale beach between beach and rocky reef, Feb. 8, 1935, Sta. 465-35; Port Culebra. South of Mala Point, bayside, shore, Feb. 24, 1934, Sta. 256-34.

Panama: Secas Islands. Shore, reef, tidepool, in pearl oysters, Feb. 4, 1935, Sta. 446a-35. In pearl oyster, Feb. 5, 1935, Sta. 452a-35; Jicarita Island. Shore, rock, in pearl oyster, Feb. 20, 1934, Sta. 243-34; Bahia Honda. 2 fms, in pearl oysters, March 10, 1933, Sta. 114-33; Panama Bay. In pearl oysters, Feb. 2, 1935, Sta. 445-35; Piñas Bay. Shore, rock, Jan. 28, 1935, Sta. 436-35. Tidepool, 2-3 fms, coral, in pearl oysters, Jan. 29, 1935, Sta. 444-35.

Colombia: Octavia Bay. Shore on island, shingle, Jan. 27, 1935, Sta. 433-35; Cupica Bay. West side between second island and peninsula, shore, in pearl oysters under rocks, Jan. 26, 1935, Sta. 427-35; Port Utria. Shore, rock, pearl oyster, Feb. 14, 1934, Sta. 232-34; shore, in pearl oysters taken among rocks at low tide, Jan. 23, 1935, Sta. 413-35. Shore, shallow water, coral, in pearl oysters, Jan. 24, 1935, Sta. 418-35. Gorgona Island. Shore, rock, sand, Jan. 22, 1935, Sta. 405-35; Shore, rock, in pearl oysters, Jan. 22, 1935, Sta. 405a-35.

Galapagos Archipelago, Ecuador: Tower Island, Darwin Bay. Shore, in pearl oyster, Feb. 26, 1933, Sta. 101-33.

The U.S. National Museum possesses material of this species from the following localities: Lower California, Mexico (San Lucas Island, in pearl oyster, Jan. 15, 1930, M. Valerio coll.; near Cerraloo Island, 24°11'30"N, 109°55'00"W, 10 fms, shells, oyster dredge, April 30, 1888, *Albatross* Sta. 2828; near San José Island, 24°55'15"N, 110°39'00"W, 33 fms, fine gray sand and broken shells, oyster dredge, March 16, 1889, *Albatross* Sta. 3001, and 25°02'15"N, 110°43'30"W, 17 fms, sand and shells, oyster dredge, March 17, 1889, *Albatross* Sta. 3002), Tres Marias Islands, Tepic, Mexico (Maria Madre, 4-10 fms, May 13-24, 1925, Expedition to the Revillagigedo Islands of the California Academy of Sciences), Panama (January, 1914, J. Zetek coll.), Galapagos Islands, Ecuador (North Seymour Island, June 11, 1932, Crocker Expedition 1932).

In the collection of the U.S. National Museum 8 specimens of *Pontonia* are present which I refer to this species, and which originated

from the Florida coast, being collected by the *Pelican* of the U.S. Bureau of Fisheries. The localities from where the material was obtained are:

West coast of Florida: Off Panama City, Bay Co., 30°06'00"N, 85°45'00"W, 8 fms, March 10, 1939, *Pelican* Sta. 152-H.

Off Cape St. Blas, Gulf Co., 29°29'00"N, 85°53'00"W, 19 fms, March 10, 1939, *Pelican* Sta. 153-2.

East coast of Florida: Off Melbourne, Brevard Co., 28°05'00"N, 80°04'00"W, 24 fms, Jan. 17, 1940, *Pelican* Sta. 168-1.

In the American Museum of Natural History at New York I examined a specimen of this species from the Gulf of California, which was already reported upon by Boone (1931).

Distribution: The species lives commensally in the pearl oyster *Pinctada fimbriata* Dunker (often cited as *Margaritophora fimbriata*), and is known to occur on the west coast of America from the Gulf of California to Colombia and the Galapagos Islands, while it now for the first time is recorded from the east and west coasts of Florida. The records in literature are: Gulf of California! (Lockington, 1878; Kemp, 1922; Boone, 1931!), Lower California (Coulon, 1917), Pulmo Reef near Cape Pulmo, Lower California (Chace, 1937), Puerto Escondido near Carmen Island (Lockington, 1878), San Domingo Point, Santa Inez Bay (Chace, 1937), Mulege Bay, Lower California (Lockington, 1878), Bay of Panama (Smith, 1869a), Flamenco Island, near entrance of Panama Canal, Panama (Nobili, 1901). Boone's records (1931) of this species from the Archipelago de las Perlas, Panama, are incorrect. I examined Boone's specimens and found them to be *P. pinnae*. The material mentioned by Boone (1931, p. 182) from the Gulf of California collected by Mr. Harry Payne Bingham in all probability is a mixture of *P. pinnae* and *P. margarita*. The species generally is recorded from pearl oysters (Kemp, 1922; Boone, 1931; Chace, 1937); other authors (Smith, 1869; Lockington, 1878) are more specific and mention the species of pearl oyster as *Margaritophora fimbriata* (Dunker).

Type: The type locality is Bay of Panama. The whereabouts of the type specimen(s) are not known to me.

Remarks: Nobili (1901) described a new species of *Coralliocaris* from Flamenco Island, Panama. His description, however, shows distinctly that the specimen described by him is no *Coralliocaris*, as he states the protuberance at the basal part of the dactylus of the last three legs to be rounded, while in *Coralliocaris* it is hoof-shaped. Comparing

his description with specimens of *Pontonia margarita* I found the closest resemblance and I have no doubt that the two species are identical.⁶ The genus *Coralliocaris* is not known from American waters. The slightly swollen basal part of the dactylus of the last three legs of the present species, which led Nobili (1901) to place it in the genus *Coralliocaris*, also was the cause that Miss Rathbun (1904) placed this species in the genus *Conchodytes*. As Kemp (1922) already pointed out, in the genus *Conchodytes* the basal part of the dactylus of the last three legs is not swollen, but bears a large protuberance there, often provided with a tooth at the top, being quite different from what is shown by the present species. He therefore is perfectly right in placing *Conchodytes margarita* back in the genus *Pontonia*. After having examined almost all indo-west-pacific species of *Conchodytes* and various species of *Pontonia*, I can not agree with Chace (1937) in uniting the two genera.

The description and figure of "*Pontonia margarita*" given by Boone (1930) obviously show that her material belongs to *Pontonia pinnae*, while she moreover states that the species occurs in *Margaritophora fimbriata* as well as in *Pinna* sp. The material mentioned by her (Boone, 1931) in a later paper as *Pontonia margarita* is a mixture of that species with *P. pinnae*, the description and figure she gives are copies of those of her 1930 paper and thus refer to *Pontonia pinnae*; her specimens from the Archipelago de las Perlas, Panama were examined and proved to be *Pontonia pinnae*, the identity of her specimens from the Gulf of California only can be made certain through a reexamination.

The 8 specimens, collected by the *Pelican* off the east and west coast of Florida did not show any character, sufficient to separate them as a good species from *P. margarita*. As shown in the figures, there are no good differences between the east and west coast form.

Pontonia pusilla, new species

Pl. 45, figs. a-k

Description: The rostrum is depressed and somewhat curved downwards, it reaches to the end of the antennular peduncle. The upper surface is flat, the lower is provided with a median longitudinal carina. When seen in dorsal view the rostrum is rather narrow, the apex is acute. In lateral view the apex is bluntly truncated with a minute point

⁶ When visiting the Museo di Zoologia dell Università di Turin, Italy, in May, 1950, I examined the type specimens of *Coralliocaris Camerani* Nobili. These two specimens, a male of 16 mm and an ovigerous female of 19 mm, indeed proved to belong to *Pontonia margarita* Smith.

in the lower part; some hairs are present dorsally of this tip. No teeth are present on the upper or lower margin. The carapace has the lower orbital angle in the shape of a broad toothlike lobe; the antennal spine has disappeared. The anterolateral angle is broadly rounded and anteriorly produced.

The abdomen has the pleurae of the first 5 segments rounded. The sixth segment is slightly longer than the fifth. The pleura and the posterolateral angle of the sixth segment both are rounded. The telson is 1.5 times as long as the sixth segment. The 2 pairs of dorsal spines of the telson are very large and both are placed in the anterior half of the telson. The anterior pair is shorter than the posterior and fails to reach the base of the latter pair. The posterior margin bears three pairs of spinules, the outer of which is extremely small and almost invisible. The other two pairs are well formed and of about equal length.

The eyes are rather broad. The cornea is somewhat shorter and narrower than the stalk.

The basal segment of the antennular peduncle has the stylocerite broad and rather blunt. The anterolateral angle of that segment is strongly anteriorly produced in a narrow lobe which almost reaches the end of the second segment. Both the second and the third segments are short and broad. The upper antennular flagellum is short, thick and recurved under the rostrum. The fused part of the two rami consists of three joints, while one joint of the shorter ramus is free.

The scaphocerite reaches about to the end of the antennular peduncle. It is ovate, being less than twice as long as broad. The outer margin is slightly convex and ends in an extremely large final tooth, which overreaches the rounded anterior margin of the lamella. The antennal peduncle reaches beyond the scaphocerite. There is no exterior spine near the base of the scaphocerite.

The mandible has the incisor process slender and ending in five teeth. The molar process ends in some blunt knobs. The maxillula, maxilla, first and second maxillipeds are like those of *P. pinnae*. The third maxilliped reaches almost to the end of the scaphocerite. The last joint is about $\frac{3}{4}$ as long as the penultimate and somewhat more than $\frac{1}{4}$ as long as the antepenultimate joint. The exopod reaches slightly beyond the end of the antepenultimate joint.

The first leg reaches with the carpus beyond the scaphocerite. The fingers are about as long as the palm. The carpus is as long as the chela and as long as the merus. The second legs are equal in size and

shape. They reach with part of the carpus beyond the scaphocerite. The fingers are about 0.6 times as long as the palm, both the fingers have the cutting edges provided with two rather small teeth. Some scattered hairs are present on the fingers. The palm is smooth to the naked eye but minutely rugose when examined with a strong lens. No carinae are present on the palm. The carpus is about half as long as the palm and slightly longer than the merus. The ischium is shorter than the merus. The third leg reaches somewhat beyond the end of the scaphocerite. The dactylus is rather elongate and distinctly bifid; the posterior margin proximal of the accessory tooth is slightly convex. The propodus is almost thrice as long as the dactylus; its posterior margin bears a few spinules in the distal part. The carpus is about $\frac{1}{3}$ as long as the propodus, while the merus is longer and broader than the latter joint. The fifth leg is somewhat more slender than the third.

The pleopods of the females are normal.

The uropods are elongate ovate. The exopod has the outer margin with the top rounded and provided with a movable spinule.

Size: My four specimens are all females. The largest, 7 mm in length is ovigerous. The eggs are large for the small specimens, measuring 0.4 to 0.5 mm in diameter.

Material examined: All the material examined was collected by the 1933 and 1935 Allan Hancock Expeditions, from the following localities:

Panama: Secas Islands. 14 fms, shells, nullipores, Feb. 5, 1935, Sta. 450-35; Bahia Honda. Shallow water, coral, March 10, 1933, Sta. 114-33.

Ecuador: Salango Island. 3 fms, sand, Jan. 18, 1935, Sta. 398-35.

Type: The holotype (U.S.N.M. Cat. No. 90159) is the large female specimen from Sta. 398. All the material is preserved in the collection of the U.S. National Museum at Washington, D.C.

Remarks: This species differs strongly from all other west American species of *Pontonia*, but resembles most *Pontonia californiensis*. It may, however, immediately be distinguished from that species by the characters mentioned in the key.

The species is remarkable for its small size; that nevertheless most specimens are adult is shown by the female of Sta. 450, which is ovigerous.

***Pontonia californiensis* Rathbun**

Pl. 46, figs. a-i; pl. 47, figs. a-c

Pontonia californiensis Rathbun, 1902b, Proc. U.S. Nat. Mus., vol. 24, p. 902; Rathbun, 1904, Harriman Alaska Exped., vol. 10, p. 33, fig. 11; Ritter, 1913, Proc. U.S. Nat. Mus., vol. 45, p. 497. Borradaile, 1917, Trans. Linn. Soc. Lond. Zool., ser. 2, vol. 17, p. 391; Schmitt, 1921, Univ. Calif. Publ. Zool., vol. 23, p. 38, fig. 23.

Description: The rostrum is compressed, though rather narrow. It is slightly directed downwards and reaches about the middle of the second segment of the antennular peduncle. The upper surface is flat, the lower bears an obtuse longitudinal median carina. There is one small blunt tooth near the apex on the upper margin, between this tooth and the apex some long hairs are present. No tooth is present on the lower margin. The carapace is smooth. The antennal spines are absent. The lower angle of the orbit is triangular, and produced forwards. The anterolateral angle of the carapace is broadly rounded and strongly produced forwards.

The abdomen is smooth. All pleurae are rounded. The sixth segment is about 1.2 times as long as the fifth and somewhat more than half as long as the telson. The dorsal spines on the telson are long and slender, both pairs are placed in the anterior half of the telson, close to the lateral margins. The posterior margin bears the usual 3 pairs of spines. The outer spines are very strongly reduced and almost invisible, the intermediate and inner pairs are well developed and of about equal length.

The eyes overreach the antennal spine when directed outwards. The cornea is slightly narrower and distinctly shorter than the eyestalk. No ocellus is observed.

The antennular peduncle has the stylocerite short, broad and rather bluntly pointed. The anterolateral angle of the segment is forwardly produced and ends in a blunt short spine. The last two segments are short, the third is shorter than the second. The upper antennular flagellum is short, thick and recurved. The fused part consists of 4 joints and is much more than twice as long as the two-jointed free part of the shorter ramus.

The scaphocerite is oval in shape; it fails to reach to the end of the antennular peduncle. It is less than twice as long as broad. The outer margin is convex and ends in a very large inwardly curved tooth, which

slightly overreaches the lamella. The antennal peduncle reaches somewhat beyond the scaphocerite. There is no outer spine near the base of the scaphocerite.

The oral parts strongly resemble those of *P. pinnae*. The mandible, maxillula and second maxilliped show no appreciable difference at all with those of the latter species. The maxilla has the upper lobe of the inner lacinia distinctly prolonged. The first maxilliped is more slender and has the exopod longer than in *P. pinnae*. The third maxilliped fails to reach the end of the scaphocerite. The penultimate segment is 1.2 times as long as the ultimate, and about $\frac{1}{5}$ of the length of the antepenultimate. The antepenultimate segment is broad throughout its length. The exopod reaches slightly beyond the antepenultimate segment. A strongly reduced arthrobranch is present.

The first pereopod reaches with a large part of the carpus beyond the scaphocerite. The fingers are slender and longer than the palm. The chela is about $\frac{4}{5}$ of the length of the carpus, which is as long as the merus. The second legs are strongly unequal in shape and strength. The larger of the two legs reaches with the carpus and chela beyond the scaphocerite. The fingers are about half as long as the palm. The cutting edge of the dactylus is provided with one heavy tooth in the middle and a much smaller one, halfway between the large tooth and the apex of the finger. The large tooth is slightly crenulated near the top. The cutting edge of the fixed finger too is provided with a larger and a smaller tooth. Here, however, the smaller tooth is the posterior and stands just behind the larger tooth of the dactylus, it is somewhat crenulated too. The larger tooth is smooth and placed between the two teeth of the dactylus. The palm is about quadrangular and somewhat swollen laterally, it is somewhat more than $1\frac{1}{2}$ times as long as broad. The surface of the palm is smooth to the naked eye, but minutely roughened when seen with a lens. Both upper and lower margins of the palm bear a sharp carina; these carinae are minutely serrate. The upper carina is only visible in the anterior half, posteriorly it gradually disappears. The lower carina starts close to the base of the palm and becomes inconspicuous near the base of the fixed finger. The carpus is short and triangular, it is about half as long as the palm; the upper surface is provided with a groove. The merus is short and broad, it is almost as long as the carpus and somewhat longer than the ischium. The lower margin of the ischium bears anteriorly a blunt broad tooth. There are no spines on any of the joints. The smaller leg reaches with part of the carpus beyond the

scaphocerite. The fingers are gaping, they are slightly longer than the palm. The fixed finger possesses a broad low tooth near the base, no other teeth are present on the cutting edges. But the edges of both fingers are provided over their entire length with very small denticles which become inconspicuous anteriorly. The palm is only slightly longer than broad and somewhat swollen, it has similar carinae as the larger leg, but they are much less distinct. The carpus is slightly shorter than the palm. Carpus, merus and ischium are similar to those of the larger leg. The third pereopod reaches with part of the propodus beyond the scaphocerite. The dactylus is rather elongate and is distinctly bifid; the posterior margin of the dactylus behind the proximal claw is almost straight and provided with some hairs. The propodus is about thrice as long as the dactylus; its posterior margin bears some few spinules near the base of the dactylus. The carpus is $\frac{2}{3}$ of the length of the propodus and half as long as the merus. The fifth leg is more slender than the third, and the propodus is relatively longer.

The first pleopod of the male has the endopod narrowly ovate, with some short stiff hairs on the inner margin and longer hairs on the top and the outer margin, there is no naked tongue-like tip as in *P. pinnae* and *P. margarita*. The second pleopod of the male has the appendix masculina slightly shorter than the appendix interna.

The uropods are broadly ovate and like *P. pinnae* and *P. margarita*, the outer margin of the exopod does not end in a tooth, but is rounded at the end and provided there with a movable spine.

Size: Of the three specimens of this species known at present, the male is 29 mm long, the females (both non-ovigerous) 17 and 21 mm.

Material examined: One specimen, the only male specimen known thus far, was collected by the 1940 Allan Hancock Expedition from: California: Santa Rosa Island, 1 mile south of Eastpoint. 15-16 fms, loose rock, sand, nullipores, April 10, 1941, Sta. 1284-41.

The U.S. National Museum possesses 2 female specimens of this species, one is the holotype. Both specimens originate from off Santa Cruz Island, California, 34° 00'N, 119°29'30"W, 30 fms, pebbles, small beam trawl, February 6, 1889, *Albatross* Sta. 2945.

Type: Holotype is the smaller female from off Santa Cruz Island, California. It is preserved in the U.S. National Museum.

Remarks: The species was described for the first time by Rathbun (1902b, 1904) after a female from *Albatross* station 2945, off Santa Cruz Island. This specimen was imperfect, missing the large claw, but

it was so different from the already known species, that Miss Rathbun was perfectly justified in describing it as new. The second record of this species is overlooked by most authors, as it is made in Ritter's (1913) paper on North Pacific Ascidians. He found a specimen of this species in a new Ascidian, *Phallusia vermiformis* Ritter (= *Ascidia vermiformis* (Ritter)), which like the type of *Pontonia californiensis* was collected by the *Albatross* at Sta. 2945. This record is of course highly important as it states the association of *Pontonia californiensis* with an Ascidian. This second specimen of *Pontonia californiensis* is also preserved in the collection of the U.S. National Museum, it is larger than the type, but unfortunately it only possesses one of the second chelipeds, which moreover is heavily damaged by missing the chela. The specimen of the Hancock Expedition is the largest known up till now, it is perfect in shape, possessing all the appendages. The species seems to be rare, and it is curious that all the three specimens known at present are collected at the north Channel Islands off the coast of California.

***Pontonia miserabilis*, new species**

Pl. 47, figs. d-i

Pontonia grayi p. p. Rathbun, 1902a, Bull. U.S. Fish Comm., vol. 20, pt. 2, p. 122 (non fig. 25).

Rathbun (1902a) after having described her new species *Pontonia grayi* after specimens from Porto Rico remarks: "a very small specimen without claws, and of seemingly the same species, was dredged by the *Fish Hawk* off Vieques Island, in 16 fathoms, station 6092." The specimen has been examined by me and showed to be quite different from *Pontonia grayi* (= *mexicana*) and from all other Atlantic species of *Pontonia*. It showed most resemblance to *P. californiensis* and *P. pusilla* by the absence of the antennal spine and by the very long tooth of the scaphocerite. The specimen is, however, in such a poor condition, that had it not previously been mentioned in literature, I should have refrained from describing or even mentioning it here. Now, however, I think it best to give as many details as are obtainable from this specimen, in order to make it possible for future workers, who may have better material to give additional details of this species.

The rostrum is narrow and slender and reaches to the end of the second segment of the antennular peduncle. A blunt and small tooth is present on the upper surface close to the tip, no tooth is visible on the lower surface. Some hairs are present between the upper tooth and the apex. (During the examination the rostrum broke, so that I am unable

to give a figure of it; it is, however, very similar to that of *P. californiensis*.) The carapace bears no antennal spine (in fact no spines at all). The lower orbital angle is triangular with a blunt top. The anterolateral angle of the carapace is broadly rounded and anteriorly produced.

The abdomen has the pleurae of the first five segments broadly rounded. The pleurae and the posterolateral angles of the sixth segment end in acute points, but are not produced in long spines. The sixth segment is somewhat longer than the fifth, and about $\frac{5}{8}$ of the length of the telson. The dorsal spines of the telson are placed in its anterior half and are very long. The anterior spines reach to the base of the posteriors. The posterior margin of the telson bears the usual 3 pairs of spines, the outer of which are very small.

The eyes have the cornea almost as broad as, but shorter than the eyestalk.

The antennular peduncle has the stylocerite broad and rather acutely pointed. The anterolateral angle of the basal segment of the peduncle ends in a sharp tooth. The second and third segments seem to be of about the same length. The flagella are in too poor a condition to be described.

The scaphocerite is about twice as long as broad. The outer margin is convex and ends in a long final tooth which overreaches the rounded anterior margin of the lamella. The antennal peduncle reaches to the end of the scaphocerite. No external spine is present in the basal part of the antennal peduncle.

As far as can be made out the oral parts do not seem to differ from those of *Pontonia californiensis*. The mandible has the incisor process slender and ending in five small teeth. The lower lobe of the inner lacinia of the maxilla is even less developed here.

The first leg reaches with the carpus beyond the scaphocerite. The fingers are slightly longer than the palm. The carpus is about as long as the chela and shorter than the merus. Both second legs are missing. The third leg reaches with part of the propodus beyond the scaphocerite. The dactylus is slender and distinctly biunguiculate. The posterior margin of the dactylus proximally of the accessory tooth is almost straight. The propodus is about thrice as long as the dactylus. Its posterior margin bears a spinule close to the base of the dactylus. The carpus is $\frac{2}{3}$ of the length of the propodus. The merus is somewhat longer than the propodus.

The pleopods (in my female specimen) and uropods are of the usual shape.

Size: The only specimen at my disposal, an ovigerous female, measures 8 mm. The eggs are 0.3 to 0.5 mm in diameter.

Material examined: The holotype and only specimen observed is deposited in the U.S. National Museum (Cat. No. 24669) and originates from off Vieques Island, Porto Rico (Culebritas light house, NE 3/8 E. 7¼ miles, 16 fms, coral, tangle, Feb. 8, 1899, *Fish Hawk* Sta. 6092).

Remarks: The species is closest related to *P. californiensis* and *P. pusilla*. From the first it differs in the shape of the antennulae and the first legs, from the second in the shape of the rostrum, and the telson. Further differences may be found, when undamaged specimens of the present species are discovered.

Pontonia unidens Kingsley

Pl. 47, figs. j-k

Pontonia unidens Kingsley, 1880, Proc. Acad. Nat. Sci. Phila. 1879, p. 422, pl. 14, fig. 9; Borradaile, 1898a, Ann. Mag. Nat. Hist., ser. 7, vol. 2, p. 389; Kingsley, 1899, Amer. Nat., vol. 33, p. 718, fig. 40; Borradaile, 1917, Trans. Linn. Soc. Lond. Zool., ser. 2, vol. 17, p. 391 (with question mark in synonymy of *Pontonia mexicana* Guér.).

Description: Kingsley's description of this species runs as follows: "Carapax pubescent, depressed; rostrum short, acute, slightly depressed, not extending as far forward as the eyes; orbital spine present though small; cervical suture well marked; eyes stout, reaching the last joint of the antennular peduncle. Antennulae with the joints of the peduncle sub-equal; the flagella very short, not as long as the peduncle, Antennal scale about twice as long as broad, extremity rounded and reaching to the last joint of the antennular peduncle. First pair of pereopoda slender, longer than the carapax; meros, carpus, and hand nearly equal, the fingers half as long as the palm. Second pair of feet unequal; larger hand inflated, longer than the carapax, pubescent; fingers one-third the length of the palm, incurved and slightly depressed; the dactylus with a large obtuse tooth near the base, which fits into a corresponding cavity in the pollex (as in many species of *Alpheus*); pollex without teeth. Smaller hand three-fourths as long as the larger, cylindrical straight fingers one-third as long as the palm. Remaining pereopoda moderate, minutely unguiculate. Telson about twice as long as broad, sides strongly arcuate [= arcuate]."

Size: "Length 10 mm."

Distribution: "Key West, Fla., A. S. Packard, Jr."

Type: "The types are in the Museum of the Peabody Academy of Science at Salem, Mass." The present whereabouts of the types, if still extant, are not known to me.

Remarks: I am entirely at a loss as to where this species has to be placed, the description and figure give insufficient clues. The only American Pontonids which have the second legs as described and figured by Kingsley are the species of *Periclimenaeus*, which, however, have the carapace not pubescent and provided with a distinct cervical groove; they do not have the rostrum depressed and the eyes are shorter than described by Kingsley. The genus *Pontonia* has the depressed rostrum, but it has the carapace not pubescent and provided with a cervical groove either, while furthermore the second legs and the eyes are different.

The identity of this species with *Pontonia mexicana* as thought possible by Kingsley himself and by Borradaile, 1917, is certainly not true.

Genus TYPTON Costa, 1844

Definition: The body is plump, almost cylindrical, being slightly more compressed than depressed. The rostrum is simple, and compressed. The carapace is smooth. Only antennal spines are present. These antennal spines are placed rather high on the anterior margin of the carapace and partly cover the eye. It is therefore not certain that the name antennal spine is correctly applied here. But until it is proven that these spines in *Typton* are something different from the antennal spines of other Palaemonids, I will use this name. Several authors named these spines supra-orbital, but I cannot agree with them in this respect, as supraorbital spines have a quite different position, posterior to and removed from the orbital margin. The anterior margin of the carapace is strongly produced forwards.

The abdomen has the pleurae of the first five segments rounded.

The scaphocerite is strongly reduced, hardly reaching to the base of the last segment of the antennal peduncle or falling short of it.

The mandible bears no palp. The incisor process may be reduced or even absent. The inner lacinia of the maxillula is slender. All maxillipeds are provided with well developed exopods.

The first leg has the carpus unsegmented. The second legs are very heavy and unequal. The last three legs are rather robust, the posteriors

are more slender than the anterior. The dactylus is bifid. No basal tubercles are present on the dactylus.

The pleopods differ from those of all other Pontonids observed by me by having the second pleopod of the male without appendix masculina. All pleopods, except the first, in both sexes are provided with appendices internae.

The uropods are ovate. The outer margin of the exopod is entire or serrate in the distal part. A movable spine is present at the inner side of the final tooth of the outer margin of the exopod.

Many, if not all, species of this genus live commensally in sponges.

Type: The types species is *Typton spongicola* Costa, 1844, from the Mediterranean and Eastern Atlantic.

Remarks: The present genus seems to be most closely related to *Periclimenaeus*. In *Typton* the reduction in the size of the scaphocerite has gone still further than in *Periclimenaeus*, while also the rostrum is smaller and without teeth. Like in *Periclimenaeus* the incisor process of the mandible in some species is reduced, while in *Typton* there even is a species without this process. Furthermore the appendix masculina, which is already small in males of *Periclimenaeus*, is entirely absent in *Typton*. With the genus *Paratypton* from the indo-westpacific region, the present genus has the strong reduction of the scaphocerite in common.

Up till now only 3 species of this genus were known, one from the Eastern Atlantic, one from the Red Sea and one from Tortugas. It was therefore a surprise to find not less than seven species represented in the material studied, six of these species are new. Of the seven American species known at present, five occur on the Atlantic side and three on the Pacific side.

KEY TO THE AMERICAN SPECIES OF TYPTON.

1. Outer margin of uropodal exopod entire. 2
 - 1¹. Outer margin of uropodal exopod serrate in the distal part. 6
2. Dactylus of both second legs semicircular by having the upper margin strongly convex. Inner side of cutting edge of fixed finger of smaller second leg not produced to a lamella, which partly covers the dactylus. Antennal spine, when seen laterally, broad, tooth-shaped and not spiniform. Carpus of large second leg with spinules on lower border. *tortugae*
- 2¹. Dactylus of both second legs not semicircular, generally being elongate, with upper margin straight or only slightly convex.

- Inner side of cutting edge of fixed finger of smaller second leg produced to a lamella, which partly covers the inner side of dactylus. Antennal spine strong and spiniform. Carpus of large second leg without lower spinules. 3
3. Rostrum distinctly longer than antennal spines. Mandible with a well developed incisor process in adults. Dactylus of large second leg swollen, blunt, hammer-shaped, distinctly longer than fixed finger. 4
- 3¹. Rostrum about as long as antennal spines. Mandible in adult specimens with the incisor process reduced or wanting. Dactylus of large second leg slender, about as long as or slightly longer than fixed finger, never blunt and hammer-shaped. 5
4. Posterior margin of sixth abdominal segment rounded in the middle. *vulcanus*
- 4¹. Posterior margin of sixth abdominal segment in the middle with a distinct tooth. *hephaestus*
5. Dactylus of last three legs distinctly bifid. Fingers of larger second leg in the same plane as the palm. Mandible without incisor-process. *gnathophylloides*
- 5¹. Dactylus of last three legs indistinctly bifid. Fingers of larger second leg twisted and lying in a plane almost vertically on that of the palm and the fixed finger. Mandible in adults with a reduced incisor process. *carneus*
6. Outer margin of uropodal exopod serrate in distal third only. Uropodal exopod broadly ovate. Posterior pair of dorsal spinules of telson placed slightly before middle of telson. *prionurus*
- 6¹. Outer margin of uropodal exopod serrate in more than its distal half. Uropodal exopod elongate ovate. Posterior pair of dorsal spines of telson placed close to anterior pair in anterior quarter of telson. *serratus*

Typton tortugae McClendon

Pl. 43, figs. a-o

Typton tortugae McClendon, 1910, Pap. Tortugas Lab., vol. 3, p. 57, pl. 1, fig. 2; Schmitt, 1930, Yearb. Carnegie Inst. Wash., vol. 29, p. 344, figs. 1-10; Pearse, 1932, Pap. Tortugas Lab., vol. 28, pp. 119, 121; Arndt, 1933, Mitt. Zool. Mus. Berlin, vol. 19, pp. 250, 251; Gurney, 1936, Proc. Zool. Soc. Lond., 1936, p. 619.

Description: The rostrum is simple, spine-like, without teeth. It is directed straight forwards, only the extreme tip is curved upwards, the tip reaches about to the middle of the eyestalk. The carapace is smooth. The antennal spine is small, tooth-like and placed on the lower orbital angle. No other spines are present. The anterolateral angle of the carapace is broadly rounded and anteriorly produced.

The abdomen has the pleurae of the first five segments rounded. In the sixth segment both the pleurae and the posterolateral angle end in a sharp point. The fifth and sixth abdominal segments are of about the same length. The telson is about 1.5 times as long as the sixth segment. It is rather broad. The posterior of the two pairs of dorsal spines is situated slightly behind the middle of the telson, the anterior pair lies somewhat closer to the anterior margin of the telson than to the posterior pair of spines. The posterior margin of the telson bears three pairs of spines. The outer spines are extremely short; the intermediate are well developed, and are somewhat longer and stronger than the inner spines. Some two hairs are present between the inner and intermediate spines.

The eyes have the cornea well developed and rounded. It is somewhat shorter than the stalk. The eyes fail to reach the end of the basal segment of the antennular peduncle.

The antennular peduncle has the basal segment very long and slender. The stylocerite is rather short and broad and falls largely short of the middle of the basal segment, the apex ends in a rather sharp point. The second and third segments are of about the same breadth as the first, but they are much shorter, being together about half as long as the basal segment. The second segment is somewhat shorter than the third. Of the upper antennular flagellum both rami are completely fused. The lower five or six joints are broadened.

The antenna has the scaphocerite very strongly reduced, it is only visible under strong magnification as a small triangular scale. The antennal peduncle reaches slightly beyond the second segment of the antennula.

The mandible bears no palp, the incisor process ends in some three small teeth, the molar process bears a row of spinules at the top. The maxillula has the inner lacinia slender, the upper lacinia is somewhat broadened, the palp is indistinctly bilobed. The maxilla has the endite deeply cleft, both lobes are rather broad, the palp is normal in shape, the scaphognathite is large and not very broad. The maxillipeds all possess exopods. The basis and coxa of the first maxilliped are fused and show no notch on their line of separation; the palp is rather large

and curved; the exopod has the flagellum well developed, with a distinct elongate caridean lobe; the epipod is distinctly bilobed. The second maxilliped is normal in shape and bears a large epipod. The third maxilliped reaches slightly beyond the eyes. The penultimate joint is almost 1.5 times as long as the ultimate and 0.6 times as long as the antepenultimate; the exopod reaches slightly beyond the end of the antepenultimate segment.

The first leg reaches with the entire carpus and often with part of the merus beyond the antennular peduncle. The fingers are short, being about 0.6 times the length of the palm. The carpus is slightly longer than the chela and somewhat shorter than the merus. The second legs generally are unequal in size (in only one of my specimens they are equal), but of about equal shape. They reach with the carpus or even part of the merus beyond the antennular peduncle. The fingers are slightly less than half as long as the palm. They are strongly compressed. The dactylus is semicircular in shape, having the upper margin very strongly convex (in young specimens it is more elongate); the cutting edge of the dactylus only possesses a shallow tooth near the base, the rest of the edge is unarmed, the tip of the dactylus is curved. The fixed finger is straight, it is slightly shorter than the dactylus and tapers regularly from the base towards the tip; one distinct tooth is present at the inner side of the basal part of the cutting edge. The palm is compressed and somewhat swollen, both upper and lower margins are convex, near the base of the dactylus the palm narrows abruptly, so that there is a deep emargination in the upper margin of the chela near the dactylo-propodal articulation. Very minute tubercles form a honey-comb pattern over the surface of the palm. The carpus is conical in shape and about half as long as the palm. In the larger chela the lower margin of the carpus shows some indistinct crenulations. The merus measures $\frac{2}{3}$ of the length of the carpus, here the lower margin bears several small spinules. The ischium is of about the same length as the merus, its lower margin is smooth or slightly crenulated in the anterior part. The third leg reaches with part of the carpus beyond the antennular peduncle. The dactylus is small and elongate triangular, it is bifid. The accessory tooth is very small and lies about at $\frac{1}{3}$ of the length of the posterior margin of the dactylus from the tip. The propodus is rather broad, it is more than three times as long as the dactylus, the posterior margin bears two spinules. The carpus is only a little shorter than the propodus and about the same height. The merus is about 1.3 times as long as the propodus, but is higher than that joint. The ischium measures $\frac{5}{7}$ of the length of the merus. The fourth and fifth legs are more slender than the third.

The pleopods are normal in shape. No appendix masculina is present in the males.

The uropods are broadly ovate. The outer margin of the exopod ends in a tooth, which at its inner side bears long and movable spine.

Size: The ovigerous females are 11 to 15 mm long. The eggs measure 0.4 to 0.6 mm.

Colour: A specimen from the west side of Loggerhead Key, Tortugas, is accompanied by a note written by Dr. Waldo L. Schmitt describing the fingers to be pale drab red, speckled, and the eggs to be vermilion. A coloured figure of the species has been given by McClendon (1910, pl. 1, fig. 2).

Material examined: In the U.S. National Museum material of this species is present from: Mouth of Indian River, Fla. (March 21, 1874, E. Palmer coll.), Tortugas, Fla. (shallow water, in loggerhead sponge, July 29, 1931, A. S. Pearse coll.), Fort Jefferson, Tortugas, Fla. (E. of fort landing dock, picked from *Porites* debris, July 22, 1930, W. L. Schmitt coll. Sta. 28-30), White Shoals, 5 miles S. of Loggerhead Key, Tortugas, Fla. (from inside a loggerhead sponge, which was 14 inches in diameter and 8 inches high, 7 to 10 fms, July 20, 1924, W. L. Schmitt coll. Sta. 33-24), off west side of Loggerhead Key, Tortugas, Fla. (7 feet water, from loggerhead sponge, 18 inch top diameter, 12 inch bottom diameter and 12 inches high, Aug. 14, 1924, W. L. Schmitt coll.), Loggerhead Key, Tortugas, Fla. (from loggerhead sponge, July 8, 1931, A. S. Pearse coll.), Southern part of the Gulf of California, 24° 12' N, 109° 55' W, (9.5 fms, bottom shingle, April 30, 1888, *Albatross* Sta. 2826).

The lower California specimen was found in the same sample with the type specimens of *Synalpheus townsendi mexicana* Coutière and *Typton hephaestus* new species.

Distribution: The present species is known from Bermuda, Florida and the Gulf of California. The records in literature are: Outside Castle Harbour, Bermuda (Gurney, 1936), Tortugas, Florida (McClendon, 1910; Schmitt, 1930; Pearse, 1932). The species inhabits sponges of the species *Speciospongia vespara* (Lam.) and *Stematumenia strobilina* (Lam.) and is found there in company with *Synalpheus brooksi* Coutière. The latter species generally occurring in large numbers, while the number of specimens of *Typton* in a sponge is small. Gurney (1936) reports his specimen from coral rock. The species lives in shallow water (up to 10 fms).

Type: The holo- and paratypes are from Tortugas, Florida, July 1908, J. F. McClendon coll. The specimens probably have to be in the collections of the U.S. National Museum, but I could not locate them there.

Remarks: McClendon (1910) in a paper "On Adaptations in Structure and Habits of some Marine Animals of Tortugas, Fla." dealt with the present species, which was undescribed at that moment. He also gives figures of it, and uses the manuscript name *Typton tortugae* Rathbun. As McClendon gives a figure from which the animal may be recognized, he becomes the author of the name *Typton tortugae* for this species, and neither the author's name Rathbun nor Schmitt (the latter gave the first systematic description of the animal in 1930) may be used.

I cannot find any marked differences between the Lower California specimen and the material from the east coast, so that we must assume that the species occurs on both coasts.

***Typton vulcanus*, new species**

Pl. 49, figs. a-n

Description: The rostrum is slender, pointed and unarmed. It is directed forwards or somewhat downwards and has the tip curved up slightly. It reaches beyond the base of the cornea. The antennal spines are well developed and spiniform, but they fall distinctly short of the tip of the rostrum. The carapace and abdomen are as in *T. tortugae*. The telson has the posterior of the two dorsal pairs of spines situated in about the middle, the anterior pair is placed about midway between the posterior pair and the anterior margin of the telson. These spines are well developed, but not very long. The posterior margin of the telson bears the usual 3 pairs of spines.

The eyes are well developed. They do not reach the end of the basal segment of the antennular peduncle.

The basal segment of the antennular peduncle has the stylocerite short, broad and blunt, it fails to reach the middle of the segment. No spine is present at the anterolateral angle of the basal segment. The second segment is slightly shorter than the third. The upper antennular flagellum is fused for 4 joints, 1 joint of the shorter ramus is free.

The antennal peduncle has the scaphocerite very small and oval in shape. The peduncle itself fails to reach the base of the third antennular segment.

The mouth parts show much affinity to those of *T. carneus*. The mandible bears a well developed incisor process, which in the distal

part is crenulated by the presence of about 20 blunt small teeth; the molar process ends in some slender points. The maxillula is normal in shape. The maxilla has the inner lacinia not cleft. The first and second maxillipeds are normal. The third fails to reach the end of the first joint of the antennular peduncle. The ultimate segment is slightly shorter than the penultimate and half as long as the antepenultimate. The exopod reaches slightly beyond the antepenultimate segment.

The first pereiopod reaches with the carpus beyond the antennular peduncle. The fingers are rather elongate, being 0.8 times as long as the palm. The carpus and merus are rather broad. The carpus is 1.2 times as long as the chela and 0.8 times as long as the merus. The second legs are strongly unequal, they reach with part of the carpus beyond the scaphocerite. The fingers of the larger leg are very short and unequal. The dactylus is about $\frac{1}{3}$ of the length of the palm, it is heavy, blunt, hammer-shaped and twisted, strongly resembling the dactylus of some Alpheidae like: *Alpheus idiocheles* Cout. This very plump dactylus is longer than the short triangular fixed finger, which bears a large blunt tooth at the outer side of the basal portion of the cutting edge. The palm is strongly swollen and is only slightly broadened posteriorly. The carpus is somewhat less than half as long as the palm. The merus is $\frac{2}{3}$ of the length of the carpus and bears some posterior spinules. The ischium is somewhat longer than the merus. The smaller second leg strongly resembles that of *T. gnathophylloides* and *T. carneus*, by having the inner side of the cutting edge of the fixed finger lamelliform produced, so as to cover the larger part of the inner side of the dactylus. The upper margin of the dactylus is rather strongly convex. The carpus is about half as long as the chela and 1.2 times as long as the merus. The ischium is longer than the merus. A few spinules may be seen at the posterior margin of the merus. The third leg reaches with the propodus beyond the antennular peduncle. The dactylus is distinctly bifid and bears some small spinules on the posterior margin proximally of the accessory tooth. The propodus is about five times as long as the dactylus and bears some posterior spinules, especially in the distal part. The carpus is slightly shorter than the propodus and 0.8 times as long as the merus. The fourth and fifth legs are similar to the third, but are more slender.

The pleopods are normal.

The uropods are ovate. The outer margin of the exopod is entire and ends in a strong tooth, which bears a movable spine at the inner side.

Size: The specimens examined by me are 8 to 10 mm long. No ovigerous females are present in the material.

Material examined: One specimen of this species (a paratype) was collected during the 1930 Allan Hancock Expedition:

Colombia: 2 miles south of Cape la Vela. 21-22 fms, gray sand, April 8, 1939, Sta. A 14-39.

In the U. S. National Museum two specimens of this species (holo- and paratype) are present (Cat. No. 90191). They were collected south of Tortugas, Fla. (40 fms, August 4, 1931, W. L. Schmitt coll.).

***Typton hephaestus*, new species**

Pl. 49, figs. o-p

This species is extremely close to *Typton vulcanus*, in fact the only distinct difference between the two forms is the shape of the posterior margin of the sixth abdominal segment. In *T. vulcanus* this margin is evenly rounded between the posterolateral angles, while in *T. hephaestus* there is a distinct median tooth on this margin, which in my female specimens is single, while in the only male specimen this tooth has a bifid top. Furthermore in my material of *Typton hephaestus* the anterior margin of the carapace seems to be produced less far forwards than in *T. vulcanus*, while also the merus of the larger second leg is somewhat broader and the stylocerite is pointed. These latter three characters may be variable and of little use to separate the two species.

Size: The ovigerous females are 10.5 and 11 mm long. The eggs are 0.4 to 0.6 mm in diameter.

Material examined: In the U.S. National Museum three specimens of this species (Cat. No. 90190) are present from the southern part of the Gulf of California, 24°12'N, 109°55'W, (9.5 fms, bottom shingle, April 30, 1888, *Albatross* Sta. 2826).

Type: Holotype is the largest female of this sample.

Remarks: This species may be considered to be the Pacific representative of *Typton vulcanus*.

***Typton gnathophylloides*, new species**

Pl. 50, figs. a-l

Description: The rostrum is simple, pointed and with the extreme tip curved upwards. It reaches about as far forwards as the antennal spines and fails to attain the base of the cornea. The carapace is provided with antennal spines only. The antennal spines are strong and partly

cover the eyestalk, they are almost as strong as the rostrum. The anterior margin of the carapace is produced forwards below the antennal spine and is broadly rounded.

The abdomen has the pleurae of the first five segments broadly rounded. The pleurae and the posterolateral angles of the sixth segment end in distinct sharp points. The sixth segment is as long as the fifth. The telson is more than half as long again as the sixth segment. The posterior of the two pairs of dorsal spines is situated in the middle of the telson, the anterior pair lies somewhat closer to the anterior margin of the telson, than to the posterior pair. The posterior margin of the telson bears the usual three pairs of spinules, the outer of which are very short, the inner of about equal length. Some hairs are present between the inner and intermediate spines.

The eyes are normal in shape, the cornea is rounded, pigmented and shorter than the stalk. The eyes fail to reach the end of the first segment of the antennular peduncle.

The antennular peduncle has the stylocerite rather small and pointed, it fails to reach the middle of the basal segment. No anterolateral spine is present on this basal segment. The second and third segments are of about the same length and together they are about half as long as the first segment. The two rami of the upper antennular flagellum are fused for about four joints, one small joint of the shorter ramus is free.

The antenna bears a small degenerated triangular scaphocerite at its base. This scaphocerite fails to reach the base of the ultimate segment of the peduncle. The peduncle is slender.

Except for the mandible the oral parts show no essential differences with those of *T. tortugae*. The mandible, however, is very curious by missing the incisor process entirely. The molar process ends in some teeth. The third maxilliped reaches about to the end of the antennal peduncle. The ultimate joint is somewhat shorter than the penultimate, which is broadened by having the lower margin distinctly convex. The antepenultimate joint is about twice as long as the penultimate. The exopod reaches about to the end of the antepenultimate joint.

The first pereopod reaches with the carpus beyond the antennal peduncle. The fingers are short and blunt and measure 0.6 times the length of the palm. The carpus is 1.3 times as long as the chela and 0.8 times as long as the merus. The second legs are unequal in shape and size. The larger has the fingers about half as long as the palm. The dactylus is elongate, with the upper margin about straight, except near the tip where it is strongly convex. No teeth are visible on the cutting

edge of the dactylus. The fixed finger bears one indistinct tooth at the internal side of the basal part of the cutting edge. The fixed finger narrows regularly towards the acute and upwards curved tip. Both fingers lie in the same plane as the palm. The palm is heavy and swollen, it is higher posteriorly than anteriorly, both upper and lower margins are about straight. The carpus is rather short and triangular, it measures about 0.4 times the length of the chela. The lower margin of the carpus is smooth. The merus is about $\frac{4}{7}$ of the length of the carpus, its lower margin is provided with small spinules. The ischium is longer than the merus. The smaller leg has fingers $\frac{2}{3}$ of the length of the palm. The fingers are elongate triangular, the upper margin of the dactylus is only slightly curved. The inner margin of the cutting edge of the fixed finger is produced to a lamellar plate, which partly covers the dactylus, this lamella is highest near the base. The palm is slightly broadened posteriorly. The carpus is elongate and measures more than half the length of the chela. The merus is $\frac{3}{4}$ of the length of the carpus and slightly shorter than the ischium. The third leg reaches with the propodus beyond the antennal peduncle. The dactylus is distinctly bifid, with the additional tooth large (pl. 50, fig. 1 shows the dactylus of an abnormal specimen). The posterior margin of the dactylus proximally of the accessory tooth shows some very small spinules. The propodus is thrice as long as the dactylus, its posterior margin bears several spines. The carpus is about $\frac{7}{8}$ of the length of the propodus and 0.7 of that of the merus. The fourth and fifth legs are smaller and slenderer and have the dactylus less distinctly bifid.

The uropods are ovate in shape. The outer margin of the exopod is entire and ends in a distinct final tooth, which at its inner side bears a movable spine.

Size: The largest specimen, an ovigerous female, is 8 mm long. The eggs have a diameter of 0.5 to 0.6 mm.

Material examined: Of this species only two specimens are at my disposal, both belonging to the collection of the U.S. National Museum and originating from Tortugas (about 13 miles S. of No. 2 Red Buoy, 27' ottertrawl, net up at 45 fms end of haul, June 10, 1925, W. L. Schmitt coll., Sta. 210-25 (holotype) U.S.N.M. Cat. No. 89026; Fort Jefferson, E. of fort landing dock, picked from *Porites* debris, July 22, 1930, W. L. Schmitt coll., Sta. 28-30).

Remarks: This species especially is remarkable for the absence of the incisor process of the mandible, which would exclude it from the Palaemonidae as generally defined and place it among the Gnatho-

phyllidae. From the latter family, however, it differs in having the endites of the maxilla well developed and the maxillipeds slender. I have no doubt that the species is a *Typton*, as is shown by all the characters, except that of the mandible. There is a tendency among the Pontonids to have the incisor process diminishing in size (cf. *Periclimenaeus bermudensis* and *Periclimenaeus pacificus*).

***Typton carneus*, new species**

Pl. 51, figs. a-o

Description: The rostrum is short, straight and simple. It reaches about to the base of the cornea in adult specimens, while it only slightly overreaches the base of the ocular peduncle in young specimens. In several old specimens the rostrum as well as the antennal spines are directed upwards so that it seemingly does not reach as far as the base of the cornea. (In the paratypes the rostrum is less high than in the holotype.) The antennal spines are strong and spiniform, they reach about as far forwards as the rostrum. The general shape of the carapace and the abdomen is as in the previous species. The shape of the telson too is like in that species. The dorsal spines are well developed, the posterior pair is situated in the middle of the length of the telson, the anterior pair lies slightly closer to the anterior margin of the telson than to the posterior pair. The posterior margin is normal in shape.

The eyes in adult specimens fall largely short of the end of the basal segment of the antennular peduncle, in juveniles they reach about to the end of that segment. They are normal in shape.

The basal segment of the antennula is elongate, the stylocerite is broad and pointed, failing to reach the middle of the segment. The second and third joints are short, the third being shorter than the second, together they are less than half as long as the first. The upper antennular flagellum has the two rami fused for one or two joints only, the shorter ramus possesses one free joint.

The antennal peduncle has the scaphocerite strongly degenerated and oval in shape.

The mandible has the incisor process strongly reduced in adult specimens, in juveniles that process is well developed and bears several teeth on the edge, the molar process is pointed at one side. The maxillula is as in *T. tortugae*. The maxilla is typical, but for the fact that the endite is not cleft at all. The first and second maxillipeds show no differences from those of *T. tortugae*. The third maxilliped fails to reach the end of the basal segment of the antennular peduncle. The last joint

is about $\frac{3}{4}$ of the length of the penultimate and half as long as the antepenultimate. The exopod reaches beyond the end of the antepenultimate joint.

The first leg reaches with the carpus beyond the antennular peduncle. The fingers are short and blunt, the palm is 1.4 times as long as the fingers. The carpus is slightly longer than the chela and about 0.8 times as long as the merus. The second legs are unequal; they reach with the carpus beyond the antennal peduncle. The fingers of the large leg are about $\frac{4}{7}$ of the length of the palm in adult specimens, $\frac{2}{3}$ of that length in juveniles. The dactylus is slender, with the upper margin straight and almost parallel to the lower margin. In adult specimens the dactylus is curved so that it lies in a plane which is placed almost vertically on the plane in which the propodus lies. In young specimens both fingers are situated in the same plane. The fixed finger too is rather slender and possesses a tooth at the inner side of its basal part. The palm is high, compressed and slightly swollen. The carpus is conical, being broadest anteriorly. It is half as long as the palm in adults, $\frac{2}{3}$ as long as the palm in juveniles. There are no spinules on its lower margin. The merus measures about 0.6 times the length of the carpus. The lower margin of the merus is provided with spinules. The ischium is about as long as the merus and bears a few or no spinules on the lower margin. The smaller second leg has the fingers $\frac{2}{3}$ of the length of the palm. Just like in *T. gnathophylloides*, here too the inner margin of the cutting edge of the fixed finger is lamelliform produced and partly covers the inner surface of the dactylus. The shape of the smaller second leg very strongly resembles that of the smaller leg of *T. gnathophylloides*. The carpus is elongate, being somewhat shorter than the palm. The merus is as long as the ischium and 0.6 times as long as the carpus, some indistinct spinules are visible on the lower margin of the merus. The third leg reaches with part of the carpus beyond the antennular peduncle. The dactylus is bifid but the additional tooth is so small and placed so close to the apex that it is visible only under a powerful lens. Behind this accessory tooth some minute spinules are present on the posterior margin. The propodus is about four times as long as the dactylus and it bears some small spinules on the posterior margin. The carpus is slightly shorter than the propodus, while the merus is slightly longer than the latter joint. The fourth and fifth legs resemble the third but are more slender.

The pleopods are typical for the genus. No appendix masculina is present.

The uropods are ovate. The exopod has the outer margin entire and ending in a distinct tooth, which at its inner side bears a movable spine.

Size: The specimens observed by me measure 5 to 15 mm. Oviparous females are 14 and 15 mm long. The diameter of the eggs is 0.5 to 0.7 mm.

Colour: The colour of the holotype was noted by Dr. Waldo L. Schmitt on the label as follows: "Flesh color; eyes vermilion with black center."

Material examined: In the collection of the U.S. National Museum 16 specimens of this species are present. They originate from: Tortugas, Fla. (not far from Nun Buoy, course S. x W., 67 feet depth, June 20, 1931, W. L. Schmitt coll., Sta. 5-31; S. of Tortugas, 40 fms, Aug. 4, 1931, W. L. Schmitt coll.), off the west coast of Florida (27°04'N, 83°21'15"W, 26 fms, coarse gray sand and broken shells, March 18, 1885, *Albatross* Sta. 2409), Los Arroyos, west coast of Cuba (in sponge, May 20, 1914, Cruise of the *Tomas Barrera*, Sta. 8).

Type: The holotype is the specimen from Tortugas, Fla. (W. L. Schmitt coll., Sta. 5-31), U.S.N.M. Cat. No. 89023.

Remarks: The species seems to be most closely related to *T. gnathophylloides*. It may be distinguished, however, from that species by several very distinct characters as the shape of the larger second leg and that of the dactylus of the last three legs. By the presence of a very reduced incisor process on the mandible in the adults and a well developed one in the young specimens, the present species forms a transition between *T. gnathophylloides* and the other *Typton* species, in the former this process is entirely wanting, in the latter it is fully developed.

The specimens from the cruise of the *Tomas Barrera*, 12 in all, were sent together with the other Decapod material of that cruise to Dr. Mary J. Rathbun and were recognized by her as belonging to a new species, since in the vial with these specimens a label was found in Miss Rathbun's handwriting with the inscription "Pontoniidae nov."

A specimen from Osborn Island in Gardner Bay, Hood Island, Galapagos Archipelago (shore, rock, Jan. 31, 1934, Allan Hancock Expeditions Sta. 202-34) and one from SE of Cormorant Point, Charles Island, Galapagos Archipelago (shore, Jan. 29, 1933, Allan Hancock Expeditions Sta. 38-33) show much affinity to the present species, especially in the shape of the rostrum and the antennal spines, that of the telson, the reduced incisor process of the mandible and in the shape of the first and third legs. As, however, the second legs are missing in

both specimens, it is impossible to identify them with certainty, the more as it is quite well possible that they belong to an undescribed species.

Typton prionurus, new species

Pl. 52, figs. a-1

Description: The rostrum is simple, rather high and with the extreme tip curved upwards; it reaches about to the end of the ocular peduncle. The antennal spine is strong and spiniform, it is, however, much shorter than the rostrum. The carapace and abdomen are as in *T. serratus*.

The telson has the two pairs of dorsal spines large. The posterior pair is situated slightly before the middle of the telson, the anterior pair lies about midway between the posterior pair and the anterior margin of the telson. The posterior margin of the telson is as in *T. serratus*.

The eyes are well developed and normal in shape, they fail to reach the end of the basal segment of the antennular peduncle.

The basal segment of the antennular peduncle has the stylocerite short and rather broad, ending in a sharp point. No spine is present on the anterolateral angle of the basal segment. The second and third segments are of about equal length, together they are half as long as the basal segment. The upper antennular flagellum has the two rami fused for four joints, the free part of the shorter ramus consists of only one or two joints.

The antennal peduncle reaches about to the end of the antennular peduncle. The scaphocerite is very small and pointed, with the outer margin straight, the inner margin somewhat convex, it fails to reach the end of the penultimate joint of the antennal peduncle.

The mandible has the incisor process well developed and ending in some teeth, the molar process ends in blunt knobs and bears some spinules. The other mouth parts strongly resemble those of *T. tortugae*. The third maxilliped fails to reach the end of the basal segment of the antennular peduncle. The ultimate segment is slightly shorter than the penultimate and less than half as long as the antepenultimate. The exopod reaches somewhat beyond the end of the antepenultimate segment.

The first pereopod reaches with the carpus beyond the antennular peduncle. The fingers are short and blunt, they measure slightly more than half the length of the palm. The carpus is 1.2 times as long as the chela and $\frac{5}{6}$ of the length of the merus. The second legs are unequal in shape as well as in size. They reach with part of the carpus beyond

the antennal peduncle. The larger leg has the fingers elongate, they are about half as long as the palm and are curved inwards at the tip. The dactylus has the upper margin straight and about parallel to the cutting edge. The fixed finger regularly tapers towards the top and possesses a distinct tooth in the basal part of the inner side of the cutting edge. The fingers lie in the same plane as the palm. The palm is slightly swollen and broadens posteriorly. The carpus is triangular, being broadest anteriorly, it is about $\frac{2}{5}$ of the length of the chela. The lower margin of the carpus is provided with some small spinules. The merus is about 0.6 times the length of the carpus and too possesses spinules on the lower margin. The ischium is about as long as the merus. The smaller leg has the fingers half as long as the palm. The dactylus has the upper margin strongly convex, being thereby semicircular. The fixed finger regularly tapers towards the top and has a blunt and low tooth at the inner side of the basal portion of the cutting edge. The palm broadens posteriorly. The carpus is more elongate than in the larger leg, it is about $\frac{2}{5}$ of the length of the chela. There are no spinules on the ventral surface of the carpus. The merus is $\frac{3}{4}$ of the length of the carpus and is provided with some posterior spinules. The ischium is about as long as the merus. The third leg reaches with the propodus beyond the antennal peduncle. The dactylus is distinctly bifid; between the two teeth and behind the accessory tooth small spinules are present. The propodus is 3.5 times as long as the dactylus and bears some few spinules on the posterior margin. The carpus is about $\frac{5}{6}$ of the length of the propodus and $\frac{5}{7}$ of the length of the merus. The ischium is about as long as the carpus. The fourth and fifth legs are more slender than the third.

The pleopods are of the shape typical for this genus. The males possess no appendix masculina at the second pleopod.

The uropods are elongate. The posterior third of the outer margin of the exopod is distinctly serrate. A movable spine is placed at the end of the final tooth of that margin. The posterior margin of the exopod is broadly rounded.

Size: Of the two specimens at my disposal one is an ovigerous female of 7.5 mm, the other, probably a male, measures 7 mm. The eggs are rather large, being 0.4 to 0.5 mm in diameter.

Material examined: Of this species two specimens, the holotype (ovigerous female, Cat. No. 90154) and paratype are present in the U.S. National Museum at Washington, D.C. These two specimens, the only ones examined by me, originate from Tortugas, Fla. (in channel

between Middle Ground and White Shoal, 10 fms, Aug. 8, 1930, W. L. Schmitt coll., Sta. 45-30).

Remarks: This species is very closely related to *T. serratus* and *T. spongicola*, which both have the distal part of the outer margin of the uropodal serrate. From *T. serratus* it differs in the characters mentioned in the key. *T. spongicola* has the serrations of the uropodal exopod confined to a very small region in the extreme distal part of the outer margin, this serrated region is much larger in *T. prionurus*. In *T. spongicola* the posterior dorsal teeth of the telson are placed behind the middle of the telson. In the European species, moreover, the rostrum and antennal spines are better developed, while the smaller second leg has the upper margin of the dactylus only slightly concave, so that the dactylus is not semicircular as in both American species.

Typton serratus, new species

Pl. 53, figs. a-1

Description: The rostrum, like in the previous species is simple, without teeth. It reaches beyond the base of the cornea, and tapers gradually to a sharp tip, which is directed slightly upwards. The carapace is smooth and provided with antennal spines only. These antennal spines are strong and spiniform, differing much from those of *T. tortuga*, which are small and more or less tooth-shaped. The antennal spine is placed rather high on the anterior margin of the carapace and reaches more or less distinctly over the eye. Below this antennal spine the anterior margin of the carapace curves forwards and ends in a broadly rounded anterolateral angle.

The abdomen has the pleurae of the first five segments rounded. The pleura of the sixth segment ends in a sharp point, while the posterolateral angle of that segment is spiniform. The fifth and sixth abdominal segments are of about equal length. The telson is twice as long as the sixth abdominal segment. The two dorsal pairs of spines are very strong and are placed close together in the anterior quarter of the telson. The tips of the anterior spines almost reach the base of the posterior. The posterior margin of the telson is broad and bears the usual six spines, the outer pair of which is very short, the two inner pairs are long, being of equal length, though the inner spines are somewhat more slender than the intermediate; some hairs are present between the inner and intermediate spines.

The eyes are well developed and have the cornea rounded and well pigmented. They fail to reach the end of the first segment of the antennular peduncle.

The antennular peduncle has the stylocerite small and pointed, it fails to reach the middle of the basal segment of the peduncle. This basal segment is slender, it has no anterolateral spine. The second segment is shorter than the third, together these two segments are less than half as long as the first. The upper antennular flagellum has the two rami fused for about four joints, only one joint of the shorter ramus is free.

The antenna is provided with a very small degenerated rectangular scaphocerite, which fails to reach the end of the penultimate segment of the antennal peduncle. The end of the antennal peduncle falls just short of the end of the antennular peduncle.

The mandible has the incisor process provided with many small teeth at the distal end. The maxillula, maxilla, first and second maxillipeds are as in *T. tortugae*. The third maxillipeds fail to reach the end of the basal segment of the antennular peduncle. The ultimate joint of the third maxilliped is $\frac{3}{4}$ as long as the penultimate and half as long as the antepenultimate. The exopod slightly overreaches the antepenultimate joint.

The first leg reaches with part of the carpus beyond the antennular peduncle. The fingers are very short and blunt, being somewhat more than half as long as the palm. The carpus is about 1.2 times as long as the chela and $\frac{6}{7}$ of the length of the merus. The second legs are strong and unequal, sometimes the right, sometimes the left leg is the larger. The larger leg reaches with the carpus beyond the antennal peduncle. The fingers are slightly less than half as long as the palm. The dactylus does not lie in the same plane as the palm; it is twisted, and the inner side is concave. The upper margin of the dactylus is straight or slightly concave, except in the extreme distal part where it is convex. It never is semicircular as in *T. tortugae*. The cutting edge bears no teeth. The fixed finger is normal in shape, tapering regularly towards the tip, which is curved upwards; a distinct tooth is present at the inner side of the cutting edge. The palm is somewhat swollen, it is broader posteriorly than anteriorly; both upper and lower margins are straight. Many very small tubercles are visible on the surface of the palm. The carpus is about half as long as the palm, it is strongly constricted near the base, some small denticles are visible on the lower margin of the carpus. The merus is somewhat shorter than the carpus

and bears distinct denticles along the lower margin. The ischium is about $\frac{2}{3}$ as long as the merus. The smaller second leg has the dactylus lying in the same plane as the palm and the fixed finger, the upper margin is regularly convex giving the dactylus a semicircular appearance, there are no teeth on the cutting edge. The shape of the other joints of the smaller leg is like that of the corresponding joints of the larger leg. The fingers are less than half as long as the palm, the carpus, however, is distinctly more than half the palmar length. The merus is somewhat shorter than the carpus and about as long as the ischium. The third leg overreaches the antennular peduncle with the propodus. The dactylus is distinctly bifid, the accessory tooth lies relatively closer to the tip than in *T. tortugae*. Proximally of this accessory tooth there are minute denticles on the posterior margin of the dactylus. The propodus is rather broad, it is about thrice as long as the dactylus and also about thrice as long as it is high. There are about four strong spines on the posterior margin of the propodus. The carpus is as long as the propodus and $\frac{2}{3}$ of the length of the merus. The fourth and fifth legs are shorter and more slender than the third, but they are similar in shape to the third leg, though the posterior margin of the propodus of the fifth leg only bears some spines in the extreme distal part.

The pleopods are of the usual shape. No appendix masculina is visible in the second pleopods of the male.

The uropods are elongate. In the exopod the distal half of the outer margin is serrate, the teeth being rather large. A distinct movable spine is placed at the inner side of the posterior of the teeth. The specimen from Puerto Escondido and those from Tenacatita Bay are much smaller than the Galapagos specimens. They measure 4.5 to 7 mm, while the 7 Galapagos specimens are 9 to 14 mm long. The Mexican specimens differ from those from the Galapagos in the following points:

1. The rostrum is shorter, reaching only to about the middle of the eyestalk.
2. The posterior pair of dorsal spines of the telson is placed slightly in advance of the middle of the telson.
3. The large second chela is less elongate and has the palm relatively shorter, and of about the same height throughout its length.

These differences may be due to age only but it also is possible that we have to do here with two distinct forms. More material, especially adult material from Mexico can decide this question.

Size: Ovigerous females are 10 mm long. The eggs are 0.5 to 0.7 mm in diameter.

Colour: "Light Chinese orange; articulation of fingers darker coloured" (according to a field note by Dr. Waldo L. Schmitt on two specimens from Tagus Cove, Albemarle Island, Galapagos Archipelago).

Material examined: The Allan Hancock Expeditions 1934, 1935 and 1940, brought home specimens of this species from:

Lower California, Mexico: Puerto Escondido. 8-15 fms, sand, sponge, coral, Feb. 10, 1940, Sta. 1093-40.

Jalisco, Mexico: Tenacatita Bay. Lagoon, *Pinnas*, Feb. 15, 1935, Sta. 487-35.

Galapagos Islands, Ecuador: Albemarle Island, Tagus Cove. Shallow water, coral, in brilliant red sponge, Jan. 14, 1934, Sta. 152-34. From green sponge, Jan. 15, 1934. Charles Island, Cormorant Bay. 2 fms, dredging, Feb. 6, 1933, Sta. 59-33.

Distribution: This species occurs in the shallow waters of the American west coast from Lower California to the Galapagos Islands, and is an inhabitant of sponges.

Type: The holotype is a female from Sta. 152, the rest are paratypes. The holotype (Cat. No. 90162) and part of the paratypes are preserved in the collection of the U.S. National Museum, Washington, D.C., the other paratypes are in the collection of the Allan Hancock Foundation at Los Angeles, Calif.

Remarks: The present species immediately may be distinguished from most other species of this genus by the serrate outer margin of the uropodal exopod. In this respect it nears *Typton spongicola* and *Typton prionurus*. *Typton spongicola* Costa, a species inhabiting the eastern Atlantic, too has the ultimate part of the outer margin of the uropodal exopod serrate, though this serrated part is much shorter than in *Typton serratus*, also the arrangement of the dorsal spines of the telson in the European species is different. The only other American species with the outer margin of the uropodal exopod serrate is *Typton prionurus*, new species; the differences between this species and *T. serratus* have already been given in the key.

Typton SPECIES

In the Allan Hancock material two specimens of *Typton* are present, which differ from the described species and from each other, so that it is possible that they belong to two new species. The specimens are too small and too imperfect to justify making them the types of new

species. They will be preserved in the collection of the U.S. National Museum under the name *Typton species*. They originate from:

Colombia: Octavia Bay. Shallow water, coral, Jan. 28, 1935, Sta. 435-35. (One imperfect small specimen and some loose legs.) Gorgona Island. Shallow water, *Pocillopora* coral, Jan. 22, 1935, Sta. 411-35. (One imperfect specimen.)

Genus **FENNERA**, new genus

Definition: The body is depressed. The rostrum is short, compressed, and toothed. The carapace is smooth and provided with antennal spines, no supraorbital, hepatic or branchiostegal spines are present. Three to five spines are situated in an oblique row behind the antennal spine.

The pleurae of the first four abdominal segments are rounded.

The scaphocerite is well developed.

The mandible bears a large incisor process, but no palp. The maxilla with slender laciniae. The maxilla misses the inner lacinia. All maxillipeds are provided with exopods.

The first legs have the carpus not segmented. The second legs are stronger than the first. Their fingers are dorsoventrally depressed. The last three legs are slender with a simple dactylus, which has the posterior margin provided with a large basal tubercle.

The second to fifth pleopods bear appendices internae, while the second pleopod of the male is provided with an appendix masculina.

The outer margin of the exopod of the uropods ends in a movable spine.

The only species known of this genus probably lives epizootic on corals.

Type: *Fennera chacei*, new species.

Remarks: The genus comes closest to *Coralliocaris*, from which, however, it differs by the possession of a row of spines behind the antennal spine.

The only known species is:

Fennera chacei, new species

Pl. 54, figs. a-p

Description: The body is depressed. The rostrum is short and compressed, it is straight, and fails to reach beyond the eyes. The upper margin of the rostrum bears three, seldom four, teeth, one of which is

placed behind the orbital margin. The distance between the distal tooth and the tip of the rostrum is larger than that between the teeth themselves. The tip of the rostrum is slender and finely pointed. The lower margin bears no teeth at all. The carapace is rather smooth. No hepatic, branchiostegal or supraorbital spines are present. The antennal spine is distinct and is placed on the lower angle of the orbit. A broad ridge extends from the antennal spine obliquely backwards. There is a longitudinal row of three (sometimes up to 5) distinct spines, placed behind the antennal spine. The anterior margin is only slightly anteriorly produced, and the anterolateral angle of the carapace is rounded.

The abdomen has the pleurae of the first five segments rounded, those of the fourth and especially of the fifth segment are very small. The sixth segment is almost twice as long as the fifth and has the pleurae very small; both the pleurae and the posterolateral angles are rounded. The telson is about as long as the sixth abdominal segment, and it bears two pairs of dorsal spines. The anterior of these pairs of spines is situated somewhat behind the anterior third of the telson, the posterior pair is placed about halfway between the anterior pair and the posterior margin of the telson. This posterior margin bears the usual three pairs of spines, the intermediate of which are very strong. Between the inner spines some hairs may be observed.

The eyes are well developed, have the cornea distinct and rounded, and reach to the end of the basal segment of the antennular peduncle.

The antennular peduncle has the basal segment broad, with the stylocerite large and pointed, reaching distinctly beyond the middle of the segment. The anterolateral angle of the segment ends in a strong spine. The second and third segments are of about the same length, together they are more than half as long as the basal segment. The upper antennular flagellum has the two rami fused for three joints, the shorter ramus has only one joint free.

The scaphocerite is short and broad, reaching somewhat beyond the antennular peduncle, it is about twice as long as broad. The outer margin is slightly concave and ends in a distinct final tooth, which is overreached by the lamella. The antennal peduncle reaches about to the middle of the scaphocerite.

The mandible has the incisor process broadened at the end and its cutting edge is serrate in the lower part, entire in the upper. The molar process is relatively small and ends in a bunch of hairs. The maxillula has both the laciniae slender, the palp is slightly bilobed. The maxilla lacks the inner lacinia, the palp is distinct, the scaphognathite is well

developed and rather broad. All maxillipeds are provided with exopods. The first maxilliped has the basis and coxa completely fused, the palp is rather small, the caridean lobe well developed, the epipod is large and not bilobed. The second maxilliped is normal in shape, the exopod is long, the epipod bears no podobranch. The third almost reaches the end of the antennal peduncle. The last joint is about as long as, but distinctly narrower than the penultimate, together these two segments measure about 0.6 times the length of the antepenultimate. The exopod reaches to the end of the antepenultimate joint, a small arthrobranch is present.

The first leg reaches with the chela and part of the palm beyond the scaphocerite. The chela is long and slender, the fingers are relatively very short, being only half as long as the palm. The palm broadens posteriorly. The carpus is as long as the chela and somewhat shorter than the merus. The second legs are rather strong, but short, they are unequal in size, but of almost similar shape, the larger reaches with part of the chela beyond the scaphocerite, the smaller just attains the top of that scale. The fingers of the larger leg are short, dorsoventrally flattened and triangular, they are about $\frac{1}{5}$ of the length of the palm. The palm is swollen, being broadest anteriorly. The carpus is 0.6 times as long as the palm and gradually narrows posteriorly, it is as long as the merus, which is of the same length as the ischium. The smaller leg has the carpus relatively longer than the palm and shorter than the merus. The third leg reaches with part of the propodus beyond the scaphocerite. The dactylus is simple and curved, it bears a distinct tubercle in the basal part of the posterior margin. The propodus is about six times as long as the dactylus, it broadens proximally, no spines could be found on the posterior margin. The carpus is $\frac{2}{3}$ as long as the propodus. The merus is somewhat shorter than the propodus. The ischium is 0.7 times as long as the merus. The fourth and fifth legs are similar to the third.

The pleopods are normal in shape. The second to fifth pleopods bear appendices internae, while the second pleopod of the male moreover is provided with an appendix masculina, which is slightly shorter than the appendix interna. The endopod of the first pleopod in the female is very narrow, in the male it is broadly ovate.

The uropods are ovate. The outer margin of the exopod is entire and ends in a movable spine.

Size: The largest specimen seen by me measures 6 mm. Ovigerous females are 4 to 6 mm long, the eggs have a diameter of 0.4 to 0.5 mm.

Material examined: The 1933-1935 Allan Hancock Expeditions collected about 55 specimens of this species at the following localities:

Sinaloa, Mexico: Isabel Island. Shallow water, *Porites* coral, March 19, 1933, Sta. 125-33.

Costa Rica: Port Parker. Shallow water, coral, Feb. 9, 1935, Sta. 473-35.

Panama: Secas Islands. Bay of South Island, shallow water, *Porites* coral, Feb. 22, 1934, Sta. 252-34; Bahia Honda. Shallow water, 2 fms, coral, March 10, 1933, Sta. 114-33; shallow water, coral, Feb. 21, 1934, Sta. 247-34; Piñas Bay. 2-4 fms, coral, Jan. 29, 1935, Sta. 444-35.

Colombia: Octavia Bay, off point between it and anchorage. Shallow water, coral, Jan. 28, 1935, Sta. 435-35; Gorgona Island. Shallow water, *Pocillopora* coral, Jan. 22, 1935, Sta. 411-35.

Type: Holotype is the ovigerous female from Secas Islands. The holotype (Cat. No. 88888) and part of the paratypes are preserved in the collection of the U.S. National Museum, Washington, D.C.; the remainder of the paratypes is deposited in the collection of the Allan Hancock Foundation.

Remarks: The genus seems to be closest related to *Coralliocaris*, from which it differs by the presence of the additional spines behind the antennal spine and by the shape of the first two legs. With the genus *Coutièrea* it agrees in having a row of spines behind the antennal spine, a feature not observed in other Pontonids. Like *Coutièrea* the present genus also possesses a tubercle at the base of the dactyli of the last three legs. It differs from that genus, however, by the absence of the lateral expansions of the basal part of the rostrum, by the lack of a pterygostomial spine, by having no ridges on the carapace, by the rounded pleurae of the abdominal segments and by having the maxillipeds provided with exopods.

It is a great pleasure for me to give this species the name *Fennera chacei* in honour of Dr. Fenner A. Chace Jr., curator of the division of Marine Invertebrates, U.S. National Museum, Washington, D.C., as a token of appreciation of the generous help given during the preparation of this report and on other occasions.

Genus ANCHISTIOIDES Paulson, 1875

Definition: The body is laterally compressed. The rostrum is toothed and compressed, being well developed. The carapace is smooth and provided with an antennal spine and postorbital tubercle, no hepatic or branchiostegal spines are present. The anterior margin of the carapace is about straight.

The abdomen has the pleurae of the first five segments rounded. The telson has the posterior margin provided with one or two pairs of spines.

The scaphocerite is well developed.

The mandible bears no palp. The inner lacinia of the maxillula is slender. The maxilla bears no inner laciniae at all. The exopod of the first maxilliped is reduced, that of the second is well developed, while that of the third maxilliped is entirely wanting.

The first leg has the carpus unsegmented. The second legs are heavy and equal. The last three legs are slender. The dactylus is minutely bifid, no basal tubercle is present on the posterior margin of the dactylus.

The pleopods in the male as well as in the female all have an appendix interna at the endopod. An appendix masculina is present on the endopod of the second pleopod of the male.

The uropods are elongate ovate. The outer margin of the exopod is entire and ends in a distinct tooth, which at its inner margin bears a movable spine.

One of the indo-westpacific species is known to inhabit sponges.

Type: *Anchistioides compressus* Paulson, 1875.

Of the four species known to belong to the present genus, only one inhabits American waters:

Anchistioides antiguensis (Schmitt)

Pl. 55, figs. a-p

Periclimenes antiguensis Schmitt, 1924c, Univ. Iowa Stud. Nat. Hist., vol. 10, pt. 4, p. 84.

Periclimenes barbadensis Schmitt, 1924c, Univ. Iowa Stud. Nat. Hist., vol. 10, pt. 4, pls. 3, 4.

Anchistioides antiguensis Gordon, 1935, Proc. Linn. Soc. Lond., 1934-35, p. 135; Gordon, 1935, Journ. Linn. Soc. Lond. Zool., vol. 39, p. 346, figs. 25-27; Gurney, 1936, Proc. Zool. Soc. Lond., 1936, p. 619, pl. 1, figs. 1-7; Wheeler & Brown, 1936, Journ. Linn. Soc. Lond. Zool., vol. 39, p. 413, figs. 1, 2; Gurney, 1939, Ann. Mag. Nat. Hist., ser. 11, vol. 3, p. 125, fig. 2c.

Description: The rostrum is large and high, it reaches somewhat beyond the scaphocerite. The upper margin bears 8 to 10 dorsal teeth. The first of these teeth is placed at $\frac{1}{3}$ of the length of the rostrum in advance of the posterior limit of the orbit, the teeth being regularly divided over the distal $\frac{2}{3}$ of the dorsal margin of the rostrum. The lower margin of the rostrum bears 5-8 teeth. The carapace is smooth and is provided with a postorbital tubercle and an antennal spine. The postorbital tubercle is large and conical and is placed slightly behind the posterior limit of the orbit. The antennal spine is sharp and slender, it is situated some distance below the rounded lower orbital angle. The anterior margin of the carapace is not produced forwards and the antero-lateral angle is rounded.

The abdomen is smooth and has the pleurae of the first five segments broadly rounded. The pleurae and posterolateral angles of the sixth segment are pointed. The fifth and sixth segments are of about the same length. The posterior margin of the latter bears a minute median tooth. The telson is about twice as long as the sixth segment. The posterior of the two pairs of dorsal spines of the telson is placed somewhat before its middle, the anterior pair is situated closer to the anterior margin of the telson than the posterior pair of spines. The posterior margin of the telson bears two pairs of spines. One, the outer pair, being extremely small, the inner much longer and heavier; between the two inner spines there is a pair of setae.

The eyes are well developed. The cornea is about as broad as the stalk, and it is rounded.

The antennulae have the basal peduncular segment broad, the stylocerite is short, broad and blunt. The anterolateral angle of the basal segment bears a strong spine. The second and third segments are short, they are of about equal length and when measured together, they are longer than half the length of the basal segment. The upper antennular flagellum has the shorter ramus thick and hairy, and fused with the longer ramus for about half its length. As far as I can see the shorter ramus consists of about 10 joints, which, however, are very indistinct.

The scaphocerite far overreaches the antennular peduncle. It is about three times as long as broad. The outer margin is slightly sinuous. The final tooth is strong, curved outwards and slightly overreaches the lamella. The lamella is broadest somewhat below the middle and regularly narrows anteriorly. The antero-internal angle is very acute. The antennal peduncle fails to reach the middle of the scaphocerite.

The mandible has both the incisor and molar process well developed, the incisor process ends in three teeth, the molar process in some blunt knobs, no palp is present. The maxillula has both laciniae slender, and the palp bilobed. Of the maxilla the inner laciniae are entirely wanting, a palp is present, the scaphognathite is large and rather slender. The first maxilliped has the basis and coxa fused, the palp is distinct, the exopod is reduced: the flagellum of the exopod is much shorter than the basal part. The epipod is large and not divided. The second maxilliped is of the usual type; the exopod is well developed and reaches beyond the maxilliped itself. An epipod is present. The third maxilliped is very slender, and reaches slightly beyond the antennal peduncle. The last joint is somewhat shorter than the penultimate and almost $\frac{1}{3}$ of the length of arthrobranch are placed near the base.

The first leg slightly overreaches the scaphocerite. The fingers are about as long as the palm. The carpus is as long as the chela and $\frac{4}{5}$ of the length of the merus. The second legs are very strong and equal, they reach with the fingers or part of the palm beyond the scaphocerite. The fingers are long and slender, with the tips curved and crossing. The cutting edges close in the proximal part of their length; at their outer side, however, both dactylus and fixed finger bear some denticles. Dactylus and fixed finger are of about the same shape, they are almost 1.5 times as long as the palm. The palm is about cylindrical and not swollen. The carpus is short and conical, being half as long as the palm and about $\frac{1}{3}$ as long as the merus. The ischium is somewhat less than half as long as the merus. The third pereopod fails to reach the end of the scaphocerite. The dactylus is rather narrow and bifid, the accessory tooth being not very distinct. The propodus is barely three times as long as the dactylus; it is provided with spinules on the posterior margin as well as on the sides. The carpus is about $\frac{4}{5}$ of the length of the propodus and slightly more than half as long as the merus. The fourth and fifth legs are very similar in build to the third, the fourth, however, is conspicuously smaller than either the third or the fifth.

The first pleopods of the males as well as those of the females have the endopod provided with an appendix interna. The other pleopods too bear an appendix interna, while an appendix masculina is present in the endopod of the second pleopod of the males.

The uropods are elongate ovate. The outer margin of the exopod is slightly convex and ends in a strong tooth, which at its inner side is provided with a movable spine.

Size: The largest specimen seen by me measures 25 mm. The only ovigerous female examined is 18 mm long. The diameter of the eggs is 0.6 to 0.8 mm.

Material examined: In the U.S. National Museum material of this species is present from the following localities: St. Georges Island, Bermuda (The Reach, surface at night, Feb.-May, 1936, J. F. G. Wheeler coll.; R. Gurney coll., British Museum don.), Tortugas, Fla. (about 8 miles S. of No. 2 Red Buoy, picked from coral rock, 25 fms, June 11, 1925, W. L. Schmitt coll., Sta. 217-25; along eastside of White Shoal, 30 feet ottertrawl, 10-11 fms, Aug. 9, 1930, W. L. Schmitt coll., Sta. 49-30; channel haul off E. side Loggerhead Key, 65 feet, June 21, 1931, W. L. Schmitt coll., Sta. 7-31), off the Westcoast of Florida (28°46'N, 84°49'W, 26 fms, coarse sand and coral, March 15, 1885, *Albatross* Sta. 2406; 27°04'N, 83°21'15"W, 26 fms, coarse gray sand and broken shells, March 18, 1885, *Albatross* Sta. 2409; 26°33'10N, 83°15'10W, 27 fms, fine white sand with black specks, March 18, 1885, *Albatross* Sta. 2411; 26°33'N, 83°10'W, 28 fms, 7 feet beam trawl, April 2, 1901, *Fish Hawk* Sta. 7123), Bahamas (San Salvador, surface, 1886, *Albatross*), off Yucatan (22°18'N, 87°04'W, 24 fms, white rocks and coral, Jan. 30, 1885, *Albatross* Sta. 2365), Virgin Islands (St. Thomas, 1884, *Albatross*).

Type: The holotype (no paratypes are extant) is preserved in the collection of the Museum of the State University of Iowa, Iowa City, Iowa. The type locality is English Harbor, Antigua.

Distribution: *Anchistioides antiguensis*, though described for the first time as late as 1924, seems to be a rather common form of the east coast of America from Bermuda to the West Indies. It is recorded in literature from: Bermuda (Gordon, 1935; Gurney, 1936), St. Georges West, Bermuda (Gordon, 1935), The Reach, St. Georges Island (Wheeler & Brown, 1936), English Harbor, Antigua (Schmitt, 1924c).

Remarks: The genus *Anchistioides*, which, apart from the present species, contains some indo-westpacific members is quite aberrant. On account of the larval development it is placed by Gurney (1938, p. 44) in a separate subfamily Anchistioidinae. Until we know more about the larval development of the other related forms, I follow Gordon (1935) in placing the genus in the Pontoniinae.

Genus **COUTIÈREA** Nobili, 1901

No specimens of the only species of this genus have been examined by me. The definition given here is based on the data given in literature.

Definition: The rostrum is large, more or less cylindrical in the distal part, but with winglike expansions at the base. These expansions of the rostrum partly cover the eyestalks, and anteriorly they end each in a sharp supraocular tooth⁷. Antennal and pterygostomian spines are present. Behind the orbit there is one or three postorbital spines⁸. A groove or ridge runs all over the lateral part of the carapace.

The abdomen has the pleurae (at least in the male) all ending in strong spines.

The scaphocerite is well developed.

The second and third maxillipeds have no exopods.

The first leg has the carpus unsegmented. The second legs are strong. The last three legs have the dactylus provided with a distinct basal tubercle.

The second to fifth pleopods all have appendices internae, the second pleopod of the male also has an appendix masculina.

Type: *Coralliocaris Agassizi* Coutière, 1901.

The genus contains only one species:

Coutièrea agassizi (Coutière)

Pl. 56, figs. a-f

Coralliocaris Agassizi Coutière, 1901, Bull. Mus. Hist. Nat. Paris, vol. 7, p. 115, fig.

Coralliocaris Agassizii Nobili, 1901, Boll. Mus. Zool. Anat. Comp. Torino, vol. 16, p. 415, p. 4 (new genus *Coutièrea* proposed).

Coutièrea agassizi Borradaile, 1917, Trans. Linn. Soc. Lond. Zool., ser. 2, vol. 17, p. 386.

Coralliocaris agassizi Kemp, 1922, Rec. Indian Mus., vol. 24, p. 267 (placed in *Coutièrea*).

⁷ These teeth incorrectly have been called by some authors supraorbital spines. In my opinion they are not homologous with the supraorbital spines of other species of Pontoninae and therefore I prefer to name them supraocular teeth.

⁸ Coutière mentions only one spine at each side, which he calls hepatic, in his figure giving the animal in dorsal view, however, three such spines are figured on the right side. The spine or spines certainly are not hepatic, as they are situated on a much higher level than the antennal spine, in my opinion they are postorbital spines.

Coutière (1901) gave the following description of the species:

"On the carapace the cardiac, gastric, hepatic and branchiostegal regions are clearly defined by depressions. The rostrum, which is completely unarmed, narrow and with parallel margins is more than twice as long as the antennular peduncles. At both sides of the basal part of the rostrum the supraorbital spines⁹ form a very strong projection, which almost entirely covers the eyestalks, and reminds one rather closely of the figure given by Miers for *C. tridentata*.

"The antennal spine, is strongly developed and bears laterally an accessory spine; it reaches forwards to the middle of the scaphocerite.

"The hepatic spine¹⁰ which is situated at a point where the antennal and supraorbital ridges come together, forms a strong transverse projection. Finally the pterygostomial angle also is produced to a strong spine and forms the limit of a round incision of the carapace.

"The third segment of the antennular peduncle is as long as the visible part of the first and second segments. Of the latter two segments the first is the broadest, it bears a small lateral spine in the distal part of the external margin and a strong spinelike projection at its lower surface.

"The basicerite bears a strong lower spine. The anterior margin of the broad and oval scaphocerite reaches forwards to the end of the antennular peduncle and surpasses the final tooth by far.

"The fused and thickened part of the upper antennular flagellum is about as long as the proximal articles of the peduncle. The whole flagellum extends somewhat beyond the extremity of the rostrum.

"The distal joint of the second maxilliped is somewhat narrower than the penultimate joint. The third maxilliped is narrow, the third (proximal) joint is a little broader than the two others and longer than these two together. The latter, which are equal, are provided with strong hairs.

"The second pereopods are unequal, but of similar shape. The palm is regularly oval in shape, being slightly thickened. The fingers are as long as the palm and completely unarmed.

"The following legs are short, cylindrical, smooth and unarmed. The merus bears at its lower (= posterior) margin a strong oval protuberance; a similar but weaker protuberance is visible on the very

⁹ vid. footnote 7 on p. 142.
¹⁰ vid. footnote 8 on p. 179.

short carpus. The propodus bears only two short distal spines. The dactylus is thick, conical, curved, with a strong basal protuberance and a simple claw.

"The abdominal pleurae end laterally in strong spines (the specimen is a male) which continue on the pleosome, in the shape of outstanding ridges. The tergum of the sixth segment also bears two strong spines, which enclose the telson. The latter is very narrow and grooved, in its extreme part it only bears two short spines which are placed close together. The three usual pairs are situated on the outer margin and become less and less visible from the top to the base of the telson.

"The endopod of the first pair of pleopods is a broad and rounded lamella, which is smooth and naked. In the second pair this endopod bears two internal appendices, one of which has the usual retinacular hooks."

Size: "One male specimen. Total length, inclusive of the rostrum, 25 mm."

Distribution: The type and only specimen known originated from: Off Barbados, 94 fms, December 1878-March 1879 (prob. 1879), *Blake Sta.* 276.

Type: The type specimen (holotype) probably is preserved in the Museum d'Histoire naturelle at Paris. At my request Dr. Elisabeth Deichmann, curator of Marine Invertebrates at the Museum of comparative Zoology at Harvard College, Cambridge, Mass., kindly informed me that the specimen is not in the latter Museum.

Remarks: The species was described by Coutière (1901) as *Coralliocaris Agassizi*. Nobili (1902) pointed out that the species certainly is no *Coralliocaris* and he erected a new genus *Coutièrea* for it. Kemp (1924) even doubts that the genus belongs to the Pontoniinae: "Coutière states that the apex of the telson is armed with only two short spines placed close together and it is thus possible that the genus does not belong to the subfamily Pontoniinae." The part of the description of Coutière dealing with the telson is rather obscure as he says: [The telson] "porte à son extrémité deux courtes épines seulement, très rapprochées. Les trois autres paires normales sont situées sur le bord externe et de moins en moins visible de la pointe à la base du telson." In my opinion Coutière probably includes in his "trois autres paires" one or more of the posterior pairs. The description is not quite clear however.

Genus **PSEUDOCOUTIÈREA**, new genus

Definition: The body is more or less compressed. The distal part of the rostrum is about cylindrical and unarmed. The basal part is winglike expanded and partly covers the eyestalks. These winglike expansions end anteriorly in a sharp supraocular tooth. The carapace is smooth, it is provided with antennal spines. No postorbital or pterygostomial spines are present. A branchiostegal groove runs all over the length of the lateral part of the carapace.

The abdomen has the pleurae of the third to fifth segments ending in a sharp tooth. The posterior margin of the telson bears three pairs of spines.

The scaphocerite is well developed.

The mandible bears no palp, the incisor process is well developed. The laciniae of the maxillula are rather broad. No exopods are present on the second and third maxillipeds, of the first maxilliped only the caridean lobe is present, but no flagellum is visible.

The first pereopod has the carpus not segmented. The second legs are rather strongly unequal in size, but about equal in shape. The last three legs are rather slender. The dactylus is simple, without basal protuberance.

The second to fifth pleopods have an appendix interna. An appendix masculina is present on the endopod of the second pleopod of the male.

The uropodal exopod has the outer margin ending in a tooth, which at its inner side bears a movable spine.

Type: *Pseudocoutièrea elegans*, new species.

Of this genus only one species is known:

Pseudocoutièrea elegans, new species

Pl. 57, figs. a-r

Description: The rostrum is long and slender, reaching sometimes almost to the end of the antennular peduncle, and sometimes beyond the scaphocerite. It is about cylindrical and curved slightly upwards in the distal part. There are neither dorsal nor ventral teeth. Near the base the rostrum suddenly is expanded laterally and forms at each side a large wing-like supraocular tooth, which partly covers the ocular peduncle. The rostrum continues on the carapace as a longitudinal ridge, which is especially distinct at a level with the bases of the eyes. The anterior margin of the carapace bears a distinct antennal spine, which is placed some distance below the very broadly rounded lower orbital

angle. The spine itself is placed on an anteriorly produced narrow lobe of the carapace, below which the anterior margin of the carapace is strongly concave. A longitudinal sharp groove, which shows some resemblance to the branchiostegal groove in *Palaemon*, extends over the whole length of the carapace running from a point on the anterior margin some distance below the antennal spine, all over the lateral part of the carapace. From the supraocular tooth a distinct ridge curves downwards; from the antennal spine a similar ridge curves upwards. The anterolateral angle of the carapace is rounded.

The abdomen has the pleurae of the first two segments broadly rounded, that of the third is broadly rounded in the anterior part, but shows a sharp tooth in the posterior half. The fourth and fifth segments have the pleurae ending in a narrow, rather slender point. The sixth segment has both the pleurae and the posterolateral angles acute. This segment is about 1.5 times as long as the fifth. The telson is somewhat longer than the sixth abdominal segment. The two dorsal pairs of spines are small, the anterior pair is situated about in the middle of the telson, the posterior pair is placed closer to the posterior margin of the telson than to the anterior pair of spines. The posterior margin is provided with the usual three pairs of spines.

The eyes are well developed and reach about to the end of the basal segment of the antennular peduncle.

The stylocerite is sharp and slender and reaches about to the middle of the basal segment of the antennular peduncle. The anterolateral angle of this segment is provided with a strong spine, which reaches about to the end of the second segment of the peduncle. The anterior margin of the basal segment between the anterolateral spine and the outer margin of the second segment is anteriorly produced to a blunt tooth, which overreaches the base of the anterolateral spine, but fails to reach as far as the tip.

The third segment is distinctly longer than the second. The upper antennular flagellum has the two rami fused for five joints, the free part of the shorter ramus consists of about two joints.

The scaphocerite is 2.5 times as long as broad, it reaches beyond the antennular peduncle. The outer margin is slightly concave and ends in a strong final tooth, which, however, is overreached by the strongly anteriorly produced lamella. The antennal peduncle almost reaches the middle of the scaphocerite. No external spine is present near the base of the scaphocerite.

The mandible has the incisor process well developed and ending in about three teeth. The molar process ends in some blunt teeth and bears some spinules. The maxillula has the two laciniae rather broad. The palp is bilobed. The endite of the maxilla is cleft, though not very deeply; the palp is distinct, just like the scaphognathite. None of the maxillipeds possesses exopods. The coxa and basis of the first maxilliped are completely fused, a palp is present, the caridean lobe is well developed, but bears no trace of a flagellum, the epipod is bilobed. The second maxilliped is normal in shape, the epipod is well developed. The third maxilliped reaches slightly beyond the base of the scaphocerite. The last segment is as long as the penultimate and half as long as the antepenultimate. An epipod and an arthrobranch are present.

The first leg reaches with part of the chela beyond the scaphocerite. The chela is slender, the fingers measure $\frac{2}{3}$ of the length of the palm or they are as long as the palm. The carpus is somewhat longer than the chela, and somewhat shorter than the merus. The second legs reach with part of the chela beyond the scaphocerite. They are unequal in size, but about equal in shape. In the larger leg the fingers are about $\frac{1}{2}$ to $\frac{2}{3}$ as long as the palm. Both fingers are elongate and close over their entire length. The dactylus possesses a small tooth in the proximal part of its cutting edge. In some, probably the better developed specimens, the dactylus is much more heavy, almost like the dactylus of the larger leg of *Periclimenaeus* species, the anterior part of the cutting edge is bluntly convex and the posterior part bears a large tooth, while also the fixed finger shows a trace of a tooth on the cutting edge. The palm is elongate and more or less cylindrical, there are several small tubercles visible on the surface of the palm. The carpus is slightly less than half as long as the palm. The merus is twice as long as the carpus, and somewhat longer than the ischium. The ischium has a distinct spine near the distal end of the upper margin. Of the smaller second leg the fingers are relatively longer, the palm being about 1 to 1.3 times as long as the fingers. The relation between the other joints is about the same as that between the joints of the larger leg. The spine of the ischium is less distinct. The third leg fails to reach the end of the antennal peduncle. The dactylus is strong, simple, and curved, it is broadened at the base but does not possess a tubercle there like in *Coutièrea agassizi*. The propodus is curved and is 2.5 times as long as the dactylus, a very small spinule is visible in the distal part of the lower margin. The carpus measures $\frac{1}{3}$ of the length of the propodus. The merus is somewhat

shorter than the propodus, its posterior margin forms a distinct tubercle in the distal part. The ischium is somewhat more than half as long as the merus, it bears an anterodistal tooth.

The first pleopod of the male has the endopod with a broad, bluntly topped lobe at the distal part of the inner margin, the proximal part of that margin possesses some hairs. The second male pleopod has the appendix masculina much shorter than the appendix interna.

The uropods are elongate ovate in shape. The outer margin of the exopod is entire and ends in a distinct final tooth, which at its inner side bears a movable spine.

Size: The largest specimen examined by me measures 16 mm. Ovigerous females are 9 to 16 mm long. The eggs have a diameter of 0.5 to 0.7 mm.

Material examined: Eight specimens of this species were collected by the Allan Hancock Expeditions 1934, 1935, 1937 and 1941. They originate from:

Southern California: Santa Catalina Island, $\frac{1}{2}$ mile E. of Long Point. 45-50 fms, sand, sea urchins, *Blake* trawl, September 14, 1941, Sta. 1405-41.

Lower California, Mexico: Off Ildefonso Island. 50 fms, sand, shell, March 15, 1937, Sta. 677-37; Guerrero, Mexico: South of White Friars. 25 fms, rock, gorgonids, March 2, 1934, Sta. 264-34.

Galapagos, Ecuador: Off Bindloe Island. 20 fms, rock, tangles, December 3, 1934, Sta. 311-35.

Type: Holotype is the large female (16 mm) from off Santa Catalina Island (Sta. 1405-41). It is preserved in the collection of the Allan Hancock Foundation, Los Angeles, Calif., together with some of the paratypes. The other paratypes are in the collection of the U.S. National Museum, Washington, D.C. Holotype, AHF no. 411.

Genus WALDOLA, new genus

Definition: The body is rather compressed. The rostrum is compressed and toothed, without winglike expansions at the base. The carapace is smooth and is provided with hepatic spines only. Antennal spines are absent.

The pleurae of the first five abdominal segments are rounded. The telson has the posterior margin provided with three pairs of spinules.

The scaphocerite is well developed.

The mandible bears no palp, the incisor process is distinct. The laciniae of the maxillula are rather broad. The inner lacinia of the

maxilla is present. The exopods are absent from the second and third maxillipeds, the exopod of the first maxilliped has the flagellum reduced in size.

The first leg has the carpus unsegmented. The second legs are heavy. The last three are slender. The dactylus is simple and without a basal protuberance.

The second to fifth pleopods have the endopods with an appendix interna, an appendix masculina is present on the endopod of the second pleopod of the male.

The uropodal exopod has the outer margin ending in a tooth, which at its inner side is provided with a movable spine.

Type: Waldola schmitti, new species.

Only one species of this genus is known:

Waldola schmitti, new species

Pl. 58, figs. a-j; Pl. 59, figs. a-f

Description: The rostrum is short, compressed, and reaches only slightly beyond the end of the basal segment of the antennular peduncle. It is high and suddenly narrows in the pointed apex. The upper margin is strongly convex and bears 7 to 9 teeth, the first or first two of which are placed behind the orbit. The first tooth is very small and stands at the foot of the rostral crest, the distance between it and the second tooth is larger than that between the other teeth, these distances become smaller anteriorly. Sometimes this very small first tooth is wanting, so that only one tooth is placed behind the orbit. There is a large space between the ultimate tooth and the apex of the rostrum. The lower margin of the rostrum is straight or slightly convex and bears no teeth. The midrib of the rostrum runs closely along the lower margin. The carapace bears no supraorbital and antennal spines, moreover no post-orbital ridge is present. There is only an hepatic spine, which is very strong and almost reaches the anterior margin of the carapace with its tip. The lower angle of the orbit is produced forwards in a triangular process with a rounded top. Some distance below the hepatic spine the anterior margin of the carapace forms a pointed lobe. The anterolateral angle of the carapace is rounded.

The abdomen is smooth, the pleurae of all segments are rounded. That of the fifth segment is rather small. The sixth segment is almost thrice as long as the fifth and about 1.5 times as long as the telson. The anterior pair of dorsal spinules of the telson lies about in the middle

of the length of the telson. The posterior pair lies somewhat closer to the anterior pair than to the posterior margin of the telson. This posterior margin is truncated and bears the usual six spinules. The intermediate pair of spinules is only slightly larger than the inner pair.

The eye is well developed, the cornea is globular and about 1.5 times shorter than the stalk. No ocellus was observed by me.

The basal segment of the antennular peduncle has the stylocerite strong and pointed, it does not reach the middle of the basal segment. The outer margin of the segment is somewhat convex, the anterolateral spine is strong and distinctly overreaches the anteriorly produced margin of the segment. The second and third segments are about equal in shape. The upper antennular flagellum has the two rami fused for four joints, the free part of the shorter ramus consists of four joints too and is about half as long to quite as long as the fused part.

The scaphocerite reaches somewhat beyond the antennal peduncle. The outer margin is concave. The final tooth is strong but is distinctly overreached by the lamella, which is produced antero-internally. The lamella is of about the same breadth over its entire length.

The mandible bears no palp; the incisor process ends in four teeth, which are of about the same size; the molar process is provided with about four knobs, one of which bears some spinules. The maxillula has both the inner and the upper lacinia broad, the palp is distinctly bilobed. The maxilla has the endite undivided, the scaphognathite is not very broad. The first maxilliped has the endites not separated by a notch, the palp is small, the exopod has the flagellum short, the caridean lobe is distinct, the epipod is rather large and distinctly bilobed. The second maxilliped is of the usual shape, but the exopod lacks entirely, the epipod is large. The third maxilliped fails to reach the end of the antennal peduncle. The last segment is about $\frac{4}{6}$ of the length of the penultimate, the antepenultimate segment is about twice as long as the penultimate. An epipod, but no exopod is present.

The first pereopod reaches to the end of the scaphocerite. The fingers are shorter than the palm and are unarmed. The carpus is 1.4 times as long as the chela, and as long as the merus. The second legs are strongly unequal in shape. The stronger reaches with the chela beyond the scaphocerite. The fingers are somewhat shorter than half the palm. The cutting edge of the dactylus bears two teeth in its proximal part, while the edge of the fixed finger is unarmed. The palm is cylindrical, numerous distinct tubercles are placed on the palm and the fingers, being most distinct near the upper and lower margins. The

carpus is $\frac{3}{5}$ of the length of the palm, it too bears some dorsal tubercles; the anterior margin is somewhat sinuous. The merus is about as long as the palm and slightly longer than the ischium. The smaller second leg reaches with the larger part of the fingers beyond the scaphocerite. The fingers are as long as the palm, their cutting edges are unarmed. There are no tubercles on this leg. The carpus is slightly longer than the palm and 0.7 times the length of the merus. The merus is somewhat longer than the ischium. There are no spines on any of the joints. The third leg reaches just to the end of the scaphocerite or fails to reach that far. The dactylus is strong and simple. The propodus is four times as long as the dactylus. The carpus is $\frac{2}{6}$ of the length of the propodus. The merus is about as long as the propodus. The fifth leg is similar to the third.

The first pleopods of the male have the endopod ovate, with the inner margin about straight. The second pleopods of the male have the appendix masculina much shorter than the appendix interna.

The uropods are elongate, the outer margin of the exopod in the male ends in a rather small tooth, which at its inner side is provided with a distinct spine.

Size: The largest male seen by me measures 17 mm. Ovigerous females are 14 to 15 mm long. The eggs are rather few, their diameter is 0.3 to 0.5 mm.

Material examined: The Allan Hancock 1934 Expedition collected four specimens (two of which are ovigerous females and one is a male) from the following localities:

Tepic, Mexico: Off Isabel Island. 10-25 fms, sand, nullipores, March 5, 1934, Sta. 277-34.

Guerrero, Mexico: South of White Friars. 25 fms, rock, gorgonids, March 2, 1934, Sta. 264-34.

Colombia: Cabita Bay near Cape Corrientes. 10-15 fms, mud, Feb. 13, 1934, Sta. 230-34; Off Gorgona Island. 20 fms, rock, shell, Feb. 12, 1934, Sta. 221-34.

Type: Holotype (U.S.N.M. Cat. No. 90269) is the ovigerous female of Sta. 277, of which specimen also most of the figures are made. All type material is preserved in the collection of the U.S. National Museum, Washington, D.C.

Remarks: This species is named *Waldola schmitti* for Dr. Waldo L. Schmitt, head curator of the Department of Zoology, U.S. National Museum, Washington, D.C., who made it possible for me to undertake

the present study, and to whom I owe so much for his advice and kind help during the time I was working on the present material in the U.S. National Museum.

Genus NEOPONTONIDES, new genus

Definition: The body is more or less compressed. The rostrum is compressed in the distal part, with or without teeth, the basal part is laterally expanded, partly covering the eyestalks. These expansions do not have an anterior tooth. The carapace is smooth or somewhat areolated. Only antennal spines are present.

The first to fifth abdominal pleurae are rounded. The telson has the posterior margin provided with three pairs of spinules.

The scaphocerite is well developed.

The mandible bears no palp, the incisor process is distinct. The maxillula has the two laciniae slender. The maxilla is provided with an inner lacinia. The first maxilliped has the exopod with a caridean lobe and a small flagellum. The second and third maxillipeds bear no exopod at all.

The first leg has the carpus unsegmented. The second legs are strong. The last three legs have the dactylus simple and without a basal protuberance.

The second and fifth pleopods have the endopod provided with an appendix interna, the second pleopods of the male moreover possess an appendix masculina.

The uropodal exopod has the outer margin ending in a tooth, which at its inner side bears a movable spine.

Type: *Periclimenes beaufortensis* Borradaile, 1920.

Remarks: The genus is very closely related to *Pontonides* Borradaile from the indo-westpacific region. This latter genus differs from *Neopontonides* by the rostrum which is depressed over its entire length and which bears no teeth, by the maxilla in which the inner laciniae are absent, and by the first maxilliped, in which the exopod has the flagellum much less developed; moreover *Neopontonides* has the body more slender and less compressed than in *Pontonides*. Of *Neopontonides* two species are known, both living in American waters. They may be separated as follows:

1. Upper margin of rostrum with 0-5 teeth. Dactylus of second leg with two teeth on cutting edge. Eastern. . . . *beaufortensis*
- 1¹. Rostrum with 11 dorsal teeth. Dactylus of second leg with one tooth on cutting edge. Western. . . . *dentiger*