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NEW CARIDEA FROM THE DOMINICAN REPUBLIC

BY JOHN C. ARMSTRONG

INTRODUCTION

The material upon which this report is based was collected by the author at Barahona Harbor, Dominican Republic, during the summers of 1932 and 1933. A narrative account of this work by William G. Hassler has appeared in Natural History (1933, vol. 33, no. 3, May-June, p. 287). The local names referred to in the text may be found on the United States Hydrographic Office charts of the region.

My thanks are due to Dr. Fenner A. Chace, Jr., for the privilege of examining specimens of *Crangon viridari* and of *C. armillatus* in the Museum of Comparative Zoölogy and to Dr. Waldo L. Schmitt for making available to me material of these two species from the collection of the United States National Museum.

HIPPOLYTIDAE

GENUS **OGYRIDES** STEBBING

In his great monograph on the family Crangonidae, Coutière (1899) considered *Ogyrides* to be a member of that group, and most subsequent workers have followed him in this. The relation of this genus with more typical crangonids was thought to lie through *Automate* and *Pterocaris*. Of this he wrote (*ibid.*, pp. 347–348), "La série *Ogyris* [*Ogyrides*], *Pterocaris*, *Automate* se laisse assez nettement établir. Ces genres offrent le caractère commun des ophthalmopodes parallèles, cylindriques, non recoverts par la carapace échancrée. *Ogyris* est à beaucoup d'égards (absence d'échancrures cardiques, armature du telson, rostre multidenté, 1re paire

faible, méropodite de la 3me paire armé) un véritable Hippolytidé, et constitute le point de contact le plus étroit de cette famille avec les Alpheides [Crangonidae]."

At that time he had not, however, seen any examples of *Ogyrides*, *Automate*, or *Pterocaris*. Ortmann, who had described *O. occidentalis* under the family Hippolytidae in 1893, adhered to his original classification in 1901. The most drastic revision was that proposed by Hay and Shore (1918) who wrote (p. 388), "Having before us representatives of *Ogyris* (*Ogyrides*) and *Automate*, as well as several typical genera of both families mentioned (Crangonidae and Hippolytidae), we have come to the conclusion that *Ogyris* differs too greatly and in too many characters to admit to our placing it in either family. Its resemblance to *Automate* is very slight, and it appears also to be very different from *Pterocaris*." They, therefore, proposed that a special family, Ogyridae, should be erected for its reception. Of this they said, "The family is coterminous with the genus *Ogyris* and, probably, should stand between the Crangonidae and the Hippolytidae."

Their suggestion has not been followed by later authors. The general agreement that the Crangonidae and Hippolytidae are very closely related and that *Ogyrides* stands, as it were, in the position of connecting link cannot be retained if we are to accept the conclusions which Gurney based upon extensive studies of decapod larvae. In his report (Gurney, 1938) on the palaemonid and crangonid larvae of the Red Sea he follows a discussion of the larval characters of the families involved with the statement (p. 59), "The points of similarity which I have given are at least positive and unequivocal, and I submit that they suffice to prove that the Palaemonidae and the Alpheidae [Crangonidae] are very closely related, and that they are not nearly related to the Hippolytidae."

A comparison between the series of *Ogyrides yaquiensis* before me and two species of *Automate*, *kingsleyi* and *haightae*, shows little similarity between these genera. With the exception of the relatively very slight elongation of the eyestalks in *Automate*, that genus does not appear to resemble *Ogyrides* any more closely than do the other crangonid genera. The more important divergences between *Ogyrides* and the described genera of the crangoids are: (1) the strong bristles and narrow proportions of the median and inner laciniae of the first maxillipeds; (2) the third segment of the third maxilliped being shorter than the second; (3) the feeble

development of the first pair of chelipeds; (4) the presence of a sternal plate on the thorax; (5) the multidentate rostrum; (6) the transverse ridges and grooves of the telson; (7) the absence of the cardiac notch; and (8) the absence of the transverse articulations of the outer blades of the uropods. Among the known genera of the crangonids these last two characters are similar only in the genus *Thunor*, a highly specialized relative of *Crangon* which quite obviously bears no special affinity to *Ogyrides*. Considering also that if *Ogyrides* be excluded, the family Crangonidae forms a very compact group of closely related genera, I do not believe that the available evidence justifies its inclusion in that group. Among the other caridean families, it appears to be most closely related to the Hippolytidae. The following characters support this relation: (1) the multidentate rostrum; (2) the absence of the cardiac notch; (3) the feeble development of the first pair of chelipeds; (4) the multi-articulate carpus of the second leg; and (5) the presence of a thoracic sternal plate. Ventral processes on the thoracic sterni are found on a number of hippolytids. I have observed them on species of *Spirontocaris*, *Alope*, *Saron*, *Thor*, and *Trachycaris*, those of the latter genus being particularly well developed. In this family they may also occur on both sexes.

So far as I have been able to ascertain, no genus previously referred to the Hippolytidae has the terminal segment of the third maxilliped shorter than the penultimate as does *Ogyrides*, nor does any have the transverse grooves and ridges of the telson.

In the synoptic key to the genera of Hippolytidae, given by Holthuis (1947, p. 4) in his recent review of the family, *Ogyrides* would fall close to *Enalus*. It does not, however, bear any striking resemblance to that genus.

In conclusion, I consider that *Ogyrides* is best accommodated in the Hippolytidae for the present and that a knowledge of the larval stages must be obtained before the question of its relationships can be satisfactorily resolved.

Ogyrides yaquiensis, new species

Figure 1

MATERIAL: Holotype, one female, A.M.N.H. No. 9564, carapace 4.3 mm. long; paratypes, 27 females (16 ovigerous), eight males, and nine so mutilated that the sex cannot be determined, A.M.N.H. No. 9565. All taken on grass banks 1 to 3 feet deep near mouth of Rio Yaqui del Sur.

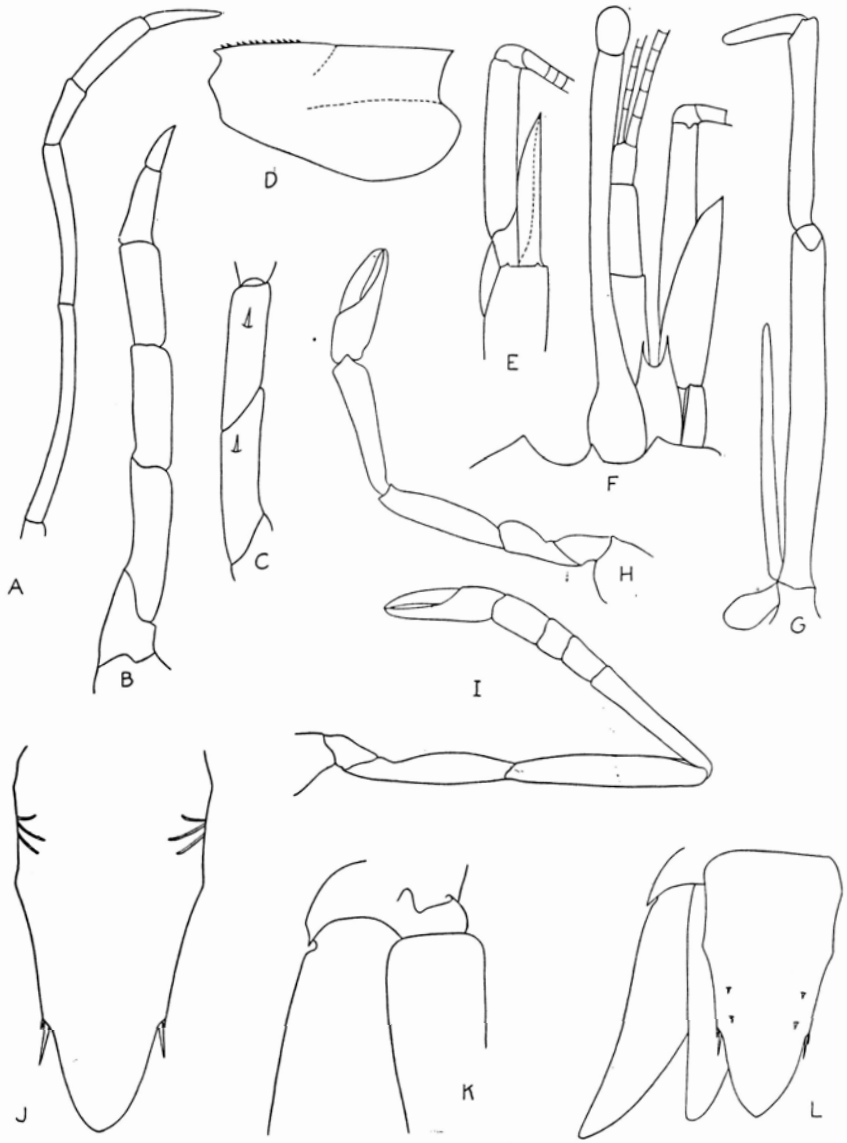

FIG. 1. *Ogyrides yaquiensis*, new species. A. Fifth leg. B. Third leg, outer side. C. Ischium and merus of third leg, inner side. D. Carapace. E. Peduncle of second antenna. F. Frontal and antennal structures. G. Third maxilliped. H. First cheliped. I. Second cheliped. J. Under side of telson. K. Under side of proximal portion of uropod. L. Tail fan.

DESCRIPTION: The rostrum is equilaterally triangular, curving downward slightly at the tip which is rounded and furnished with a scanty tuft of coarse bristles. The anterior margin of the carapace is fringed with short fine hairs. The rostral carina is low, extends one-quarter the length of the carapace and bears from eight to 12 spiniform teeth. (The frequency distribution of these teeth is shown in table 1.) The carina with the fewer teeth have, in general, the longer teeth. Coarse bristles similar to those at the tip of the rostrum are placed in a row at either side of these teeth along about half the length of the carina.

The eyestalks, narrowest in the middle, extend beyond the carpocerite for from 0.24 to 0.38 of their length. The proximal third of their interior border is beset with a few short plumose bristles.

The antennular peduncle falls slightly short of the carpocerite. The second antennular article is a little more than half as long as the first; the third, a little less than half the second. The stylocerite is large, reaching slightly less than two-thirds the length of the first antennular article and terminates in two strong, acuminate spines.

Both the internal and external distal angles of the ventral surface of the basicerite are armed with a minute spine. The scaphocerite reaches nearly to the end of the second antennular article. Its scale, nearly four times as long as wide at its greatest width, is almost as long as the lateral spine, only a minute tip of the latter being left free. The carpocerite exceeds the scaphocerite by one-third of its length and is five times as long as wide.

The third maxillipeds are long, reaching beyond the eye peduncles when extended.

The first pair of chelae are short, feeble, and symmetrical. The fingers, with pointed tips, gape slightly when closed, have unarmed cutting edges, and are somewhat less than twice the length of the palm. The merus is four times as long as wide.

The second pair over-reaches the carpocerite by about half the length of the fingers. The carpus is subdivided into four segments which stand in the following proportions on the type: proximal 1.0:second 0.27:third 0.18:fourth 0.31:and chela 0.82. On the figured specimen these ratios are: 1.0:0.27:0.18:0.35:0.73; on another specimen: 1.0:0.30:0.16:0.30:0.80.

All the segments of the following three pairs of legs are furnished with setae. The ratios of the lengths of five distal segments of the third leg of the type are: ischium 1.0:merus 0.9:carpus 0.8:

propodus 0.54:dactylus 0.28. On the figured specimen these ratios are: 1.0:0.70:0.68:0.47:0.33; on another female: 1.0: 0.91:0.73:0.45:0.36. The merus and the ischium of the third leg are armed with strong spines near the distal end of the inner side. The lengths of segments of the fourth leg of the type stand in the ratios: ischium 1.0:merus 1.14:carpus 0.68:propodus 0.50: dactylus 0.21.

The relative lengths of the ischium, merus, carpus, propodus, and dactylus of the fifth leg of the type are: 1.0:0.7:0.29:0.40: 0.35; on the figured specimen: 1.0:0.72:0.29:0.44:0.35; on another female: 1.0:0.67:0.24:0.36:0.27.

The telson has an obtuse lateral prominence situated at about the proximal third of the lateral margins. The distal end is obtusely pointed. The ventral surface bears three arcuate transverse ridges on either side near the proximal base.

REMARKS: *Ogyrides yaquiensis* resembles *occidentalis* (Ortmann) and *striaticauda* Kemp. *Yaquiensis* may be at once distinguished from *occidentalis* by the great length of the eyestalks, which over-reach the antennular peduncle by from one-quarter to one-third of the length of the eyestalks on *yaquiensis* and reach about to the end of the antennular peduncle on *occidentalis*. According to Ortmann's figures (1893, pl. 3, figs. 4–4n) of *occidentalis*, *yaquiensis* also differs in the following particulars: (1) the external angle of the basicerite of *yaquiensis* bears a very minute spine discernible only under high magnification, while *occidentalis* bears a strong spine at that point; (2) the scaphocerite of *yaquiensis* is shorter and has a less prominent lateral spine; (3) the lateral prominences of the telson are well developed in *yaquiensis* and lacking in *occidentalis*. From *striaticauda*, *yaquiensis* may be distinguished by the following characters: (1) the longer ocular peduncles which in *striaticauda* exceed the antennular peduncle by only the length of the last segment; (2) the relative length of the carpal segments of the second leg, of which the third is only about one-half the length of the second and fourth in *yaquiensis* and the last three of which are subequal in *striaticauda;* (3) the number of transverse ridges on the under side of the telson, three in *yaquiensis* and four in *striaticauda*.

Hay and Shore (1918, p. 388) and Yokoya (1927, p. 172, pl. 7, fig. 14) refer to the sternal plate as a thelycum. These authors had only single specimens for study, in both cases females. Kemp (1915, p. 288, fig. 30d), although dealing with series of specimens,

does not give the sexual distribution of that structure but refers to it as a sternal plate. In *yaquiensis* this plate is present on the males as well as the females and cannot therefore be regarded as a thelycum. Its shape and size in the three other species for which this character is known, *alphirostris* (Kingsley), *occidentalis* (Ortmann), *orientalis* (Stimpson), as described by Yokoya (1927, p. 172), and *striaticauda* (Kemp), seem to be much the same as in the present species.

The transverse ridges on the under side of the telson appear to have been overlooked by all authors except Kemp (1915) and De Man (1922). On these Kemp (*ibid.*, p. 288) remarked, "The telson does not possess a feeble lateral prominence but on either side, situated in the proximal third on the ventral surface, are four oblique ridges, the three anterior ones placed close together, the other rather more distant. In spirit they have a rather nacreous lustre and perhaps represent a stridulating organ, but I am unable to find that they possess transverse striae and there does not appear to be any ridge on the basal segment of the uropods which could be brought to bear on them...." I have also observed three such ridges on the telson of *occidentalis* and of *alphirostris*.

In *Ogyrides yaquiensis* the structure on the under side of the telson consists of three short arcuate ridges near its proximal base. These extend to the margins of the telson and, if the telson be examined from a lateral view, they are clearly visible in the emargination defined by the proximal base of the telson and the lateral prominences. When viewed in this manner, the ridges may be seen to incline posteriorly at a considerable angle from the normal to the ventral surface of the telson. On the basal segment of the uropods is a structure which locks with these ridges. This structure consists of a ridge whose anterior edge is undercut to form a groove receiving the telson ridge and which curves in a complementary sense to the telson ridge. The external and internal ends of the uropod ridge terminate in an obtuse tooth or lobe, that of the outer end being much the larger. Both of these are directed anteriorly.

In those preserved specimens on which this mechanism remained engaged, the transverse portion of the uropod ridge was hooked upon one of those of the telson, while the outer lobe comes to rest against the lateral margins of the telson. These margins are beveled towards the dorsal surface of the telson, and part of the outer lobe of the uropod ridge engages with that portion of the

telson ridge which lies on that slope of the bevel. Most of the specimens with the ridges interlocking in the preserved material had the uropod ridge hooked over the second telson ridge; a few, however, had it engaged with the first or the third. How this is possible may be seen by the following experiment: If the telson of a well-preserved specimen with the anterior ridge engaged be depressed by pressing on its dorsal surface while holding the abdomen stationary, the relative positions of the uropods and telson will be altered; any point on the uropods will be brought opposite a point on the telson posterior to that which is formerly opposed. Consequently, provided the muscles of the uropods in this preserved material remain firm enough to offer some resistance to the movement of the telson, the result of this procedure is to cause the ridge on the uropod to engage with a telson ridge posterior to the one with which it was formerly associated. If the pressure on the telson now be released, the telson will remain locked in this new position.

TABLE 1

TEETH ON ROSTRAL CARINA IN *Ogyrides yaquiensis*, NEW SPECIES

Number of specimens	1	4	34	5	2	1
Number of teeth	8	9	10	11	12	13

It may thus be seen that the morphology of this curious structure suggests the possibility that it may serve as a locking mechanism to strengthen the tail fan when used as an oar for the rapid backward propulsion of the animal. The transverse ridges would then serve to keep the tail fan together in a dorso-ventral sense, while the inner spur on the uropod ridge may help to prevent a lateral displacement of the uropods. What utility there may be in having a series of transverse ridges on the telson, with the resultant possibility of locking the telson in as many positions, is not evident, and I cannot at present offer any suggestion.

CRANGONIDAE

GENUS **CRANGON** WEBER

Crangon viridari, new species

Figure 2

Crangon armillatus DARBY (not Milne Edwards), 1934, p. 349; 1935, p. 151; 1939, p. 61.

MATERIAL: Holotype, one male, carapace length 120 mm., A.M.N.H. No. 9567; paratypes: dissected specimen, one male, A.M.N.H. No. 9569, carapace length 112 mm.; 41, A.M.N.H. No. 9568. This species was very common on the grass banks inside the north end of El Cayo where 43 specimens were obtained by sweeping with a dip net.

DESCRIPTION: The rostrum is narrow, 1.7 times as long as wide on the type, 2.0 on the dissected specimen, 1.8 on another, and 2.2 on yet another. The rounded rostral carina is defined by shallow

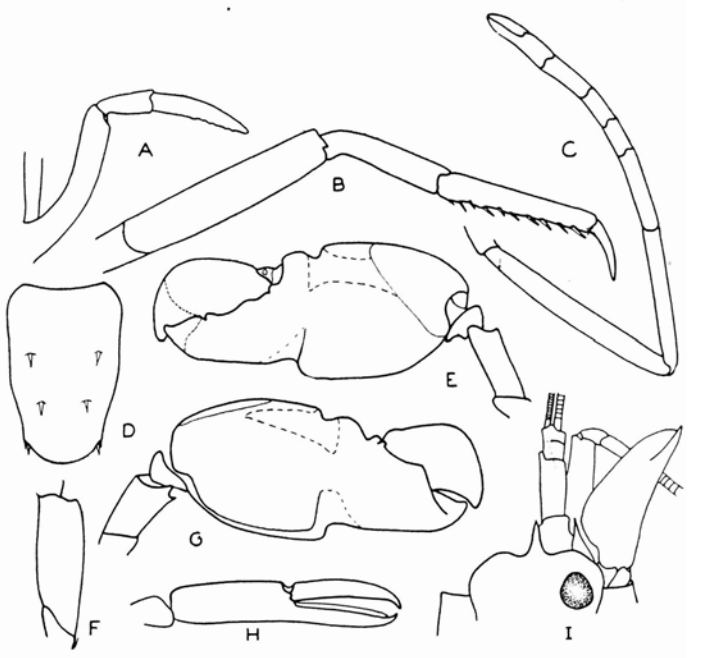

FIG. 2. *Crangon viridari*, new species. A. Third maxilliped. B. Third leg. C. Second leg. D. Telson. E. Large chela, lower side. F. Merus of small chela. G. Large chela, upper side. H. Small chela. I. Frontal and antennal structures.

sulci and extends back on the carapace to the base of the orbital hoods.

The lengths of the first, second, and third antennular articles on the dissected specimen stand in the following ratio: 2.4:2.0:1.0; and on another specimen: 2.5:1.95:1.0. The second antennular article is 2.5 times as long as wide at the middle and 2.1 times as long as wide at the distal end as the dissected specimen. These

figures were 2.5 and 2.0, respectively, on another specimen. The terminal spine of the scaphocerite reaches to the end of the first antennular segment. The basicerite, unarmed above, bears a strong ventral spine. The carpocerite, 4.25 times as long as wide on the dissected specimen and 4.0 times as long as wide on another, reaches to the end of the antennular peduncle. The scale of the scaphocerite, 2.6 times as long as its greatest width on the dissected specimen, reaches to the end of the carpocerite with its terminal spine projecting slightly farther.

The distal end of inner margin of the upper side of the merus of the larger chela bears a strong spine. The proportions of the larger chela of the type are: total length 1.0:fingers 0.35:height 0.46; on the dissected specimen these ratios are: 1.0:0.38:0.44; on another specimen: 1.0:0.37:0.43. The fixed finger has a small, V-shaped notch in the cutting edge at about the mid-point of its length. The merus of the smaller chela is armed with a small acute spine at the distal end of the inner margin of the upper side. The small chela ranges from 5.0 to 6.2 times as long as wide, being broader on the smaller specimens and on the males of pairs of approximately equal size (table 2). The dactyl is simple in both sexes.

The merus of the second pair of chelae is 8.3 times as long as wide on the dissected specimen. The lengths of the proximal, second, third, fourth, and distal carpal segments of the dissected specimen stand in the following proportion: 1.0:0.61:0.25:0.28:0.36; on another specimen: 1.0:0.63:0.26:0.24:0.37; and on yet another: 1.0:0.6:0.3:0.3:0.4.

The merus of the third and following legs is unarmed. On the dissected specimen this is 5.3 times as long as wide, on another specimen 5.2, and on yet another 4.9. The dactyls of the third and following legs are simple.

The telson of the dissected specimens is 2.6 times as long as wide at the distal base, that of another specimen 2.5.

DISCUSSION: *Crangon viridari* appears to resemble *C. armillatus* (H. Milne Edwards) most closely. From that species it may be separated by the following characters. The rostral carina in *viridari* is straight and rounded, that of *armillatus* is usually flat and either triangular or U-shaped. There is a complete intergradation of these shapes in the latter species, and as the proportions of the chelae cited by Schmitt (1924, p. 77) also show an almost perfect gradation, *Crangon verrilli*, established by him for

specimens with a U-shaped rostral area, must be considered identical with *C. armillatus*. I have also seen specimens of the latter species which permit the selection of a graded series leading to a

TABLE 2

Crangon viridari		*Crangon armillatus*	
Length of Carapace (in mm.)	Length/Width of Small Chela	Length of Carapace (in mm.)	Length/Width of Small Chela
42	5.0	60	3.4
45	5.0	65	4.5
55	5.0	70	4.0
55	5.3	72	4.1
60	5.0	75	3.5
60	5.3	85	4.1
60	5.6	90	4.2
75	5.5	90	3.7
75	5.5	90	3.5
78	5.0	95	3.7
79	5.0	100	4.0
85	5.3	100	5.0
85	5.0	105	4.3
90	5.3	107	4.1
90	5.3	110	3.9
90	5.5	110	3.5
105	5.5	110	3.6
105	5.5	110	3.0
110	5.3	115	3.2
110	5.5	115	3.7
120	5.4	120	2.9
125	5.5	120	4.1
125	5.5	120	3.6
130	5.5	125	3.5
130	6.2	130	3.3
		130	4.4
		135	3.1
		140	3.5
		140	3.6
Mean carapace length 87.36		Mean carapace length 104.62	
Mean length/width of small chela 5.34		Mean length/width of small chela 3.8	
Standard deviation of length/width of small chela 0.27		Standard deviation of length/width of small chela 0.47	

very rare extreme where the rostral area has been reduced to a rounded carina as in *C. viridari*.

The notch on the cutting edge of the fixed finger of the large chela is perhaps the most convenient diagnostic feature; this is always present in *viridari* and absent in *armillatus*.

The smaller chela of *viridari* is significantly narrower than that of *armillatus* (table 2). The critical ratio of the difference between the means is 15.75, indicating that there is only about one chance in several hundred thousand that such a difference could have arisen from chance alone.

With *viridari* there is positive correlation between the length of carapace and the ratio of the length to width of the small chela. The correlation coefficient is +0.6, indicating a significant tendency for the claw to become narrower as the length of the carapace increases. For *armillatus* the corresponding correlation coefficient is −0.3 showing a slight tendency for the claw to become wider with increasing carapace length.

The abdominal sternites of *viridari* are always unarmed, while about 60 per cent of males and 25 per cent of the females of *armillatus* have a median spine on at least the first of these sternites.

It is also interesting that these two forms seem to be separated by an ecological isolation. *C. viridari* has been taken only upon grass banks, while as far as I am aware *C. armillatus* is found only among and under stones. The "*C. armillatus*" discussed by Darby (1934, 1935, 1939) as living on the grass banks at Tortugas, Florida, proved upon examination of the material deposited by him in the United States National Museum to be *C. viridari*.

THUNOR, NEW GENUS

Rostrum absent. Front emarginate. Orbital hoods rounded, unarmed, and covering the eyes anteriorly. Cardiac notch absent. Carapace lacking all spines.

Ocular beak absent. Corneae unarmed.

Terminal segment of antennular peduncle bifurcated.

Mouth parts of *Crangon* with the exception of the first maxilla which lacks the setae on the outer half of the bifurcated palp.

First chelae directed anteriorly and very asymmetrical. Larger chela with adhesive disks. Dactylus of larger chela with the pollex as in the *Obesomanus* group of *Crangon*.

Second chelipeds with the carpus divided into five segments.

No transverse articulation on outer uropods.

No anal tubercles.

Branchial formula of *Crangon*.

DISCUSSION: *Thunor* appears to be most closely related to *Crangon*. Among the described secies of *Crangon, Thunor rathbunae* most closely resembles *C. idocheles* described by Coutière (1906, p. 883) from the Indian Ocean. From this and all other species of *Crangon, Thunor* may be distinguished by the following characters: (1) the obsolescence of the ocular beak, well developed in all species of *Crangon* as a distinct projection; (2) the absence of the cardiac notch, well developed in all other genera of the family; (3) the absence of the anal tubercles; and (4) the absence of the transverse articulations of the outer uropods.

Thunor rathbunae (Schmitt)

Figures 3, 4A–J, 4L

Crangon rathbunae SCHMITT, 1924, p. 74, pl. 1, figs. 1–10.

MATERIAL: Thirty-one females (22 ovigerous) and 42 males

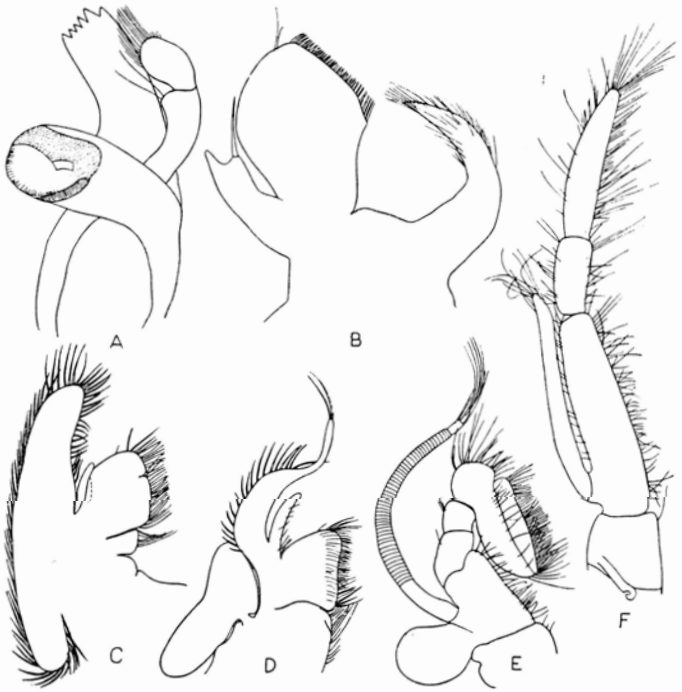

FIG. 3. *Thunor rathbunae* (Schmitt). A. Mandible. B. First maxilla. C. Second maxilla. D. First maxilliped. E. Second maxilliped. F. Third maxilliped.

from the crevices of dead coral fragments in the quiet water behind the Piedra Prieta Reef.

REMARKS: The armature of the telson exhibits a degree of variation which is not, so far as I am aware, equaled by any other species of crangonid. Not only do the number and position of their spines on both the telson and the uropods vary, but their arrangement is often asymmetrical. Typical variations are shown

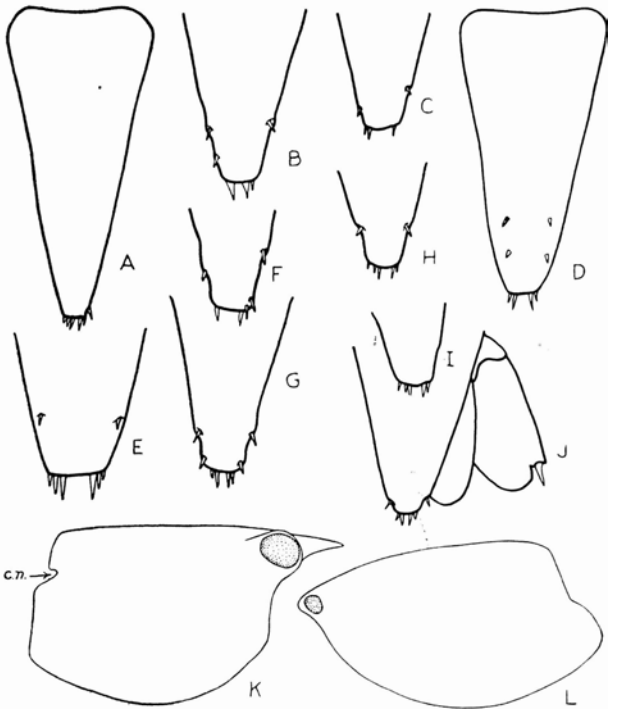

FIG. 4. *Thunor rathbunae* (Schmitt). A–J. Varieties of telsons. K. Carapace of *Crangon gracilipes* showing cardiac notch, c.n. L. Carapace of *Thunor rathbunae*.

in figure 4. That shown in E of that figure is evidently the "norm" of the Barahona population, as 60 per cent of the specimens presented either that configuration or one very similar to it. That of D is the next commonest, with 16.5 per cent of the specimens having the four dorsal or marginal spines near the distal end and two pairs of terminal spines. The individuality of the specimens is so pronounced that, although most of them resemble

one of the figured types, it does not seem possible to group them into any very significant classification. Most of the uropods are quite normal in appearance with a single unpigmented spine on the external distal margin of the outer blade. A few, however, have one or both of the spines duplicated, and some showed the black pigmentation so characteristic of the *Macrochirus* group of the genus *Crangon*.

GENUS **SYNALPHEUS**

Synalpheus filidigitus, new species

Figure 5

MATERIAL: Holotype, one male, A.M.N.H. No. 9572, carapace length 2.7 mm.; paratypes, A.M.N.H. No. 9573, dissected specimen, one female, A.M.N.H. No. 9574. This species was very common in the cavities of a small sponge growing between the branches of a colony of porites in the quiet water halfway between the Piedra Prieta Reef of Barahona Harbor and the shore; over 150 specimens were collected forming the series discussed below.

DESCRIPTION: The rostrum is short, its length being less than half the distance across the front as measured between the tips of the orbital spines. The latter are subequal to the rostrum in length, being generally a little shorter but occasionally equal to, or even exceeding, it in some specimens.

The length of the first, second, and third articles of the antennules stand in the following ratio on the dissected specimen: 2.0:1.0:1.0. The stylocerite reaches about to the distal quarter of the first article.

The superior angle of the basicerite bears a strong spine which falls short of the end of the stylocerite (in the type by an amount about equal to its own length). The slender outer spine reaches in the type to the end of the second antennular article. In other cases it may be a little shorter and hardly reaches to the middle of the same article in some specimens. The scale of the scaphocerite is lacking in both sexes. The spine reaches to the end of the distal antennal article on the type and appears to have a range of variation very similar to that of the outer spine on the basicerite. The carpocerite, five times as long as wide on the dissected specimen, exceeds the antennular peduncle usually by about the length of the terminal antennular article.

The proportions of the larger chela on the type are: fingers 1.0:

total length 3.3:height 1.1; on the dissected specimen these are: 1.0:3.5:1.3; on another specimen: 1.0:2.7:0.9; and on still another: 1.0:3.0:0.9. The palm is armed anteriorly with a small tubercle tipped with short, slender, downwardly directed spine. The great majority of individuals show the form illustrated in figure 5A. In a few cases, however, the tubercle may be reduced until in extreme examples the spine appears to spring merely from a slight prolongation of the palm, the dorsal margin of which is then straight. In a very few the spine itself may be reduced. Two small specimens, a male and a female, with narrow chelae

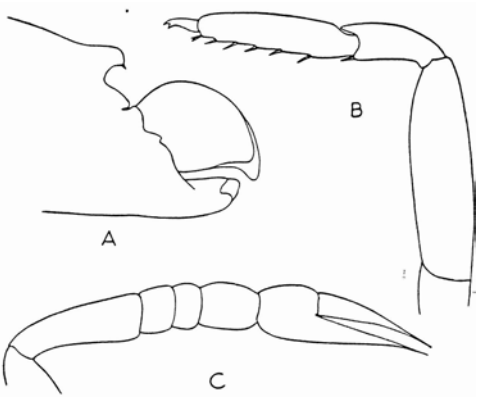

FIG. 5. *Synalpheus filidigitus*, new species. A. Distal portion of large chela. B. Third leg. C. Second leg.

lack the spine, while two small males not only lack the spine but show only a trace of the tubercle.

The proportions of the smaller chela on the type are: fingers 1.0:total length 2.2:height 0.8; on the dissected specimen these ratios are: 1.0:2.20:0.77; on another specimen: 1.0:2.25:0.83. The carpus is very close to 0.5 of the total length of the chela in all the larger specimens measured but is somewhat longer in the very small individuals, being 0.4 of the total length of the chela on a male with a carapace length of 1.9 mm. The merus is 3.3 times as long as wide on the type, on the dissected specimen 3.6, on another specimen 3.4, and on still another 3.5.

The carpus of the second leg has only four articles. The first, second, third, and fourth of these stand in the following ratio on the dissected specimen: 1.0:0.2:0.16:0.4; on the opposite side of the same specimen: 1.0:0.23:0.18:0.45; on another individual:

1.0:0.27:0.23:0.45. The fingers of the chela are peculiarly elongate, being almost threadlike at their tips.

The merus of the third legs is 3.3 times as long as wide on the type, 3.4 on the dissected specimen, and 3.5 on another specimen.

The outer margins of the uropods bear from four to two teeth, the majority having three.

A large female, carapace length 3 mm., carried 20 eggs 0.6 mm. in diameter.

REMARKS: This form agrees very closely with Coutière's *S. rathbunae*, from which it differs in the following particulars: (1) the superior spine of the basicerite which in *S. filidigitus* constantly falls short of the end of stylocerite and which extends to the end of the latter in *S. rathbunae;* (2) the tubercle on the distal end of the palm of the larger chela which is spinose in the great majority of individuals of *S. filidigitus* and not spinose on *S. rathbunae;* (3) the narrower merus of the smaller chela which is over three times as long as wide on *S. filidigitus* and only 2.35 on *S. rathbunae;* (4) the filiform tips to the fingers on the second chelae of *S. filidigitus* which are of normal shape on *S. rathbunae;* and (5) the narrower merus of the third leg which is over three times as long as wide on *filidigitus* and only 2.8 on *rathbunae*.

The apparent discrepancy in the relative length of the first antennular article, which I have given as twice the second for the *filidigitus* while Coutière (1909, p. 84, fig. 51) indicates that in the *rathbunae* it is only 1.2 times the second, may be due to the method of measurement. I have removed this appendage and measured the length of the first article from its base. From Coutière's figure it seems, however, probable that his ratio refers to the length of the visible portion of the first segment.

Synalpheus disparodigitus, new species

Figure 6

MATERIAL: Holotype, one male, A.M.N.H. No. 9575, carapace 3.8 mm. long; paratypes: eight males, five females (two ovigerous), A.M.N.H. No. 9576; dissected specimen: one male, A.M.N.H. No. 9577. All are from the quiet water behind the Piedra Prieta Reef.

DESCRIPTION: The rostrum is narrow, four times as long as wide on the type and falls short of the end of the first antennular segment by a distance equal to its own length on the type, by 1.15 of its length on the dissected specimen, and 1.65 on a small male.

The orbital, or lateral, spines are wider, as long as wide on the type, and vary in length from being almost equal to the rostrum to being only about one-half as long. On a single female the lateral spine of the left side is completely absent.

The first, second, and third antennular articles on the dissected specimen stand in the following ratio: 2.8:1.73:1.0. The second

FIG. 6. *Synalpheus disparodigitus*, new species. A. Finger of small chela. B. Outer margin of uropods. C. Telson. D. Small chela. E. Frontal and antennal structures. F. Dactyl of third leg. G. Third leg. H. Distal portion of large chela. I. Large chela. J. Second leg.

article is 1.73 times as long as wide at the distal extremity, and the third just as long as wide at the distal end on the dissected specimen. The stylocerite falls short of the end of the first antennular segment by 0.19 of the length of that segment on the dissected specimen.

The basicerite has the upper angle truncate, almost a right angle on the type. Its lateral spine reaches to the end of the first antennular article on the type and to the proximal fourth of that

segment on another specimen. The scaphocerite lacks the scale on both sexes. The spine, reaching from 0.5 to 0.75 of the length of the ultimate antennular article, falls short of the end of the carpocerite by 0.33 of its own length on the type and 0.367 on the dissected specimen. The carpocerite exceeds the last antennular article by about the length of that segment on the type; on other specimens this may drop to about one-quarter of the length of the last segment and is 5.4 times as long as wide on the dissected specimen.

The outer distal border of the merus of the large chela bears a strong point. On the dissected specimen this segment is 3.32 times as long as wide. The proportions of the larger chela on the type are: fingers 1.0:total length 3.9:height 1.45; on the dissected specimen these ratios are: 1.0:4.05:1.48. The palm is armed anteriorly with a small tubercle tipped by a slender acute spine. The fixed finger is much reduced, there being practically no cutting edge beyond the socket receiving the plunger of the dactylus. The dactylus has not undergone a corresponding reduction, so considerably exceeds the fixed finger in length.

The merus of the smaller chela is unarmed and on the dissected specimen is 3.78 times as long as wide. On the same specimen the carpus is 0.52 times as long as the chela, on the type 0.532, and on another specimen 0.56. On the type the chela has the following proportions: finger 1.0:total length 2.58:height 0.8; on the dissected specimen these ratios are: 1.0:2.74:0.83. The dactylus terminates in two subequal teeth and bears a thick brush of hair on its upper surface.

On the dissected specimen the merus of the second pair is five times as long as wide. The carpus is divided into five segments. The first, second, third, fourth, and fifth carpal segments and the chela of the dissected specimen stand in the following ratio: 1.0: 0.29:0.29:0.29:0.57:1.47. The third leg of the dissected specimen has the merus unarmed and 3.94 times as long as wide. The carpus is 0.44 times as long as the merus, the propodus 0.83. The latter segment is 9.84 times as long as wide, its posterior margin armed with a series of five spinules and a pair at the distal end. The dactylus is 0.055 times as long as the merus and 2.6 times as long as wide at the base. The two hooks of the dactylus are parallel, the dorsal being the stronger.

All except the second abdominal pleura of the males end in a point on the ventral border.

The telson of the dissection specimen has the following proportions: length 1.4 times width of the anterior base, 4.65 times the posterior base. The anterior base is 3.33 times as wide as the posterior. The distance from the anterior pair of dorsal spines to the posterior margin is 0.715 times the telson length, from the posterior pair 0.46. The longer (inner) pair of apical spines is 0.172 times as long as the telson. The outer blade of the uropods bears from five to eight teeth with a movable spine between the last two.

REMARKS: *Synalpheus disparodigitus* is very similar to *S. pectiniger* Coutière which it resembles in the absence of the scale on the scaphocerite, the reduction of the fixed finger on the major chela, and in the toothed apex to the fingers of the small chela. It may be distinguished from that species by the following characters: (1) the dorsal prominence of the major chela which on *disparodigitus* consists of tubercle and small spine and on *pectiniger* is composed of a large, tapering, spine-like process; (2) the dactylus of the smaller chela which is bidentate on *disparodigitus* and tridentate on *pectiniger;* (3) the external blade of the uropods whose outer margin is armed with from five to eight spines on *disparodigitus* and, with the exception of the terminal spine, smooth and unarmed on *pectiniger*. *S. disparodigitus* is also similar to *longicarpus* (Herrick) which it resembles in the shape of the anterior margin of the carapace, the bidentate tip of the dactylus of the small chela, and the armed outer margin of the uropods. From *longicarpus*, *disparodigitus* is separated by the following features: (1) the lack of a scale on the scaphocerite on *disparodigitus*, present, at least, on the female of *longicarpus;* (2) the reduced fixed finger of the larger chela of *disparodigitus* which is normally developed on *longicarpus;* and (3) the narrower merus of the third leg, over three times as long as wide on *disparodigitus* and only a little over twice as long as wide on *longicarpus*.

Synalpheus barahonensis, new species

Figure 7

MATERIAL: Holotype, one male, A.M.N.H. No. 9578, carapace length 3.2 mm.; paratypes: one female, A.M.N.H. No. 9579, carapace length 3.6 mm.; dissected specimen, one male, A.M.N.H. No. 9580. All are from a live colony of *Agaricia agaricites* (Linnaeus) behind Piedra Prieta Reef.

The rostrum, 1.2 times as long as wide on the type, is equal in length to the orbital spines and falls short of the end of the first antennular article by 3.84 times its own length on the same specimen. The orbital spines are 0.6 times as long as wide on the type. The first, second, and third antennular articles on the male paratype stand in the following ratio: 3.0:1.0:1.0. The second and third articles are both as long as wide at their distal extremities on the male paratype. The stylocerite falls short of the end

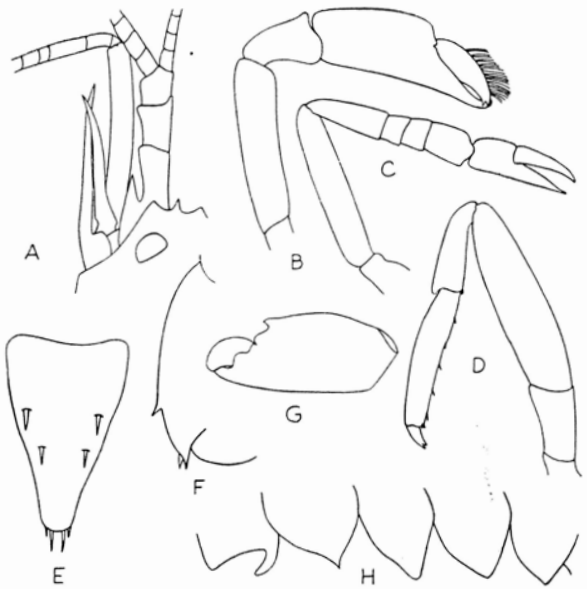

FIG. 7. *Synalpheus barahonensis*, new species. A. Frontal and antennal structures. B. Small chela. C. Second leg. D. Third leg. E. Telson. F. Outer margin of uropod. G. Large chela. H. Pleura.

of the first antennular article by 0.22 of the length of that segment on the male paratype.

The upper angle of the basicerite is very nearly a right angle. Its lateral spine reaches to the proximal third of the terminal antennular article on the type and to the end of the second antennular article on the male paratype. The scaphocerite lacks the scale on both sexes and very slightly exceeds the lateral spine of basicerite on all three specimens. The carpocerite exceeds the antennular peduncle by 0.66 of the length of the terminal article

on the type, by the entire length of that article on the male paratype, and is 6.67 times as long as wide on the male paratype.

The third maxillipeds lack any trace of the circlet of spines which usually crowns the tip of the ultimate article in *Synalpheus*.

The outer distal margin of the merus of the larger chela is rounded. On the male paratype this segment is 2.25 times as long as wide. The proportions of the larger chela on the type are: fingers 1.0:total length 3.33:height 1.42. On the male paratype these ratios are: 1.0:3.6:1.5. The anterior prominence of the palm is conical, not spined.

The merus of the small chela is unarmed and on the male paratype 4.3 times as long as wide. On the same specimen the carpus is 0.41 times as long as the chela, on the type 4.15, and on the paratype 4.9. The relative proportions of the chela on the type are: fingers 1.0:total length 2.42:height 0.75. On the male paratype these ratios are: 1.0:2.5:0.77. The dactylus terminates in two subequal teeth and bears a thick brush of hair on its upper surface.

On the male paratype the merus of the second leg is 5.8 times as long as wide. **The carpus is divided into four segments.** On the male paratype the first, second, third, and fourth carpal segments and the chela stand in the following ratio: 1.0:0.27:0.23:0.5:1.33.

The third leg of the male paratype has the merus unarmed and 3.75 times as long as wide. The carpus is 0.4 times as long as the merus. The propodus, 0.732 times as long as the merus, is 5.5 times as long as wide, its posterior margin armed with a series of five spinules and a pair at the distal end. The dactylus is 0.106 times as long as the merus and 1.6 times as long as wide at the base. **The two hooks of the dactylus are equal and parallel.**

The abdominal pleura of the males end in a point on the ventral border; those of the female are rounded.

The telson of the paratype has the following proportions: length 1.55 times the width of the anterior base, 5.84 times the width of the posterior base. The anterior base is 3.74 times as wide as the posterior. The distance from the anterior pair of dorsal spines to the posterior margin is 0.65 times the length of the telson, from the posterior pair 0.457. The longer (inner) pair of apical spines is 0.143 times as long as the telson length. The outer blade of the uropod bears two or three teeth with a movable spine between the last two.

REMARKS: *Synalpheus barahonensis* is similar to *S. rathbunae*

Coutière which it resembles in absence of the scale on the scaphocerite, the four-segmented carpus of the second leg, and a similar armature of the outer blade of the uropods. It may be distinguished from that species by the following characters: (1) the upper angle of the basicerite which is truncate on *barahonensis* and produced into a strong spine on *rathbunae;* (2) the third maxillipeds which lack the circlet of spines at the tip of the last segment, which are well developed on *rathbunae* and, as far as I am aware, on every other described species of the genus; and (3) by the much narrower merus of the third leg, 3.7 times as long as wide on *barahonensis* and only 2.2 on *rathbunae.*

Synalpheus dominicensis, new species

Figure 8

MATERIAL: Holotype, one female, A.M.N.H. No. 9581, carapace 3.3. mm. long, from quiet water inside Piedra Prieta Reef; paratype (dissected specimen), one female, A.M.N.H. No. 9582, carapace 2.8 mm. long, dredged just outside Yuncu Pass in about 2 to 4 fathoms.

DESCRIPTION: The rostrum, 4.4 times as long as wide on the holotype, 5.56 on the paratype, falls just short of the second antennular segment on the type and just reaches that article on the paratype. The orbital hoods are tipped with slender acuminate spines which fall short of the end of the rostrum by 0.288 of the latter's length on the holotype and 0.258 on the paratype.

The first, second, and third antennular segments stand in the following ratio on the paratype: 3.0:1.0:1.0. The second and third articles are both as long as wide at the distal end of the paratype. The stylocerite falls a little short of the middle of the second antennular article on the holotype and reaches the middle on the paratype.

The upper angle of the basicerite is produced into a strong spine that on the type reaches about halfway from the end of the orbital spine to the end of the first antennular article. The lateral spine of the scaphocerite exceeds the terminal antennular article by about the length of that article on the type. A scale is present in both sexes, about equal in length to the carpocerite on the holotype and only reaching to about the middle of the terminal antennular segment on the dissected specimen. The carpocerite is about equal in length to the antennular peduncle on both specimens; on the paratype it is 4.6 times as long as wide.

The outer distal margin of the merus of the larger chela is armed with a strong spine and is two times as long as wide on the paratype. The proportions of the larger chela on the type are: fingers 1.0:total length 2.64:height 0.91. On the paratype these ratios are: 1.0:2.82:1.0. The anterior prominence has the form of a strong, curved, sharp spine, the point of which is directed forward.

The merus of the small chela of the type is armed with a strong spine on the outer distal margin and is 2.56 times as long as wide.

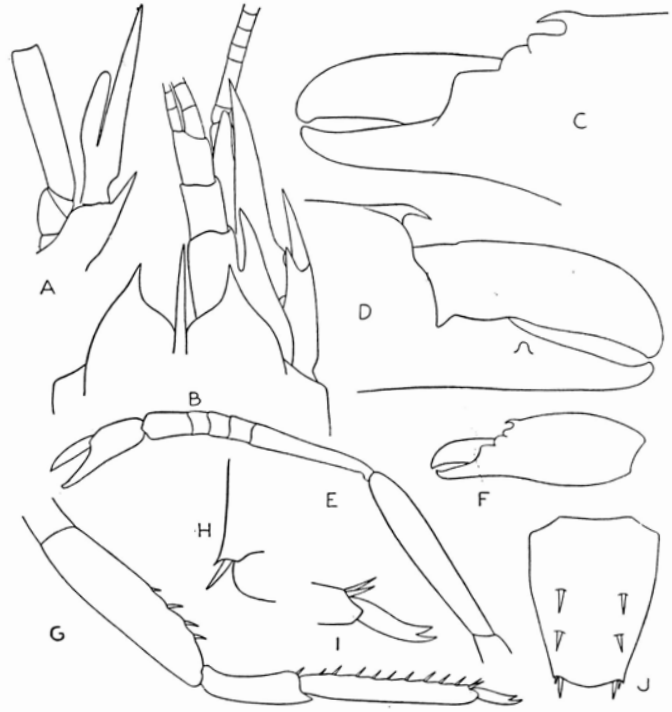

FIG. 8. *Synalpheus dominicensis*, new species. A. Peduncle of second antenna. B. Frontal and antennular structures. C. Distal portion of large chela, upper side. D. Distal portion of large chela, lower side. E. Second leg. F. Large chela. G. Third leg. H. Outer margin of uropod. I. Dactyl of third leg. J. Telson.

On the same specimen the carpus is 0.32 times as long as the chela. The relative proportions of the chela are: fingers 1.0:total length 2.68:height 0.915. The dactylus terminates in two teeth, the anterior one of which is the larger. There is no brush of hair on the upper surface.

On the paratype the merus of the second leg is 6.1 times as long as wide. The carpus is divided into five segments. On the paratype the first, second, third, fourth, and fifth carpal segments and the chela stand in the following ratio: 1.0:0.28:0.187:0.167:0.396:0.795.

The merus of the third leg is armed with four movable spines on the distal half of the lower margin and on the paratype is 3.5 times as long as wide. The carpus is 0.5 times as long as the merus. The propodus, equal in length to the merus, is seven times as long as wide and bears nine spines on the lower border in addition to the pair at the distal end. The dactylus is 0.24 times as long as the merus and 3.4 times as long as wide at the base. The ventral hook is wider than the dorsal, to which it is parallel.

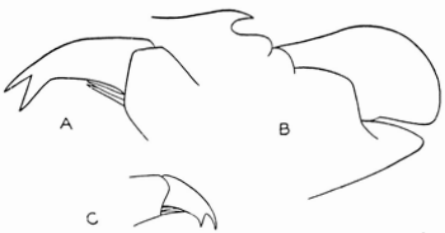

FIG. 9. Species of *Synalpheus*. A. Dactylus of third leg of *Synalpheus streptodactylus*. B. Fingers of the larger chela of the first pair of *Synalpheus streptodactylus*. C. Dactylus of the third leg of *Synalpheus ancistrorynchus*.

Both specimens are females and have the abdominal pleura rounded. On the type the telson has the following proportions: length 1.3 times the width of the anterior base, 2.5 times the length of the posterior base. The distance from the anterior pair of dorsal spines to the posterior margin is 0.585 times the length of the telson, from the posterior pair 0.308. The inner pair of apical spines is the longer and is 0.143 times as long as the telson. The outer blade of the uropods bears a single tooth and a movable spine just below it.

REMARKS: *Synalpheus dominicensis* appears allied to both the *neomeris* and the *paulsoni* groups. It is distinguished from all the American species of both groups by the row of spines on the distal portion of the posterior margin of the third legs, this segment being smooth and unarmed on previously described American species. In the *neomeris* group it most closely resembles *S. streptodactylus* Coutière, in the *paulsoni* group *ancistrorynchus*, both from the

Indo-Pacific. From these *dominicensis* is separated by the shape of the dactylus on the third leg. Dactyls from the Philippine specimens of these species in the collections of the American Museum of Natural History have been figured for comparison in figure 9A, C. From *streptodactylus* it is also distinguished by the very different shape of the fingers of the larger chela (figs. 8C, D, 9B) and the longer length of the latter, 2.64 times the total length on *dominicensis* as against 3.6 on our specimen of *streptodactylus*. From *ancistrorynchus* it may further be distinguished by the shape of the frontal margin of the carapace. On *dominicensis* the margin of the median side of the orbital lobes meets the rostrum at a very acute angle, and the latter arises so sharply from that point that it appears to originate some distance in from the frontal margin. On *ancistrorynchus*, on the other hand, the spaces between the median margins of the orbital lobes and the rostrum are nearly U-shaped, and the rostrum appears to spring from the very edge of the frontal margin.

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