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## STUDIES IN NATURAL HISTORY

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VOLUME X

NUMBER 4

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### REPORTS ON CERTAIN INVERTEBRATES AND FISHES

of the Barbados-Antigua Expedition of 1918

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1918

Reports on certain invertebrates  
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# UNIVERSITY OF IOWA STUDIES IN NATURAL HISTORY

HENRY FREDERICK WICKHAM, M.S., Editor

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VOLUME X

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## REPORTS ON CERTAIN INVERTEBRATES AND FISHES

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## CONTENTS

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*Polychaetous Annelids*

A. L. TREADWELL

*Report on the Fishes*

BARTON WARREN EVERMANN and ALVIN SEALE

*Report on the Chilopoda and Diplopoda*

RALPH V. CHAMBERLIN

*The Genus Holopus*

FRANK SPRINGER

*Report on the Macrura, Anomura, and Stomatopoda*

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## POLYCHAETOUS ANNELIDS

Collected by the Barbados-Antigua Expedition from the  
University of Iowa in 1918

A. L. TREADWELL  
Vassar College

The following is the result of a taxonomic study of the polychaetous annelids collected by the Barbados-Antigua expedition, and submitted to me for examination through the courtesy of Professor Nutting. A tabulation of the families, genera and species represented follows:

Family	
Amphinomidæ	<i>Eurythoe pacifica</i> Kinberg. <i>Hermodice carunculata</i> Kinberg. <i>Notopygos crinita</i> Grube.
Polynoidæ	<i>Hermenia verruculosa</i> Grube. <i>Halosydna leucohyba</i> Schmarda. <i>Halosydna fusca-maculata</i> n. sp. <i>Evarnella trimaculata</i> n. sp.
Sigalionidæ	<i>Sthenelais grubei</i> Treadwell.
Acoetidæ	<i>Panthalis pustulata</i> n. sp.
Phyllodocidæ	<i>Phyllodoce oculata</i> Ehlers. <i>Eulalia quinquelineata</i> Treadwell. <i>Eulalia foliosa</i> n. sp.
Syllidæ	<i>Typosyllis corallicola</i> Verrill. <i>Trypanosyllis vittigera</i> Ehlers. <i>Haplosyllis cephalata</i> Verrill. <i>Haplosyllis gula</i> n. sp.
Nereidæ	<i>Synelmis simplex</i> Chamberlin. <i>Nereis glandulata</i> Hoagland. <i>Nereis gracilis</i> Webster. <i>Nereis egregiacirrata</i> n. sp.
Glyceridæ	<i>Glycera abbranchiata</i> Treadwell. <i>Glycera dibranchiata</i> Ehlers.
Leodocidæ	<i>Leodice binominata</i> Quatrefages. <i>Leodice fucata</i> Ehlers. <i>Leodice mutilata</i> Webster. <i>Leodice caribæa</i> Grube. <i>Leodice longicirrata</i> Webster. <i>Leodice rubra</i> Grube. <i>Leodice tenuis</i> Treadwell. <i>Leodice spongicola</i> Treadwell.



	<i>Leodice rubrivittata</i> Treadwell.
	<i>Nicidion kinbergii</i> Webster.
	<i>Arabella setosa</i> Verrill.
	<i>Oenone diphyllidia</i> Schmarda.
Cirratulidæ	<i>Cirratulus nigromaculata</i> Treadwell.
	<i>Cirratulus melanacanthus</i> Grube.
Maldanidæ	<i>Nicomache antiguensis</i> n. sp.
Terebellidæ	<i>Eupolymnia magnifica</i> Webster.
Sabellidæ	<i>Branchiomma lobiferum</i> Ehlers.
	<i>Parasabella sulfurea</i> Treadwell.
	<i>Dasychonopsis conspersa</i> Ehlers.
	<i>Bispira melania</i> Schmarda.
	<i>Sabella melanostigma</i> Schmarda.
	<i>Hypsicomus purpureus</i> n. sp.
Serpulidæ	<i>Protis sombrerianus</i> McIntosh.
	<i>Spirobranchus tricornis</i> Moreh.
	<i>Spirobranchus giganteus</i> Pallas.
	<i>Pomatostegus stellatus</i> Abildgaard.

#### Family **Amphinomidæ**

##### EURYTHOE Kinberg

##### *Eurythoe pacifica* Kinberg

*Eurythoe pacifica* Kinberg, (1857), p. 14.

Common in the collections. Ten specimens from Pillars of Hercules; nineteen from tide pool near Pelican Island; four "off the Crane"; also found in "old coral heads."

##### HERMODICE Kinberg

##### *Hermodice carunculata* Kinberg

*Hermodice carunculata* Kinberg, (1857), p. 13.

Common in the collections. Found at Needham's Point and D.S.79 and 81, four specimens; Bathsheba, one specimen; Pillars of Hercules, eleven specimens; also at "sea beach at low tide" and "in old coral heads." Two small specimens measuring 15 mm. and 6 mm. in length respectively were taken at Station 99. From the character of the caruncle I concluded that they are the young of this species. The body in these is colorless but on the dorsal surface the intersegmental grooves are marked by heavy black, transverse lines.

##### NOTOPYGOS Grube

##### *Notopygos crinita* Grube

*Notopygos crinita* Grube (1878), p. 7.

Collected at "sea beach at low tide" one specimen, and Pillars of Hercules two specimens.



## Family Polynoidæ

## HERMENIA Grube

*Hermenia verruculosa* Grube

*Hermenia verruculosa* Grube, (1856), pp. 45, 46.

Treadwell, (1911), pp. 9 to 14, figs. 23 to 26.

One specimen collected at Station 101.

## HALOSYDNA Kinberg

*Halosydna leucohyba* Schmarda

*Halosydna leucohyba* Schmarda, (1861), p. 153, text figs. a, b, c; pl. XXXVI, fig. 308.

Webster, (1884), pp. 309, 310, pl. VII, figs. 19, 20.

One specimen "on old coral heads."

*Halosydna fusca-maculata* new species.

A single specimen is in the collection. In the great difference in size between the first pair and later pairs of elytra this approaches *Hermenia* of Grube, but the number of elytra is greater and the differences in size less marked than in the single species thus far described in that genus. The animal is 28 mm. in length with a width of 5 mm.

The prostomium is about as wide as long, with the anterior margin prolonged to form the bases for the lateral tentacles. (Figure 5) The anterior eyes are larger than the posterior, have evident lenses and are situated slightly ventrolaterally so that from the dorsal view they are covered by a little tissue. The cirrophore of the median tentacle is relatively rather broad and fills the anterior cleft of the prostomium. The terminal joint is much more slender than the cirrophore. The lateral tentacles are similar in form to the median. All tentacles terminate in very fine apices without any trace of a sub-terminal enlargement. In the type and only specimen the right palp is larger than the left but neither is very large, and their surfaces are smooth and without papillæ. The tentacular cirri are absent on the left side. Those of the right side show the dorsal one larger than the ventral, about as large as the left palp but more slender. Both have fine tips.

The left first elytron is present. (Figure 6) It is broadly oval in outline and translucent with no trace of color. Its inner margin extends to the median line of the prostomium and anteriorly it covers the bases of the lateral tentacles and tentacular cirri, while posteriorly it covers the first and second parapodia. In the entire animal the two first elytra must have together covered the entire dorsal surface as far back as the first two setigerous somites. The first setigerous somite is wider than the prostomium and later ones increase in width so that in the preserved material, setigerous somite 5 is three times as wide as the prostomium.

The second elytra have hardly one-half the width of the first and this together with the increase in the width of the body, makes these elytra able to cover only a very small portion of the dorsal surface; hardly more than the bases of the parapodia. (Figure 7) Elytra 2 to 6 have dark-brown margins which makes them easily recognized but later ones are



without color and so translucent as to be easily overlooked. The dorsal cirri have heavy cirrophores but their terminal joints are small.

A parapodium from near the middle of the body (figure 8), has two aciculæ, one extending into the setal lobe and the other into a small rounded dorsal lobe which must be the much degenerated notopodium and bears no setæ. The cirrophore of the dorsal cirrus is very large, broader at the base than is the setal lobe and is about as long as this lobe. At the apex it carries the small lanceolate dorsal cirrus. The setal lobe is obliquely truncated at the apex and the setæ are all alike each with a stout shaft tapering to a bluntly rounded apex. In the parapodium figured those dorsal to the aciculæ had a sub-apical tooth, those ventral to it had not. I am uncertain if this is the case in all somites. Each seta has, arranged basally from the apex, rows of flat plate-like teeth with finely denticulated edges. (Figure 9) There is a very small ventral cirrus.

The specimen retains one anal cirrus in form like the dorsal but shorter and more slender.

Collected at Barbados.

The type is in the Museum of the State University of Iowa.

#### EVARNELLA Chamberlin

##### *Evarnella trimaculata* new species

A single specimen collected at Station 101. The body is 15 mm. long, 3 mm. wide without the parapodia, has 35 somites and 15 pairs of elytra. It is characterized by three prominent brown patches on each elytron and a brownish band on each inner elytral border.

The prostomium (figure 1) has nearly a square outline with peaks blunt and radiating. The anterior eyes are the larger, situated dorso-laterally at the bases of the peaks. The posterior eyes, much smaller and very black, lie near the posterior margin.

The median tentacle is lost but its cirrophore is large and fills most of the space between the peaks. The cirrophores of the lateral tentacles extend about as far as that of the median. Each lateral tentacle narrows abruptly at about its middle forming a long slender filamentous terminal half. The palps are unusually short, hardly more than twice as long as the lateral tentacles.

Except for size the elytra are all alike. They are translucent white with smooth contours and a large number of small blunt spines are scattered over rather less than one-quarter of their area, toward the anterior border. (Figure 2). Each elytron has three pigment patches, one on either side of the point of attachment of the elytriphore and one near the outer margin. When the elytra are in place the pigment patches extending in a row outward and slightly posteriorly in each somite are a marked feature of the dorsal pigmentation. In addition to these each elytron has a band of pigment running parallel to its inner margin with more or less pigment shading away from this band on either side.

A parapodium from near the middle of the body (figure 3) has a



bluntly conical setal portion with a short anterior lip at the apex. The dorsal cirrus is slender without any special markings and arises from a very stout cirrophore placed posterior to the dorsal seta-tuft. A small acicula extends into the dorsal portion of the parapodium and a much heavier one lies in the setal lobe. The ventral cirrus is very slender. On the dorsal surface of the parapodium is an elevation corresponding to the elytophore of the elytra-bearing somites.

The dorsal setæ are stout and only a very little curved toward the blunt apex. Each has many rows of spines which have the form of transversely arranged plates which according to the position of the seta look like a marginal row of fine teeth or else are seen along both margins of the seta-stalk and then look like two rows of teeth. The ventral setæ are very heavy and few in number in each parapodium. Each (figure 4) has a stout apex with a strong sub-terminal tooth. In the parapodium figure there were 9 of these ventral setæ, of which the 3 ventralmost were smaller than the others and without lateral plates. The 6 dorsalmost ones had the small plates shown in figure 4 each of which is finely denticulated along the free margin. In the position figured they appear as a row of marginal spines. If the seta is rolled so that the sub-terminal tooth is uppermost they show on both margins. The plates evidently are wider than the stalk of the seta.

The type is in the Museum of the State University of Iowa.

#### Family *Sigalionidæ*

*STHENELAIS* Kinberg

*Sthenelais grubei* Treadwell

*Sthenelais grubei* Treadwell, (1901), pp. 187, 188, figs. 10 to 13.

The original description was rather brief but there is no doubt as to the identification. In the original description it is stated that as far as somite 27 the elytra do not cover the dorsal surface. In this specimen the first five elytra cover the surface, the next eight leave a narrow uncovered area and behind this the surface is entirely covered. One incomplete specimen collected at Station 104.

#### Family *Acoetidæ*

*PANTHALIS* Kinberg

*Panthalis pustulata* new species

Three fragments evidently together comprising the entire body of the animal were in a bottle, but because of this broken condition measurements of length and counts of the number of somites and elytra are necessarily more or less inaccurate. The body length is approximately 115 mm. and the width without parapodia 11 mm. There are about 110 somites with at least 100 elytra.

The prostomium (figure 10) is oval in outline, barely 1 mm. in the transverse and rather more than that in the antero-posterior diameter.



The slender median tentacle is inserted in a dorsal groove which extends backward for more than one-half the length of the prostomium. On either side the prostomium is prolonged into a stalk, each stalk with a large eye at the end. A second, much smaller eye on either side lies a little in front of the middle of the prostomium. The lateral tentacles lie one beneath each eye-stalk and are approximately the same form and size as the median. The palps are fully ten times as long as the tentacles, each tapering to an acute point from a base which is one-half as wide as the prostomium. Scattered irregularly over the surface of the palps and much more thickly crowded together toward the apices are a large number of spiny processes most of which are irregularly conical in outline and an occasional one may be bifid. Figure 11 is a camera drawing of the profile of a palp taken near the apex. In addition to being more closely crowded together those toward the apices are larger than those found elsewhere.

Somite 1 (figure 10) is only a very little broader than the prostomium and its tentacular cirri closely resemble in form and size the antennae, though they are a trifle greater in diameter. The cirrophores of the tentacular cirri extend forward on either side to the level of the posterior margin of the anterior eyes.

The parapodia of the anterior somites (figure 12 is drawn from the 19th) have a heavy, obliquely truncated setal lobe with equal anterior and posterior lips. In the interior is a long rod of a brown chitin which extends into the interior of the body and has nothing to do with either the setæ or the acicula. A similar structure occurs in *Panthalis oculata* Treadwell (Treadwell 1901, pages 188, 189, figure 15). The dorsal cirrus has a heavy cirrophore and is itself thin-walled and conical, extending only a short distance beyond the setal lobe. The ventral cirrus is smaller than the dorsal but similar to it in outline. There is a single very heavy acicula. Beginning with somite 10 each parapodium has on its dorsal surface a series of thin-walled globular pustules. In somites with elytra the largest lie lateral to the elytriphore, though smaller ones may occur as far toward the dorsal surface as the base of the elytriphore. In other somites they are scattered irregularly over the surface of the parapodium (figure 12). From about the 50th somite backward these become more prominent, assume a cylindrical form with rounded ends and in the preserved material are decidedly an opaque white in color. Through a large part of the posterior region they have a regular arrangement. In the elytra-bearing somites there are two, lateral to the elytriphore on the dorsal surface of the parapodium. In the other somites there are also two, one on either side of the dorsal cirrus, lying, that is, one on the side toward the apex of the parapodium and the other toward the dorsal median line.

The very heavy acicula does not protrude from the surface of the parapodium. Dorsal to it in anterior somites is a row of slender colorless setæ which suddenly narrow toward the apex and carry along the narrowed portion a row of slender fine hair-like processes. (Figure 13)



At the bases of these setæ are numerous very short slender needle-like colorless setæ. Ventral to the acicula are two kinds of setæ. In the dorsal region of the tuft there are a few (6 in the one drawn) very stout yellow setæ with the apex slightly bent and blunt pointed. (Figure 14) Subapically each has a tuft of minute spines visible only under high power. Ventral to these is a tuft of colorless setæ each with a slender stalk which widens toward the end and then narrows to a very sharp apex, bending first to one side and then back to the original direction so that the terminal portion is parallel to the basal. (Figure 15) On either side of the entire terminal portion is a row of spines, (possibly a broad spine which extends entirely across the seta and shows on both margins.) Where these spines are largest they are obviously in the form of plates whose free margins are denticulated, and probably this structure persists in the smaller ones though this point is difficult to demonstrate.

Toward the posterior end the pustules on the dorsal parapodial surfaces described above change to finger-shaped or cylindrical lobes, but in other respects the structure of the parapodia is essentially as in the anterior somites and the same forms of setæ occur, though they are less separated into groups, the different types intermingling.

Most of the elytra had been lost. In life, they could hardly have covered the dorsal surface of the body. They are thin, delicate, translucent, approximately circular in outline with a wavy margin. Against a dark background all except the border is seen to be dotted with opaque white spots. In transmitted light these spots do not show.

One specimen collected at English Harbor. The bottle contained a thick walled tube of a soft, tough material coated on the outside by minute grains of sand. I am uncertain if the tube belongs with the animal.

The type is in the Museum of the State University of Iowa.

#### Family **Phyllodocidæ**

##### PHYLLODOCE Savigny

##### *Phyllodoce oculata* Ehlers

*Phyllodoce oculata* Ehlers, (1887), p. 135, pl. 40, figs. 4, 5, 6.

A single specimen doubtfully identified as this species though the characteristic dorsal lobes are lost and the general preservation is poor. The locality label was unfortunately lost in transferring.

##### EULALIA Savigny

##### *Eulalia quinquelineata* Treadwell

*Eulalia quinquelineata* Treadwell, (1901), p. 192, figs. 27 and 29.

One imperfect specimen, lacking both anterior and posterior regions. I have identified it from the five longitudinal dark lines on the dorsal surface and the three on the ventral.



*Eulalia foliosa* new species

A single imperfect specimen, probably collected at Station 101. The length is approximately 22 mm., the greatest width about 1 mm.

In the preserved material the dorsal surface of the anterior somites is very dark brown in color, with a narrow colorless band on either side just dorsal to the parapodium. At the posterior end this color disappears.

The prostomium (figure 16) is nearly circular in outline and has a pair of enormous eyes. The median tentacle arises between the eyes, is slender and about as long as the prostomium. The frontal tentacles are heavier than the median and are about as long as the prostomium. Only one tentacular cirrus remains and this is enormously broadened at the base, much flattened and curved backward lateral to the first somites.

A parapodium from the middle of the body (figure 17) is long and slender with a bifid presetal lobe of which the dorsal lip is the longer. There is a single acicula reaching the surface between the lips of the presetal lobes, and a ventral tuft of setæ. The only dorsal parapodial lobes remaining on the specimen are on the next to the last somite. They are slender-lanceolate in outline. The seta shafts are slender and obliquely truncated at the apex. Into the truncated portion fits the base of the terminal joint which is very slender, curves rapidly to an acute tip and is denticulated along one border. (Figure 18)

The type is in the Museum of the State University of Iowa.

## Family Syllidæ

## TYPOSYLLIS Langerhans

*Typosyllis corallicola* Verrill

*Typosyllis corallicola* Verrill, (1900), p. 603.

Two incomplete specimens collected at Pelican Island seem to belong to this species, though the greenish pigment cells which Verrill described on the cirri were not to be seen, and the œsophagus extended over 8 somites instead of 10 to 12, as in Verrill's material.

## TRYPANOSYLLIS Claparède

*Trypanosyllis vittigera* Ehlers

*Trypanosyllis vittigera* Ehlers, (1887), p. 151, pl. 40, figs. 1 to 3.

A fragment of the posterior end of a syllid was collected at Station 101 and it is probably of this species, though in the absence of the anterior end it is not possible to be certain on this point.

## HAPLOSYLLIS Langerhans

*Haplosyllis cephalata* Verrill

*Haplosyllis cephalata* Verrill, (1900), pp. 613, 614.

A large number collected in sponges at Falmouth, Antigua. The setæ showed decided tendencies toward a bifurcated apex.



*Haplosyllis gula* new species

Collected at Station 101 and when they reached me attached to the surface of fragments of *Leodice longicirrata* Webster; to a small Glycerid, and to another Syllid, though most of the specimens were on the *Leodice*. They were usually attached to the body wall rather than to cirri and evidently held in place by a strong sucking action of the pharynx for when pulled loose the point of attachment on the body wall showed as a very distinct papilla. Eisig (1906 page 180) and Potts (1911, page 410) have described the ferocity with which syllids attack other annelids and it is possible that the attachment took place in the close confinement of the collecting dishes rather than in the open ocean. I have elsewhere (1909, pages 359, 360) shown that *Haplosyllis cephalata* Verrill may establish a relatively permanent attachment to other annelids, for the cirrus held in the jaw of the syllid has evidently been digested. In the specimens here described there was no evidence of anything more than temporary attachment.

Under low magnification the most noticeable feature of the animal is the reddish-brown pharynx with its darker anterior margin which in all of the specimens was so far protruded that its anterior end was level with the anterior margin of the prostomium. (Figure 22)

One entire specimen has 32 somites with a pair of unjointed anal cirri (figure 23). The body is widest at the anterior end and gradually narrows posteriorly. The total length is about 2 mm. with a prostomial width of less than 0.25 mm. The palps are separate to their bases (figure 19), are together broader than the prostomium and are longer than it. The prostomium is short, its length being about one-third its width and its anterior margin is rounded. On either side are two reddish-brown eyes, the anterior of each pair larger than the posterior and considerably farther from the mid-dorsal line. Only the median and one lateral tentacle are present in the specimen figured and as this seemed to be the best preserved one of the lot, these are drawn. The median tentacle is a little larger and longer than the lateral and both are moniliform. The dorsal tentacular cirrus is about the size of the median antenna while the ventral one is very short, (not shown in the drawing). The first dorsal cirrus is larger and longer than the dorsal tentacular, and larger than most if not all of the other dorsal cirri, though there is not the decided decrease in length posteriorly which Verrill (1900, pages 613 and 614), described for *Haplosyllis cephalata*. The preservation is however too poor to allow of accurate description of most of the dorsal cirri. The parapodia are in length about equal to one-quarter of the body width and taper gently to the rounded ends. The ventral cirrus is lanceolate in outline and its



length and breadth measurements are nearly equal to those of the parapodium.

The setæ are all alike (figure 20). Each has a rather stout sub-apical tooth and two very fine sharp-pointed apical teeth. Posterior somites have two setæ, anterior ones have three. The acicula is broader than the seta but no darker in color and is bent sharply at the apex, (figure 21). There is only one acicula to a parapodium and it comes to the surface at the base of the setæ.

The proventriculus and pharynx are both barrel-shaped and about equal to one another in length. The pharynx is reddish brown in color with the anterior margin much darker, and with a single anterior tooth. (Figure 22) The proventriculus (figure 22) has the usual arrangement of glands which appear white in reflected light but by transmitted light appear black because of their opacity. In the figure these glands are represented as larger and farther apart than they really are. When the pharynx is protruded as above described it and the proventriculus together extend as far as the fifth setigerous somite.

Co-types are in the Museum of the State University of Iowa.

#### SYNELMIS Chamberlin

##### *Synelmis simplex* Chamberlin

*Synelmis simplex* Chamberlin, (1919), pp. 177 to 179, pl. 28, figs. 1 to 5.

Two small specimens were in the collection but identification was made more certain through comparison with much larger specimens collected by myself in Tobago. The genus and species were described from two individuals collected at the Paumotu Islands and I was much surprised to find that in no respects did they differ from the West Indian specimens enough to justify the erection of a new species. The eyes which Chamberlin described as three or four on a side may be fused into a band considerably longer than broad and placed at an angle with the main axis of the prostomium. There is a small conical cirrus on the ventral surface of each palp near the anterior end, which Chamberlin did not mention. Chamberlin gives in his generic diagnosis "one pair of tentacular cirri" but this evidently means one pair on either side, for the latter is correct and it is so stated in the description of the species. There is an error in Chamberlin's key to the Subfamilies and Genera of the Syllidæ, page 165, where he puts *Synelmis* under AA; B, "tentacles and cirri articulated moniliform." They are all as stated in his later description, ovate with a constricted base and a slender apex.

The body is cylindrical with a very firm wall. In preserved



material it is highly iridescent and the reddish segmental organs are very prominent. Because of this firm wall and cylindrical form and because the parapodia with their cirri and the tentacles are very small and inconspicuous, the animal when alive looks more like a nematode than a polychæte. This resemblance is heightened by the character of its movements which because of the elasticity of the body are quite similar to those of nematodes.

The proboscis was thrown out in most of my material from Tobago. It is stout, about 6 times as long as the prostomium and with a soft margin. The pharynx is very long.

Collected at Station 99, at Ft. Barclay and at English Harbor.

#### Family Nereidæ

##### NEREIS Cuvier

##### *Nereis glandulata* Hoagland

*Nereis glandulata* Hoagland, (1919), p. 575, pl. xxx, figs. 1 to 6.

Five specimens and some immature ones that are evidently of this species were taken at Pelican Island; ten at Bathsheba, one at Pillars of Hercules, and one in "old coral heads."

##### *Nereis gracilis* Webster

*Nereis gracilis* Webster, (1884), p. 313, pl. IX, figs. 29 to 35.

One incomplete specimen in three pieces was taken at Station 99 and a young specimen at Pelican Island.

#### LEPTONEREIS Kinberg

##### *Leptonereis egregiacirrata* new species. Heteronereis phase

Small heteronereids not over 15 mm. long, which I have assigned to this sub-genus because of the absence of paragnaths. The prostomium is bent in all cases so that the palps point directly ventrally. The eyes are very large, purple in the preserved material and have prominent lenses. The tentacular cirri are rather short, the longest not reaching farther than setigerous somite 6 and the shortest barely longer than a somite. The longest is the postero-dorsal, the shortest is the antero-ventral.

The female (whose entire body is distended with eggs), has in the anterior region very feebly developed parapodia and those in the posterior region are small and closely pressed against the side of the body. Across the peristomium and the anterior 12 setigerous somites are traces of what must have been in life a prominent transverse band in each somite. Beginning on the 4th setigerous somite and continuing posteriorly there is a prominent pigment spot just dorsal to the parapodium on either side in each somite. Posterior to the 12th setigerous somite there is a tendency for the transverse band to break up, the apex of the band



remaining on either side as a prominent spot. This results in the posterior region of the body in two rows of spots in each somite, the dorsal-most being the larger, with an irregular pigment row running across the dorsal surface of the somite.

Two varieties of male appear in the collection and agree so closely in the form of the tentacles, the eyes and the jaw structure that they certainly are of the same species. In one variety the dorsal cirri of the first 7 somites have the form characteristic of the male heteronereis, while in the other the 6th somite carries on either side an enormously elongated dorsal cirrus (figure 24). This has a much swollen base and a terminal joint extending to a distance at least 5 times the diameter of the body including the parapodia. Two individuals out of seven have this structure.

The jaws are light brown in color, are relatively very heavy and each has about 10 denticulations.

Collected by submarine light at English Harbor, Antigua. Type in Museum of the State University of Iowa.

#### Family **Glyceridæ**

##### GLYCERA Savigny

##### *Glycera abbranchiata* Treadwell

*Glycera abbranchiata* Treadwell, (1901), pp. 200, 201, fig. 49.

Two specimens collected at Pillars of Hercules and one on "old coral heads."

##### *Glycera dibranchiata* Ehlers

*Glycera dibranchiata* Ehlers, (1864-68), pp. 670 to 702, figs. 1 and 3 to 8.

One specimen collected on "old coral heads."

#### Family **Leodicidæ**

##### LEODICE Savigny

##### *Leodice binominata* Quatrefages

*Eunice binominata* Quatrefages, 1865a, I, p. 327.

One specimen marked as collected in "old coral heads," Barbados.

##### *Leodice fucata* Ehlers

*Eunice fucata* Ehlers, (1887), p. 91, pl. 25, figs. 1-20.

Collected at Stations 25240, 25241, 25242, marked as from "old coral heads" but consisting only of fragments without any anterior ends; three anterior ends and many fragments from Pillars of Hercules; off the Castle, east side Barbados, fragments only; and one specimen from tide pool at Pelican Island.

##### *Leodice mutilata* Webster

*Eunice mutilata* Webster, (1884), pp. 315, 316, pl. IX, figs. 36, 36a to 36d, 40.

Two anterior ends and many fragments were collected at



Station 25242, fragments from the posterior ends from Pillars of Hercules, and fragments marked as from "old coral heads, Barbados."

*Leodice caribæa* Grube

*Eunice caribæa* Grube, (1856), p. 57.

One anterior end collected at Pillars of Hercules, several broken ends "from old coral heads," and one fragment from Station 99.

*Leodice longicirrata* Webster

*Eunice longicirrata* Webster, (1884), pp. 318, 319, pl. XII, figs. 75 to 80.

Fragments of two specimens were collected at Pillars of Hercules; one specimen from Bathsheba; young individuals from "old coral heads;" fragments from Station 90; and four young from Station 51.

*Leodice rubra* Grube

*Eunice rubra* Grube, (1857), p. 59.

Ten specimens collected at Bathsheba.

*Leodice tenuis* Treadwell

*Leodice tenuis* Treadwell, (1921), pp. 51 and 52, pl. 4, fig. 11; text figs. 154 to 163.

One incomplete specimen from Pillars of Hercules is probably of this species, though the pectinate setæ are not as prominent as they were said to be in the original description; the maxillæ are lighter and the mandibles darker in color than is there stated.

*Leodice spongicola* Treadwell

*Leodice spongicola* Treadwell, (1921), pp. 25 to 27, text figs. 53a to 53j.

One fragment of the anterior end, collected at Pillars of Hercules.

*Leodice rubrivittata* Treadwell

*Leodice rubrivittata* Treadwell, (1921), pp. 34 to 36, pl. 1, fig. 18, text figs. 85 to 94.

Two specimens collected at Fort Barclay, English Harbor.

NICIDION Kinberg

*Nicidion kinbergii* Webster

*Nicidion kinbergii* Webster, (1884), p. 320, pl. XI, figs. 81 to 88.

One specimen, collected at Pillars of Hercules.



## ARABELLA Grube

*Arabella setosa* Verrill

*Arabella setosa* Verrill, (1900), pp. 651 to 653.

One specimen collected at Pillars of Hercules and two at Station 99.

## OENONE Savigny

*Oenone diphyllidia* Schmarda

*Oenone diphyllidia* Schmarda, (1861), p. 120, pl. XXXII, fig. 256.

One incomplete specimen at Station 90 and one from "old coral heads."

Family **Cirratulidæ**

## CIRRATULUS Lamarck

*Cirratulus nigromaculata* Treadwell

*Cirratulus nigromaculata* Treadwell, (1901), p. 204, fig. 66.

One specimen, collected at Pillars of Hercules.

*Cirratulus melanacanthus* Grube

*Cirratulus melanacanthus* Grube. Quoted from Ehlers, (1887), pp. 155, 156.

One specimen marked as collected "off Lord's Castle—Station 25256."

Family **Maldanidæ**

## NICOMACHE Malmgren

*Nicomache antiguensis* new species

Fragments of two specimens were in one bottle labeled as collected at Pillars of Hercules. One fragment retained the prostomium and fourteen somites, the other the prostomium and five somites. An anal somite with eight attached somites was also in the bottle. It is impossible to tell to which of the two anterior fragments the anal somite belonged, but a comparison of the somites shows that they belong to the same species. A fragment of another specimen was collected at Pelican Island.

A lateral view of the prostomium (figure 25) shows a prominent anterior margin overhanging the mouth and extending to the sides of it but not continued posteriorly. The dorsal crest of the prostomium is rounded and extends through about a quarter of a circle. The nuchal organ is visible from the side as a depression near the antero-lateral surface of the prostomium. On a dorsal view the nuchal organs appear on either side as inverted V's with equal arms about one-third as long as the prostomium.

In preserved material the width of somite 1 is nearly twice its length; somites 2, 3 and 4 are equal to one another each being about one-third longer than somite 1. Somite 5 is three times as long as somite 4. In



the one individual which retained them somites 6 to 8 are about equal to 5 in length, but 9 and later ones are much shorter and have thinner walls. All of the somites attached to the anal somite have very thin walls but their absolute length seems to depend on the character of the preservation.

Somites 1, 2 and 3 have on either side a row of stout hooks varying from 3 to 5 in number in the different somites. Dorsal and a little anterior to these hooks is in each somite a tuft of needle setæ. On somite 4 and later somites the place of the hooks is taken by a longer row of much smaller hooks and the dorsal seta-tuft is carried on a much more noticeable papilla.

A hook from somite 3 is shown in figure 26. It has a yellow color, darker at the apex and is slightly bent. The setæ of the dorsal tuft are very slender and sharp pointed, each with a noticeable wing on either side of the central axis, which does not continue to the tip of the seta.

On the 4th and later somites the hooks are much smaller and of an entirely different form from those in the first 3. Compare figure 27 with figure 26, where they are drawn to the same scale. Each of these smaller hooks has a swelling about midway of its shaft, a prominent sub-terminal tooth and a crest of four smaller teeth diminishing in size from the basal to the apical one. In the dorsal tuft of setæ is a form which I did not find in the earlier somites. Each has a central straight shaft with paired lateral plates whose free margins are toothed. These plates diminish in size toward the apex of the seta and are not found at the extreme end. A detail of the shaft is shown in figure 28. Slender setæ like those above described for somites 1 and 2 also occur in later somites.

In posterior somites the setæ and hooks are carried on much more prominent tori than anteriorly but the dorsal setæ are exactly similar to those of the anterior region. The hooks (figure 29) have more teeth on the crest and there is beneath the subapical tooth a tuft of chitin which seems to be solid rather than in the form of fine hairs as is the case with anterior hooks.

The anal funnel is deep and carries on its margin a row of about 22 slender subequal cirrus-like processes. One of these is bifid but this seems a difference of no significance.

The type is in the Museum of the State University of Iowa.

#### Family Terebellidæ

#### EUPOLYMNIA Verrill

#### *Eupolymnia magnifica* Webster

*Terebella magnifica*, Webster, (1884), p. 324, pl. XI, figs. 58 to 60.

These belong in the genus *Eupolymnia* as defined by Verrill. They are common in the West Indian region, and the specimens in this collection are much smaller than those I have collected in the Dry Tortugas. A dense row of pigment spots on the collar was not noted by Webster.

Collected at Pillars of Hercules, English Harbor, Antigua;



and under rocks in English Harbor, the latter specimens incomplete.

Family **Sabellidæ**

BRANCHIOMMA K lliker

*Branchiomma lobiferum* Ehlers

*Branchiomma lobiferum* Ehlers, (1887), pp. 254 to 259, pl. 53, figs. 10 to 15.

One specimen collected at English Harbor, Antigua.

PARASABELLA Bush

*Parasabella sulfurea* Treadwell

*Parasabella sulfurea* Treadwell, (1917), p. 267, pl. 3, figs. 20 to 23.

One specimen collected at Bathsheba.

DASYCHONOPSIS Bush

*Dasychonopsis conspersa* Ehlers

*Dasychone conspersa* Ehlers, (1887), pp. 266 to 270, pl. 54, figs. 1 to 6.

Since this species has dorsal appendages on the gills and a two-lobed collar it belongs in the genus *Dasychonopsis* rather than *Dasychone*. The specimens in this collection agree so closely with Ehlers' description that I have decided they belong in this species, though they are much larger and have a larger number of gills. Ehlers' specimens measured 26 mm. in length and had 19 gills. Some of these were 105 mm. in total length, the gills measuring 30 mm. and there were from 35 to 40 gills. It seems probable that the difference is due to age. Two specimens were collected at Pelican Island and two at Bathsheba.

BISPIRA Clapar de

*Bispira melania* Schmarda

*Sabella melania* Schmarda, (1861), p. 35, figs. a, b, c, pl. XXIII, fig. 192.

*Dasychone wyvillei* McIntosh, (1885), pp. 501, 502; pl. XXXIa, figs. 1 to 3.

Schmarda's description is too brief to be of much diagnostic value, but so far as it goes it applies to these specimens except that he figures an uncinus without apical teeth. In all of my specimens these have apical teeth and McIntosh so indicates them in his figure 3. Schmarda's figure 192 agrees very closely with the appearance of the Barbados specimens. He figures about 24 rachides in each half of the gill, but as he is obviously intending to represent only one side of the animal the agreement is close, for the Barbados specimens have about 50 rachides in the gills.



Under the name *Dasychone wyvillei* McIntosh described a specimen from St. Thomas, West Indies. His specimen was without gills but in the general form and color of the body, the position of the anal opening, the character of the faecal groove, the form and color of the collar, and the character of the setæ, his description applies accurately to the specimens under consideration. The only detail in which the resemblance is not close is that his figure 3, labeled as an anterior (thoracic?) uncinus, has a shorter manubrium than any I have seen, resembling in this respect more closely those of the abdomen.

The gills are prominent. Each half is inrolled at the base so as to form about three-fourths of a circle. There is a dark brown basal portion with a height of 5 mm. where the height of the whole gill is 50 mm. Beyond the basal portion each rachis is entirely free. Each rachis has bands of dark brown alternating with colorless regions. Where the color appears it is continued over the corresponding filaments. Through the middle of the rachides the filaments are six times as long as the diameter of the rachis, but toward the apex of the latter they are shorter and entirely disappear near the end, leaving the latter bare. There is no trace of either eye spots or appendages on the dorsal surface of the rachides but each has a shallow, pigmented groove along its mid-dorsal line.

Having no external appendages on the gills, having avicular uncini in a single row on all somites but the first thoracic, and the abdominal uncini having longer manubria than those of the thorax, these belong in the genus *Jasminiera* Langerhans, as that genus is ordinarily defined. Chamberlin however (1919, page 471) shows that *Jasminiera* should be replaced by *Bispira* Claparède, and that species having spiral gills which are ordinarily listed as *Bispira* should be transferred to the genus *Distylia* Quatrefages.

The animals may reach a size where the body length is 110 mm. the gills of such individuals reaching a length of 70 mm. The tube is composed of fine mud without much organic matter so that it breaks very easily. Its wall is about 1 mm. thick.

Over 70 individuals were in the collection mostly from English Harbor. Others were from sea wall, Dock Yard.



## SABELLA Linnæus

*Sabella melanostigma* Schmarda

*Sabella melanostigma* Schmarda, (1861), p. 36, figs. a and b, pl. XXII, fig. 190.

Ehlers, (1887), pp. 263 to 266.

I have based this identification largely on Ehlers' description, for while the specimens agree with the diagnosis given by Schmarda, they are, except for the presence of the dark spots, quite unlike Schmarda's figure 190. The figure shows a specimen entirely devoid of collar and is so aberrant that it seems certain that either an imperfect individual was seen or an error made by the artist. There seems to be some variability in the number of thoracic somites in this species, for Ehlers gives the number as 15 while these have from 10 to 13. As they are smaller than those seen by Ehlers the difference is possibly due to age. Hoagland (1919, pp. 577 and 578, pl. XXX, figs. 10 to 15; pl. XXXI, figs. 1 and 2), described from Porto Rico what she regarded as a variety of *Sabella melanostigma* and this had only 8 thoracic somites. In other respects these agree with Ehlers' description.

Associated with the thoracic uncini are series of inconspicuous pennoned setæ not described by either Schmarda or Ehlers but found by Hoagland in the Porto Rico material. The tubes are composed of a fine, light-gray mud. Abundant at Needham's Point, 3 specimens were taken at Falmouth Harbor and they are recorded as in "sand at low tide, Barbados."

## HYPSICOMUS Grube

*Hypsicomus purpureus* new species

I have given this name to a fragment of *Hypsicomus* collected at Pillars of Hercules, English Harbor, Antigua. While only the gills, thorax and 11 body somites are present these are well enough preserved to show that they belong to a new species.

The bases of the gills are rather heavy and are in contact so that they give the effect of a cylindrical peduncle about eight times as long as the height of the collar. In the preserved material the color of this peduncle is purplish brown. At its base each gill rachis is colored much like the peduncle but this color rapidly lightens toward the apex. The rachides are about three times as long as the basal peduncle; are united by a membrane for about one-quarter of their length; their apices are blunt and devoid of filaments. The filaments in general are much lighter in color than the rachides, though toward the base of each gill there are



several patches of darker filaments giving the gills a beaded appearance. On either side of each rachis extending not much beyond the middle of its length is a row of minute eye-spots.

The collar is very narrow with ends separated dorsally but ventrally they are nearly in contact. The ventral recurved flaps are bluntly triangular in outline and their tips extend only to about the posterior margin of the collar.

The body is too badly mutilated to allow of accurate description. On the right side of the thorax are seven rows of setæ and on the left only six.

In the dorsal tuft are two kinds of thoracic setæ. The longer (figure 30) extend for about one-third of their length beyond the shorter. Each has a central axis which is curved and sharp pointed at the apex with a marginal wing which is very broad at the bend, wider on the convex side and tapering to a very acute point. Ventral to these is a double row of palæiform setæ each (figure 31) with a very heavy stalk and a wing, forming when seen in full face a circular expansion entirely around the end. In profile the central axis is seen to bend slightly at the end and the expansion appears as a flat plate.

Ventral to these setæ lies a row of uncini with pennoned setæ at their bases. The uncini (figure 33) have a single large tooth and a very heavy base, with on the crest fine striations but nothing that could properly be called denticles. The pennoned seta (figure 32) has the head noticeably striated and a very fine point.

The abdominal setæ are of two kinds, both only slightly modified from those found in the thorax. The palææ are quite similar to those of the thorax and the others resemble the pointed ones found in the thorax but are more slender with very long slender, sharp points.

The type is in the Museum of the State University of Iowa.

#### Sabellid genus and species?

From tide pool at Needham's Point was collected a fragment of a Sabellid too badly injured for identification, but it seems best to record what is possible on the chance that complete specimens may later appear. The gills are removed from the body. They are delicate, feathery, with no trace of eye spots. The collar is low, its ends separated widely dorsally but in contact ventrally, where each half ends in a short conical lobe. In the dorsal surface, anterior to the collar, are pigment patches. About 28 of the body somites are present and they all show the characteristic thoracic arrangement of setæ with simple setæ dorsally and uncini ventrally. The uncini are in a single row, each with a very long manubrium. There are no pennoned setæ. The dorsalmost setæ of the upper tuft are lanceolate at the apex, the ventral ones spatulate.



Family **Serpulidæ**- **PROTIS** Ehlers*Protis sombreriana* McIntosh

*Serpula sombreriana* McIntosh, (1885), p. 515, pl. XXXIa, figs. 14 and 15.

A single specimen in its tube was collected at Dredging Station 1. One gill is lost but in the general structure of the body, the form of the collar, and the thoracic setæ, it agrees exactly with McIntosh's description. The thoracic uncini are, however, quite different from those figured by McIntosh for instead of having a row of small teeth they have but four increasing in size from the apex to the basal one which is very large.

I have provisionally identified this as *Protis*, for it lacks an operculum and is therefore not *Serpula*. I was, however, unable to find any collar setæ like those described by Ehlers as characteristic of this genus (Ehlers 1887, plate 56, figure 11) though forms like Ehlers' figure 12 are present.

**SPIROBRANCHUS** Blainville*Spirobranchus tricornis* Mörch

*Spirobranchus tricornis* Mörch, quoted from Ehlers, (1887), p. 292, pl. 57, figs. 8 to 15.

*Spirobranchus giganteus* Pallas

*Spirobranchus giganteus* Pallas, (1766), p. 139.

Ehlers, (1887), pp. 286 to 292, pl. 57, figs. 1 to 7.

Three specimens taken at English Harbor, Antigua.

**POMATOSTEGUS** Schmarda*Pomatostegus stellatus* Abildgaard

*Terebella stellata* Abildgaard, (1789), p. 142.

Ehlers, (1887), p. 296.

Ehlers describes this species but gives no figures. He gives the measurements of his specimen as 24 mm. in length. One of the Barbados individuals is 90 mm. long with a thoracic width of 6 mm. Thirteen specimens were collected in tubes "growing in Millepores." No other locality was named.

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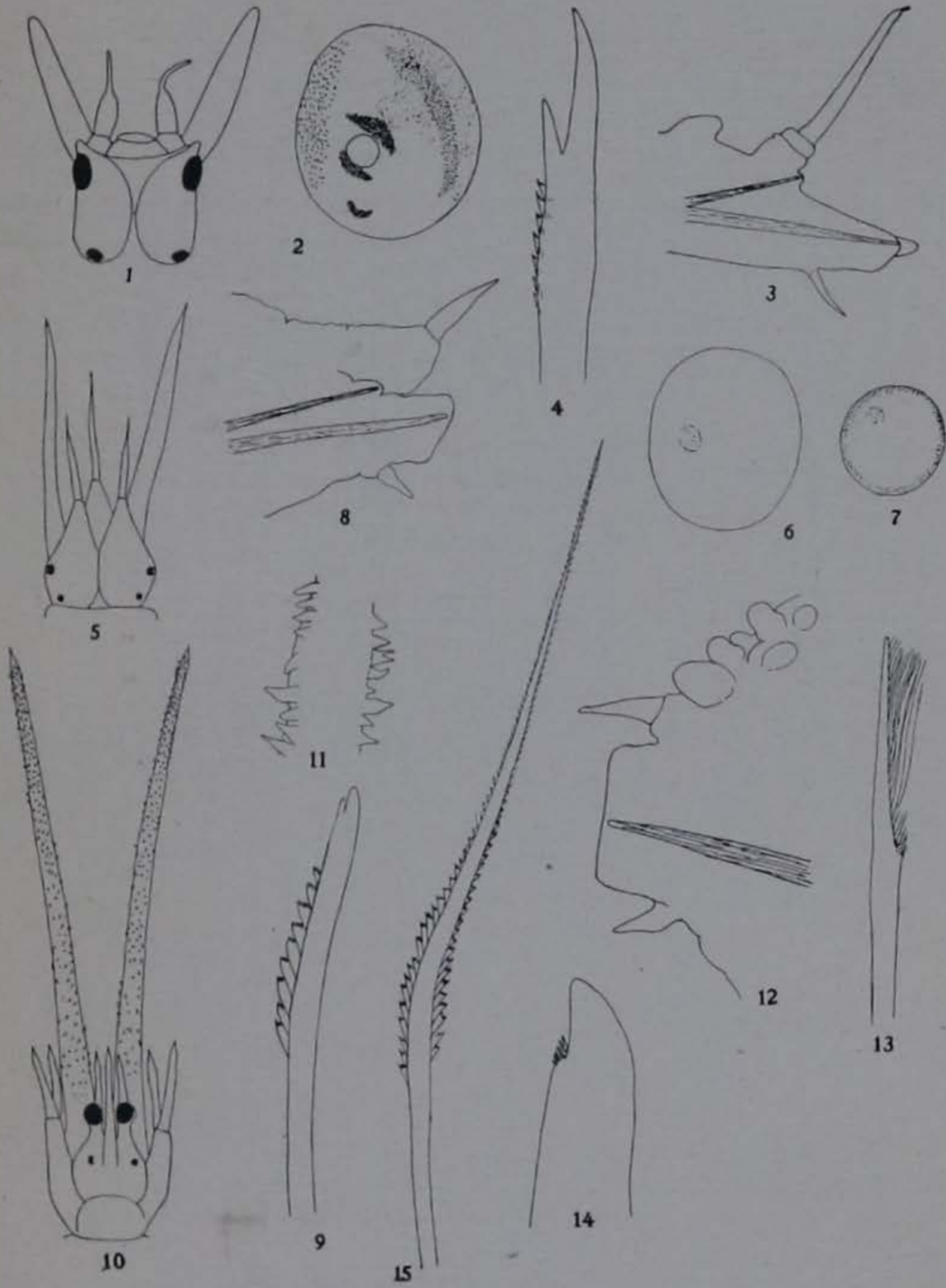
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PLATE I



(For legends see next page)



## PLATE I

Magnifications are somewhat less than stated below

Figures 1 to 4, *Evarnella trimaculata* new species. Figure 1, prostomium x 30; figure 2, elytron x 13.5; figure 3, parapodium x 17.5; figure 4, ventral seta x 185.

Figures 5 to 9, *Halosydna fuscomarginata* new species. Figure 5, prostomium x 10; figure 6, first elytron x 10; figure 7, second elytron x 10; figure 8, parapodium x 20; figure 9, seta from dorsal bundle x 185.

Figures 10 to 15, *Panthalis pustulata* new species. Figure 10, prostomium x 10; figure 11, outline of portion of palp near apex x 45; figure 12, nineteenth parapodium x 9; figure 13, seta x 370; figure 14, apex of large seta x 185; figure 15, seta x 250.

## PLATE II

Figures 16 to 18, *Eulalia foliosa* new species. Figure 16, prostomium x 10; figure 17, parapodium x 20; figure 18, seta x 250.

Figures 19 to 23, *Haplosyllis gula* new species. Figure 19, anterior end x 68; figure 20, seta x 250; figure 21, acicula x 250; figure 22, pharynx x 68; figure 23, anal cirri x 68.

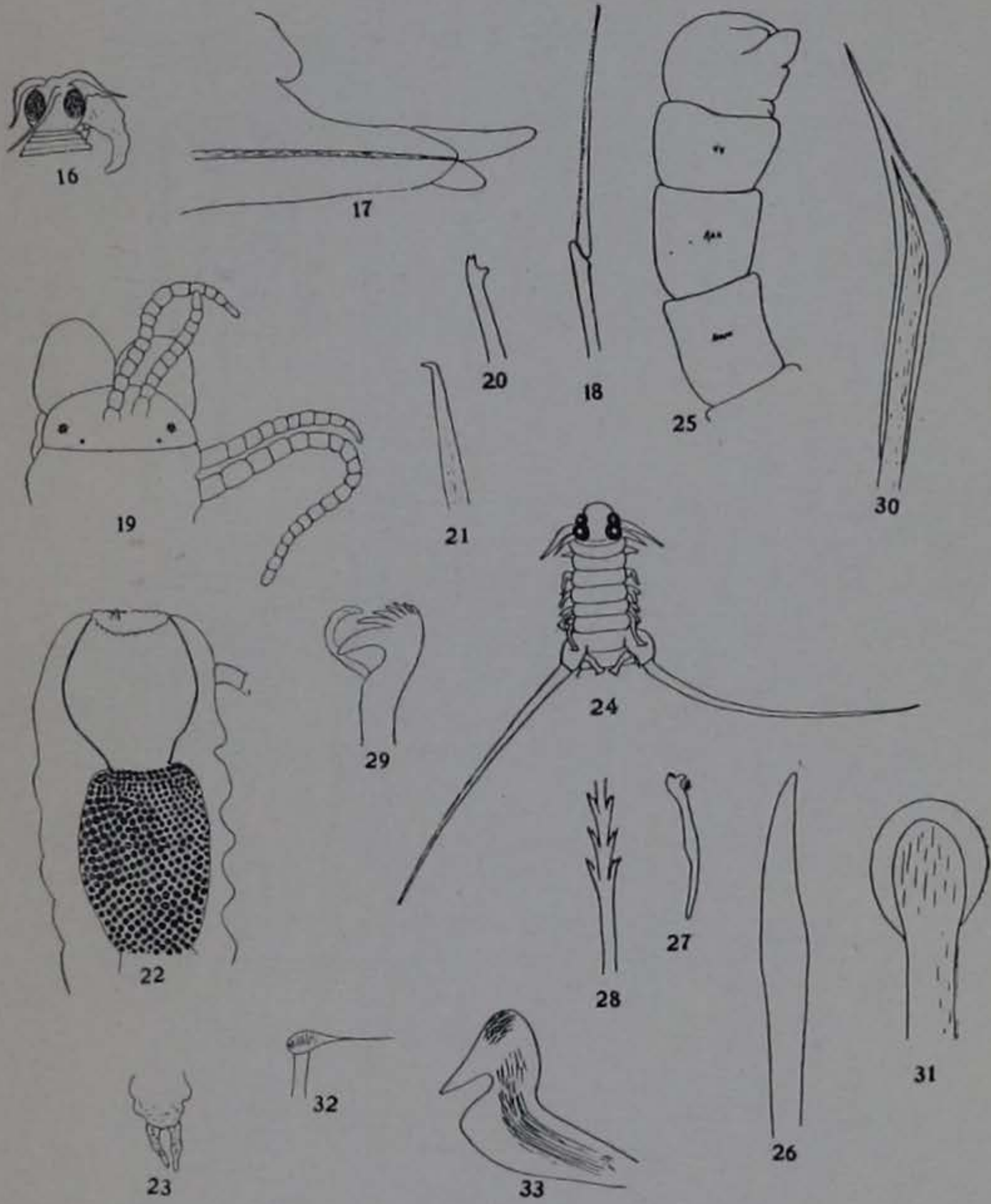
Figure 24, Anterior end of *Leptonereis egregiacirrata* new species x 8.

Figures 25 to 29, *Nicomache antiguensis* new species. Figure 25, anterior end x 5; figure 26, anterior hook x 45; figure 27, hook from somite 4 x 45; figure 28, seta x 250; figure 29, posterior hook x 185.

Figures 30 to 33, *Hypsicomus purpureus* new species. Figure 30, dorsal thoracic seta x 250; figure 31, second form of dorsal thoracic seta x 250; figure 32, pennoned seta x 250; figure 33, uncinus x 250.



PLATE II





## REPORT ON THE FISHES

Collected by the Barbados-Antigua Expedition from the  
University of Iowa in 1918

BARTON WARREN EVERMANN

Director of the Museum of the California Academy of Sciences and of  
the Steinhart Aquarium, and

ALVIN SEALE

Superintendent of the Steinhart Aquarium

The fishes collected in 1918 by the Barbados-Antigua Expedition sent out by the University of Iowa under the direction of Professor C. C. Nutting, were referred to the senior writer of this paper for study and report. A multiplicity of other more pressing duties delayed the fulfillment of this duty until recently.

The collection contains 88 specimens representing 53 species. Although most of the species are common forms, the collection is of considerable interest in establishing new records, in showing what are the more easily obtained species, and the relative abundance of the more common forms.

Following is an annotated list of the species:

1. *Myrichthys oculatus* (Kaup). Snake Eel.

*Pisoodonophis oculatus* Kaup, Apodes, 22, 1856, Curacao.

*Myrichthys oculatus*, Jordan & Evermann, Fishes North and Mid. Amer., 376, 1896; Evermann & Marsh, Fishes of Porto Rico, 74, 1902.

One specimen (no. 97), 18.5 inches long, taken July first at Antigua.

Head 4.5; eye 2.5 in snout. No caudal fin; dorsal and anal not continuous; pectoral extremely small. Teeth blunt. Color in alcohol grayish, the side with two rows of large dark spots each with a white center.



2. *Lycodontis moringa* (Cuvier). Common Spotted Moray.  
*Muraena moringa* Cuvier, Règne Animal, ed. 2, vol. 2, 352, 1829 Bahamas.  
*Lycodontis moringa*, Jordan & Evermann, op. cit., 395, 1896; Evermann  
 & Marsh, op. cit., 377, fig. 8, 1902.

One specimen (no. 96), 27.25 inches long, taken July first at Antigua.

Snout 5.75 in head; eye 2 in snout. Two or three long, depressible canines on vomer in front, and a row of small fixed teeth behind.

Color in alcohol dark brown, irregularly mottled with light yellowish; under parts of throat and head with dark spots.

3. *Echidna catenata* (Bloch). Chained Moray.

*Gymnothorax catenatus* Bloch, Ausl. Fische, 11, 74, pl. 69, figs. 4 and 5, 1738, Brazil.

*Echidna catenata*, Jordan & Evermann, op. cit., 403, 1896; Evermann & Marsh, op. cit., 79, 1902.

One specimen (no. 95), 18 inches long, taken July first at Antigua.

Head 3; eye 2.5 in snout. Teeth blunt and rounded, in two or three rows on the vomer.

Color in alcohol dark brown reticulated with bright yellow, these markings forming cross-bars on throat and breast.

4. *Cypselurus bahiensis* (Ranzani). Flying Fish.

*Exocætus bahiensis* Ranzani, Nov. Comm. Ac. Sci. Inst. Bonon., V, 1842, 362, pl. 38, Bahia; Jordan & Evermann, op. cit., 739, 1896.

*Cypselurus bahiensis*, Evermann & Marsh, op. cit., 104, 1902.

Two specimens (nos. 98 and 99) 9.2 and 10.2 inches long, taken July first at Barbados.

Head 4; depth 5; eye 3 in head; snout 3.75; interorbital 2.75; D. 10; A. 9. Base of anal 1.75 in base of dorsal; origin of anal under third dorsal ray scales about 57 in lateral series. Some fine teeth on upper jaw. Pectorals long, reaching to caudal peduncle, slightly beyond tips of ventrals.

5. *Mugil curema* Cuvier & Valenciennes. White Mullet; Liza.

*Mugil curema* Cuvier & Valenciennes, Hist. Nat. Poiss., XI, 87, 1836, Brazil, Martinique, Cuba; Jordan & Evermann, op. cit., 813, fig. 344, 1896; Evermann & Marsh, op. cit., 113, fig. 24, 1902.

One specimen (no. 107), 9 inches long, taken May 14, at Barbados.



Head 4; depth 3.9; eye 4 in head; D. IV-I, 8; A. 111.9; scales 37.

Color in alcohol brownish; tip of caudal, soft dorsal and axil of pectoral dark.

6. *Myripristis jacobus* Cuv. & Val. Candil.

*Myripristis jacobus* Cuv. & Val., Hist. Nat. Poiss., III, 162, 1829, Martinique; Jordan & Evermann, op. cit., 846.

One specimen (no. 126), 7.75 inches long, taken May 14, at Barbados.

Head 3; depth 2.4; eye 2.1; scales 34; D. X-I, 14; A. IV, 13.

Color in alcohol dull yellowish, slightly darker above; a dark area at posterior edge of opercle to base of pectoral.

7. *Holocentrus ascensionis* (Osbeck). Squirrel Fish; Candil.

*Perca ascensionis* Osbeck, Iter Chinensis, 388, 1771, Ascension Island.

*Holocentrus ascensionis*, Jordan & Evermann, op. cit., 848, pl. 131, fig. 358; Evermann & Marsh, op. cit., 118, colored plate 3.

Two specimens (nos. 123 and 124), each about 9 inches long, taken May 14, at Barbados.

Head 3.8; depth 3.4; eye 2.7; snout 1.3 in eye; scales 4.8; D. XI, 15; A. IV, 10. Length of second anal spine more than half depth of body; anterior rays of soft dorsal and caudal rays prolonged, tip of dorsal reaching anterior third of caudal.

Color in alcohol uniform dull yellowish.

8. *Upeneus martinicus* Cuv. & Val. Yellow Goatfish.

*Upeneus martinicus* Cuv. & Val., Hist. Nat. Poiss., III, 483, 1829, Martinique; Jordan & Evermann, op. cit., 859; Evermann & Marsh, op. cit., 121, colored plate 5.

One specimen (no. 105), 8.5 inches long, taken May 14, at Barbados.

Head 3.3; depth 4; eye 3.2; D. VIII, 18; A. II, 6; scales 37. Teeth biserial in front in each jaw.

Color in alcohol uniform dull yellowish.

9. *Trachurops crumenophthalmus* (Bloch). Big-eyed Sead.

*Scomber crumenophthalmus* Bloch, Ichth., pl. 343, 1793, Acara in Guinea.

*Trachurops crumenophthalmus*, Jordan & Evermann, op. cit., 911, pl. 141, fig. 385; Evermann & Marsh, op. cit., 129, fig. 30.

Three specimens (nos. 100, 101, and 102), 6 to 8.25 inches long, taken May 14, at Barbados.

Head 3.1; depth 3.9; eye 2.2. Adipose eyelid fore and aft,



covering all but the pupil and middle of the eye; no finlets; lateral line complete and armed with about 40 bony scutes at posterior third; small teeth in jaws in single series, three distinct patches of teeth on vomer, small teeth also on palatines and tongue. Premaxillaries protractile.

Color in alcohol dull yellowish.

10. *Caranx ruber* (Bloch). Carbonero.

*Scomber ruber* Bloch, Ichth., pl. 342, 1793, St. Croix.

*Caranx ruber*, Jordan & Evermann, op. cit., 919; Evermann & Marsh, op. cit., 130.

Two specimens (nos. 103 and 104), each about 8.7 inches long, taken May 14, at Barbados.

Head 3.2; depth 3; eye 4.3; snout 2.8; maxillary 2.7; D. VIII-I, 27; A. II-I, 24. No finlets; no fleshy projection from shoulder-girdle into gill-chamber; maxillary protractile; two or more rows of small sharp teeth in jaws, with 2 to 4 large canines anteriorly in each jaw; bands of small teeth on vomer, palatines, and tongue; 35 armed scutes on caudal peduncle.

11. *Caranx latus* Agassiz. Jurel; Horse-eye Jack.

*Caranx latus* Agassiz, Pisc. Brasil., 106, 1829, Brazil; Jordan & Evermann, op. cit., 923, pl. 142, fig. 389; Evermann & Marsh, op. cit., 132.

One specimen (no. 106), 15.5 inches long taken May 14, at Barbados.

Head 3.1; depth 2.5; eye 4; D. VIII-I, 21; A. II-I, 17; scales 36; maxillary 2 in head. Breast scaled; two series of teeth in jaws, the outer wide-spaced canines.

12. *Bodianus ruber* (Bloch & Schneider). Fino.

*Gymnocephalus ruber* Bloch & Schneider, Syst. Ichth., 346, pl. 67, 1801, Brazil.

*Bodianus fulvus ruber*, Jordan & Evermann, op. cit., 1145.

*Bodianus ruber*, Evermann & Marsh, op. cit., 150.

One specimen (no. 143), 10.5 inches long, taken May 24, at Barbados.

Head 2; depth 2.8; eye 3; snout 4; maxillary 2; D. IX, 15; A. III, 9; scales about 100. Teeth on jaws, vomer and palatines, those on jaws depressible. Caudal truncate.

Color in alcohol dull yellowish, with numerous rows of black dots; two black spots on top of caudal peduncle, and two at tip of lower jaw.



13. *Bodianus punctatus* (Linnæus). Nigger-fish.

*Perca punctata* Linnæus, Syst. Nat., ed. X, 291, 1758, Bahamas.

*Bodianus fulvus punctatus*, Jordan & Evermann, op. cit., 1146, pl. 182, fig. 481.

*Bodianus punctatus*, Evermann & Marsh, op. cit., 150, fig. 43.

Two specimens (nos. 146 and 147), 8 to 9 inches long, taken May 14, at Barbados.

Head 2.7; depth 2.8; eye 6; D. IX, 15, A. III, 9. Front of jaws with hinged teeth; bands of teeth on vomer and palatines. Caudal rounded. Gillrakers 9 on lower limb.

In alcohol numerous small brown spots on body and fins, these largest on head where they have light centers and dark rings.

14. *Epinephelus adscensionis* (Osbeck). Rock Hind.

*Trachinus adscensionis* Osbeck, Iter Chinensis, 1757, Ascension Island.

*Epinephelus adscensionis*, Jordan & Evermann, op. cit., 1152, pl. 182, fig. 482; Evermann & Marsh op. cit., 152, colored plate 77.

One specimen (no. 145), 10 inches long, taken May 14, at Barbados.

Head 2.5; depth 3; eye 5; D. XL, 17; A. III, 8; scales 100; gillrakers 18. Jaws with depressible teeth; vomer and palatines with teeth. Caudal rounded. Color in alcohol everywhere with round brown spots about the size of pupil or larger; about 5 more or less indistinct dark bars over the back, the posterior one on the caudal peduncle; fins spotted like the body.

15. *Epinephelus guttatus* (Linnæus). Red Hind.

*Perca guttata* Linnæus, Syst. Nat., ed. X, 292, 1758, Brazil.

*Epinephelus maculosus*, Jordan & Evermann, op. cit., 1158 and 3197.

*Epinephelus guttatus*, Evermann & Marsh, op. cit., 153, colored plate 13.

One specimen (no. 144), 8.7 inches long, taken May 14, at Barbados.

Head 2.5; depth 2.7; D. XI, 16; A. III, 8; about 51 pores in lateral line. Teeth in jaws, vomer and palatines. Caudal rounded.

Color in alcohol dull brown with round brown spots over body, belly and fins; soft dorsal, anal and caudal tipped with black.

16. *Mycteroperca bowersi* Evermann & Marsh. Gray Grouper.

*Mycteroperca bowersi* Evermann & Marsh, op. cit., 158, Culebra Island, near Porto Rico.

One specimen (no. 142), 14 inches long, taken May 14, at Barbados.



Head 3; depth 2.9; eye 6 in head, 1.5 in snout; gillrakers 15 on lower limb; D. XI, 16; A. III, 12; about 100 pores in lateral line, 134 scales. Teeth on vomer in a narrow V-shaped patch, those on palatines in a narrow line; those on jaws depressible. Maxillary 2 in head, reaching posterior line of pupil; lower jaw projecting; caudal truncate.

Color in alcohol dull brown.

17. *Mycteroperca microlepis* (Goode & Bean). Gag.

*Trisotropis microlepis* Goode & Bean. Proc. U. S. Nat. Mus., II, 1879, 141, West Florida.

*Mycteroperca microlepis*, Jordan & Evermann, op. cit., 1177, pl. 188, fig. 494.

One specimen (no. 148), 9 inches long, taken May 14, at Barbados.

Head 2.9; depth 3; eye 5, slightly exceeding interorbital width; D. XI, 18; A. III, 77; scales 150; gillrakers 12 on lower limb. Supplemental bone present. Caudal lunate.

Color in alcohol dull brown.

18. *Hypoplectrus unicolor* (Walbaum). Vaca; Petit-Nègre.

*Perca unicolor* Walbaum, Artedi Piscium, III, 352, 1792.

*Hypoplectrus unicolor*, Jordan & Evermann, op. cit., 1190.

One specimen (no. 138), 5.5 inches long, taken May 18, at Barbados.

Head 2.7; depth 2; eye 4; D. X, 15; A. III, 7; lateral line 53 pores, about 70 scales. Small teeth in jaws and a small patch on head of vomer, none on palatines or tongue; opercle with two flat spines; preopercle strongly denticulate, its lower teeth directed forward; 12 developed gillrakers on lower limb; maxillary 2 in head, reaching eye.

Color in alcohol, posterior third jet black; head and fins yellow; a deep black stripe in front of eye.

19. *Paranthias furcifer* (Cuv. & Val.). Creole Fish.

*Serranus furcifer* Cuv. & Val., Hist. Nat. Poiss., II, 264, 1828, Brazil.

*Paranthias furcifer*, Jordan & Evermann, op. cit., 1221, pl. 192, fig. 504.

Two specimens (nos. 150 and 151), each about 8 inches long, taken May 14, at Barbados.

Head 3.3; depth 3.2; eye 4; interorbital 3.2; D. IX, 18; A. III, 9; scales 90. Teeth in jaws, vomer and palatines; gill-



rakers 25 on lower limb; opercular spines 3; preopercle toothed; caudal deeply forked. Color in alcohol brown, darker on back.

20. *Priacanthus cruentatus* (Lacépède). Catalufa.

*Labrus cruentatus* Lacépède, Hist. Nat. Poiss., III, 522, 1800, Martinique.  
*Priacanthus cruentatus*, Jordan & Evermann, op. cit., 1238; Evermann & Marsh, op. cit., 167.

Two specimens (nos. 127 and 128), 6 and 6.75 inches long, taken May 14, at Barbados.

Head 3; depth 2.5; eye 2.2; maxillary 2, reaching pupil; D. X, 13; A. III, 14; scales about 90. Preopercular spine well developed.

Color in alcohol light yellowish, with about 11 rather distinct band-like stripes over the back.

21. *Rypticus bistrispinus* (Mitchill). Soapfish.

*Bodianus bistrispinus* Mitchill, Am. Month. Mag. and Crit. Rev., II, February, 1818, 247, Bahama Straits.  
*Rypticus bistrispinus*, Jordan & Evermann, op. cit., 1233, pl. 194, fig. 509; Evermann & Marsh, op. cit., 163, fig. 46.

One specimen (no. 149), 9 inches long, taken May 14, at Barbados.

Head 3, depth 2.9; eye 5.7, slightly less than snout; D. III, 25; A. 15. Preopercle with 3 spines. Teeth in jaws, vomer and palatines; scales small; opercle with 3 flat spines. Head small and pointed, lower jaw projecting.

Color in alcohol uniform brown, tips of fins darker.

22. *Neomænis apodus* (Walbaum). Schoolmaster.

*Perca apoda* Walbaum in Artedis Piscium, 351, 1792, Bahamas.  
*Neomænis apodus*, Jordan & Evermann, op. cit., 1258, pl. 147, fig. 515; Evermann & Marsh, op. cit., 172, colored plate 19.

One specimen (no. 140), 13 inches long, taken May 21, at Barbados.

Head 2.5; depth 2.9; eye 5.7; D. X, 15; A. III, 8; scales 42; gillrakers 8. Four large canines in front in upper jaw; vomer and palatines with teeth. No notch on preopercle, but the knob well developed.

Color in alcohol dull light brown with indications of 4 or 5 narrow light lines over back.

23. *Neomænis mahogoni* (Cuv. & Val.). Mahogany Snapper.

*Mesoprion mahogoni* Cuv. & Val., op. cit., II, 447, 1828, Martinique.  
*Neomænis mahogoni*, Jordan & Evermann, op. cit., 1272; Evermann & Marsh; op. cit., 179.



One specimen (no. 139), 12 inches long, taken May 25, at Barbados.

Head 2.5; depth 2.9; D. X, 12; A. III, 8; eye 4; snout 2.75; scales 50; gillrakers 8 below arch; a shallow but wide notch in preopercle, but no knob. Teeth on vomer in a diamond-shaped patch with an extension posteriorly.

Color in alcohol dull yellowish brown, no distinct markings.

24. *Ocyurus chrysurus* (Bloch). Yellowtail; Rabirubia.

*Sparus chrysurus* Bloch, Ichth., pl. 262, 1700, Brazil.

*Ocyurus chrysurus*, Jordan & Evermann, op. cit. 1275, pl. 199, fig. 520; Evermann & Marsh, op. cit., 180, colored plate 23.

One specimen (no. 152), 8.7 inches long, collected May 14, at Barbados.

Head 2.9; depth 3; eye 5, slightly greater than interorbital; scales 63. Teeth on jaws, vomer and palatines, none on tongue. Caudal deeply forked.

Color in alcohol dull yellowish brown; an indistinct dark stripe from snout through eye to caudal.

25. *Hæmulon carbonarium* Poey. Ronco Carbonero; Black Grunt.

*Haemulon carbonarium* Poey, Memorias, II, 176, 1860, Cuba; Jordan & Evermann, op. cit., 1300; Evermann & Marsh, op. cit., 188.

One specimen (no. 141), 7.5 inches long, taken May 21, at Barbados.

Head 2.9; depth 2.5; eye 3.5; D. XII, 14; A. III, 8; scales 53. Bands of villiform teeth in jaws, none on vomer or palatines.

Color in alcohol grayish.

26. *Hæmulon flavolineatum* (Desmarest). French Grunt.

*Diabasis flavolineatum*, Desmeret, Prem. Decade Ichth., pl. 35, fig. 2, 1823, Cuba.

*Haemulon flavolineatum*, Jordan & Evermann, op. cit., 1306, 1898; Everman & Marsh, op. cit., 191.

One specimen (no. 153), 8 inches long, without locality or date, taken in fish pot.

Head 3; depth 2.6; eye 3.7; interorbital 3; D. XII, 15; A. III, 9; scales 49. Teeth in irregular rows in jaws, vomer and palatines; scales enlarged above pectorals.

Color in alcohol dull yellowish, with about 16 indistinct oblique stripes on body, following lines of scales above and below lateral line.



27. *Hæmulon plumieri* (Lacépède). Common Grunt.

*Labrus plumieri* Lacépède, Hist. Nat. Poiss., III, 480, pl. 2, fig. 2, 1802, Martinique.

*Hæmulon plumieri*, Jordan & Evermann, op. cit., 1304, pl. 205, fig. 532; Evermann & Marsh, op. cit., 190, fig. 54.

Two specimens (nos. 136 and 137), each about 11 inches long, taken July 1, at Barbados in fish pot.

Head 2.7; depth 2.5; eye 5; D. XII, 16; A. III, 8; scales 5-50-7.

Color in alcohol dull grayish brown, head covered with numerous more or less undulating alternating light and dark lines, which extend upward and backward; fins unmarked.

28. *Microspathodon chrysurus* (Cuv. & Val.).

*Glyphidodon chrysurus* Cuv. & Val., op. cit., V, 476, 1830, St. Thomas.

*Microspathodon chrysurus*, Jordan & Evermann, op. cit., 1567, pl. 235, fig. 593.

One specimen (no. 88), 5.75 inches long, taken May 24, at Barbados.

Head 2.8; depth 1.8; eye 3.3; snout 2.4; scales 30-21 with pores; D. XII, 14; A. 12. A single series of movable teeth with smooth cutting edge in each jaw, those in lower the larger; pre-orbital wide, with a notch below nostril.

Color in alcohol uniform dark brown, the caudal yellowish.

29. *Sparisoma aurofrenatum* (Cuv. & Val.). Gold-bridled Parrot-fish.

*Scarus aurofrenatus* Cuv. & Val., op. cit., XIV, 191, 1839, Santo Domingo.

*Sparisoma aurofrenatum*, Jordan & Evermann, op. cit., 1634, pl. 243, fig. 610; Evermann & Marsh, op. cit., 238.

Three specimens (nos. 109, 110 and 111), 7.5 to 8.1 inches long, taken May 24 in fish pot at Barbados.

Head 3; depth 2.95; eye 4; D. IX, 10; A. II, 9; scales 24.

Color in alcohol brownish above, lighter on sides and below; a dark spot on sixth scale of lateral line; tip of caudal and axil of pectoral dark; a light stripe with dark margin from corner of mouth to below eye.

30. *Sparisoma lorito* Jordan & Swain. Loro; Parrot-fish.

*Sparisoma lorito* Jordan & Swain, Proc. U. S. Nat. Mus., VII, 1884, 95, Havana; Jordan & Evermann, op. cit., 1637; Evermann & Marsh, op. cit., 240.

One specimen (no. 115) 10.5 inches long, taken May 24, at Barbados.



Head 3.4; depth 3; eye 6.5; D. IX, 10; A. II, 9; scales 25. One posterior canine. Caudal lunate.

Color in alcohol uniform greenish; a distinct black spot at base of pectoral; outer rays of caudal darker than middle ones.

31. *Sparisoma flavescens* (Bloch & Schneider). Mud Parrot-fish. *Scarus flavescens* Bloch & Schneider, Syst. Ichth., 290, 1801, Cuba. *Sparisoma flavescens*, Jordan & Evermann, op. cit., 1639; Evermann & Marsh, op. cit., 240.

Three specimens (nos. 112, 113 and 114), each 6 to 7 inches long, taken May 14, at Barbados.

Head 3; depth 2.9; eye 4.8; D. IX, 10; A. II, 9. Four or five large scales on cheek; no posterior canines.

Color in alcohol dark olive brown above, lighter below; a dark area at upper base of pectoral but not extending into axil of fin; fins all yellowish.

32. *Scarus croicensis* Bloch.

*Scarus croicensis* Bloch, Ichth., pl. 221, 1790, St. Croix; Jordan & Evermann, op. cit., 1650; Evermann & Marsh, op. cit., 244.

One specimen (no. 108), 8 inches long, taken May 21, at Barbados.

Head 3; depth 3.2; eye 6; D. IX, 10; A. II, 9; scales 25.

Color in alcohol brownish above, lighter below; a distinct brown stripe from snout through eye to caudal, and another below this from axil of pectoral to caudal; outer rays of caudal brownish.

33. *Scarus vetula* Bloch & Schneider. Oldwife; Vieja.

*Scarus vetula* Bloch & Schneider, Syst. Ichth., 289, 1801, Cuba; Jordan & Evermann, op. cit., 1649; Evermann & Marsh, op. cit., 243, colored plate 31.

One specimen (no. 116), 9.2 inches long, without data.

Head 3; depth 3; eye 5.7; D. IX, 10; A. II, 9; scales 25; 2 posterior canines; 4 rows of scales on cheek.

Color in alcohol yellowish green above, lighter below, fins with submarginal lighter bands.

34. *Chaetodon capistratus* Linnæus. Mariposa.

*Chaetodon capistratus* Linnæus, Syst. Nat., ed. X, 275, 1758, Indies; Jordan & Evermann, op. cit., 1677; Evermann & Marsh, op. cit., 249, colored plate 35.

One specimen (no. 84), 4 inches long, taken May 14, at Barbados.



Head 3.5; depth 1.5; eye 3.1, scarcely equal to interorbital width; D. XIII, 19; A. III, 17; scales 42.

Color in alcohol yellowish with narrow black lines running obliquely upward and backward above, downward and backward below; a distinct ocular band from lower edge of opercle through eye to origin of dorsal; a black spot larger than eye in front of base of caudal peduncle; a dark intermarginal stripe on soft dorsal, anal and caudal.

35. *Chaetodon striatus* Linnæus. Butterfly-fish.

*Chaetodon striatus* Linnæus, Syst. Nat., ed. X, 275, 1758, West Indies; Jordan & Evermann, op. cit., 1677; Evermann & Marsh, op. cit., 249, colored plate 34.

Two specimens (nos. 81 and 82), 4 to 5 inches long, taken May 14, at Barbados.

Head 3.1; depth 1.5; eye 3, equal to interorbital width; snout 2.5; D. VII, 21; A. III, 7; scales 40.

Color in alcohol yellowish, with a jet black band wider than pupil from lower edge of opercle through eye to front of spinous dorsal; a second much wider band from 2d to 5th dorsal spines across side under base of pectoral to belly; a third of slightly greater width from base of last four dorsal spines across side and extending on to soft anal; and a fourth of similar character from soft dorsal across caudal peduncle on to base of anal; a diffuse darker spot in this band below soft dorsal, and one on caudal peduncle; ventrals black.

36. *Holacanthus tricolor* (Bloch). Rock Beauty.

*Chaetodon tricolor* Bloch, Ichth., pl. 426, 1795, Cuba.

*Holacanthus tricolor*, Jordan & Evermann, op. cit., 1684; Evermann & Marsh, op. cit., 251, colored plate 36.

Two specimens (nos. 85 and 86), each about 5 inches long, taken May 14, at Barbados.

A strikingly beautiful fish. In life the anterior fourth is rich orange as is also the tail and the posterior edges of the soft dorsal and anal; middle part of body jet black; a red border to dorsal and anal fins; pectorals and ventrals yellow or orange; edge of opercle and preopercle red. These colors all fade in spirits.

37. *Chaetodon ocellatus* Bloch. Butterfly-fish.

*Chaetodon ocellatus* Bloch, Ichth., pl. 211, fig. 2, 1787; Jordan & Evermann, op. cit., 1674.



*Chaetodon striatus*, Evermann & Marsh, op. cit., 249, colored plate 34.

One specimen (no. 83), 5 inches long, taken May 14, at Barbados.

Head 3; depth 1.5; eye 3; interorbital 2.8; snout 2.5; D. XII, 21; A. III, 18; scales 40.

Color in alcohol dull yellowish, a black ocular band width of pupil from near origin of dorsal through eye to lower edge of opercle a black spot size of eye on middle base of soft dorsal.

38. *Angelichthys ciliaris* (Linnæus). Blue Angel-fish; Isabelita. *Chaetodon ciliaris*, Linnæus, Syst. Nat., ed. X, 276, Indies.

*Angelichthys ciliaris*, Jordan & Evermann, op. cit., 1684, pl. 254; Evermann & Marsh, op. cit., 252, colored plate 37.

One specimen (no. 87), 7.25 inches long, taken in fish pot May 28, at Barbados.

Head 3.5; depth 1.7; eye 4.25 in head, 1.5 in interorbital width; snout 2.1; D. XIV, 20; A. III, 21.

Color in alcohol dull brown or drab; a black ocellus with a dark blue rim just in front of spinous dorsal; dorsal and anal edged with deep blue.

39. *Hepatus cæruleus* (Bloch & Schneider). Blue Tang. *Acanthurus cæruleus* Bloch & Schneider, Syst. Ichth., 24, 1801, Carolina. *Teuthis cæruleus*, Jordan & Evermann, op. cit., 1691; Evermann & Marsh, op. cit., 253, colored plate 38.

Three specimens (nos. 129, 130, and 131), 4 to 6 inches long, taken in fish pots May 14 and 31, at Barbados.

Head 3.5; depth 1.7; eye 2.5 in snout; D. IX, 26; A. III, 25.

Color in alcohol brown with indistinct narrow longitudinal stripes on side; vertical fins dark; pectoral yellow.

40. *Hepatus hepatus* (Linnæus). Common Barbero; Tang. *Teuthis hepatus* Linnæus, Syst. Nat., ed. 12, 507, 1766, Carolina; Jordan & Evermann, op. cit., 1691; Evermann & Marsh, op. cit., 254.

One specimen (no. 134), 6 inches long, taken June 14, at Barbados.

Head 3.7; depth 2; eye 2.1; D. IX, 25; A. III, 25.

Agrees only fairly well in color with typical *hepatus*; the distal portion of pectoral apparently yellow.

41. *Hepatus bahianus* (Castelnau). Ocean Tang; Medico. *Acanthurus bahianus* Castelnau, Anim. Nouv. ou Rares de l'Amer. Sud, 24, pl. 11, fig. 1, 1855, Bahia.



*Teuthis bahianus*, Jordan & Evermann, op. cit., 1693, pl. 256, fig. 629; Evermann & Marsh, op. cit., 254.

Three specimens (nos. 132, 133 and 135), 6 to 8 inches long, taken May 14, at Barbados.

Head 3.7; depth 22; eye 3; D. IX, 25; A. III, 23.

This is the common ocean tang or surgeon-fish of the West Indies. It attains a larger size than any other tang of the region.

42. *Melichthys piceus* (Poey). Blue Trigger-fish.

*Balistes piceus* Poey, Proc. Acad. Nat. Sci. Phila. 1863, 180, Cuba.

*Melichthys piceus*, Jordan & Evermann, op. cit., 1711.

One specimen (no. 79), 6.5 inches long, taken May 17, at Barbados.

Head 3.2; depth 1.9; eye 3.1 in snout; D. II-I, 34; A. 31; scales 54; first dorsal spine 1.8 in head, the third almost obsolete. Teeth even; scales on posterior part of body keeled; several larger scales behind gill-opening; a groove in front of eye; no lateral line.

Color in alcohol uniform black with a narrow white line along base of dorsal and anal.

43. *Cantherines pullus* (Ranzani). Lija Colorada; Tile-fish.

*Monacanthus pullus* Ranzani, Nov. Com. Act. Sci. Inst. Bonon., V, 4, pl. 1, 1842, Brazil.

*Cantherines pullus*, Jordan & Evermann, op. cit., 1713; Evermann & Marsh, op. cit., 258.

One specimen (no. 93), 6.25 inches long, taken May 14, at Barbados.

Head 3.9; depth 2; eye 3.25; D. II, 35; A. 31. First dorsal spine equal to snout, above front of eye.

Color in alcohol dull grayish, fins lighter.

44. *Alutera scripta* (Osbeck). Unicorn Filefish.

*Balistes scriptus* Osbeck, Iter Chinensis, I, 144, 1757, China.

*Alutera scripta*, Jordan & Evermann, op. cit., 1719, pl. 260, fig. 637; Evermann & Marsh, op. cit., 261, fig. 73.

One specimen (no. 80), 19.75 inches long, taken June 4, at Barbados.

Head 3.7; depth 2.5; eye 5.4; D. I, 47; A. 50.

Color in alcohol dull drab, with some darker marblings.



45. *Lactophrys triqueter* (Linnæus). Trunk-fish; Chapin.

*Ostracion triqueter* Linnæus, Syst. Nat., ed. 10, 330, 1758, India.  
*Lactophrys triqueter*, Jordan & Evermann, op. cit., 1722, pl. 261, fig. 638;  
 Evermann & Marsh, op. cit., 262, fig. 74.

Three specimens (nos. 118, 119, and 120), 5 to 6 inches long, collected May 14, at Barbados.

Head 3.75; depth 2; eye 2.2 in snout, less than interorbital width; D. 10; A. 10.

Carapace trigonal, without spines.

Color in alcohol dull greenish, darker at base of pectoral, dorsal and tip of caudal.

46. *Lactophrys tricornis* (Linnæus). Common Trunk-fish;  
Cowfish.

*Ostracion tricornis* Linnæus, Syst. Nat., ed. 10, 331, 1758.  
*Lactophrys tricornis*, Jordan & Evermann, op. cit., 1724, pl. 261, fig. 639;  
 Evermann & Marsh, op. cit., 264, fig. 77.

One specimen (no. 117), 9 inches long, obtained May 14, at Barbados.

Head 4.2; depth 2.4; eye 2.1 in snout, somewhat less than interorbital width; D. 10; A. 10. Carapace trigonal, the angles carinate, a stout spine directed forward over each eye; an abdominal spine on each side directed backward.

47. *Spheroides testudineus* (Linnæus). Globe-fish; Tamboril.

*Tetraodon testudineus* Linnæus, Syst. Nat., ed. 10, 332, 1758.  
*Spheroides testudineus*, Jordan & Evermann, op. cit., 1734, pl. 265, figs. 646 and 646a; Evermann & Marsh, op. cit., 269, colored plate 41.

One specimen (no. 122), 8 inches long, taken May 15, at Antigua.

Head 3; depth 2 in head; interorbital width 3.2 in head, 1.75 in snout; D. 8; A. 6. Central part of body with prickles.

48. *Chilomycterus antennatus* (Cuvier). Spiny Puffer.

*Diodon antennatus* Cuvier, Mém. Mus., IV, 131, pl. 7, 1818.  
*Chilomycterus antennatus*, Jordan & Evermann, op. cit., 1750; Evermann & Marsh, op. cit., 272, colored plate 42.

One specimen (no. 121), 6 inches long, taken May 4, at Barbados.

Body covered with short, strong spines, two above the orbits and one on the middle of the forehead. D. 13; A. 10.



49. *Balistes vetula* Linnæus. Oldwife; Cochino.

*Balistes vetula* Linnæus, Syst. Nat., ed. 10, 329, 1758, Ascension Island; Jordan & Evermann, op. cit., 1703; Evermann & Marsh, op. cit., 256, colored plate 39.

One specimen (no. 78), 18 inches long (without filaments), taken May 24, at Carlisle Bay, Barbados.

Head 3; depth 1.9; eye 4.25; D. III, 29; A. 27. No spines on side of tail, the scales smooth; lobes of caudal and anterior dorsal rays prolonged in filaments; scales on sides of belly largest.

Color in alcohol brownish green; a few narrow lines of blue radiate from eye; two wide blue lines on cheek.

50. *Scorpæna nuttingi* Evermann & Seale, new species.

## Plate I.

Head in length 2.33; depth 3; eye in head 5.5; snout 3.5; interorbital width 5; maxillary 2; mandible 2.1; preorbital 3.5; D. XII, 10; A. III, 5; scales in lateral line about 42, with about 24 pores. Maxillary reaching vertical or posterior edge of pupil.

Suborbital stay with 3 distinct stout spines; 3 short stout orbital spines; a similar spine at each corner of the occipital pit, each of the posterior pair double; preopercle with 4 spines, the upper one with a superimposed spine; opercle with 2 long, flat spines and a smaller one above. A deep pit between suborbital stay and anterior part of orbit; interorbital area deeply concave; occiput with a deep quadrate pit, with a short stout spine at each corner. Breast sparsely scaled; no scales on top of head; about 4 rows of thin scales on cheek behind eye; numerous dermal flaps on head, particularly on lower jaw; numerous flaps on body, largest along lateral line; no supraocular flap.

Fins all strong; fourth dorsal spine longest, about 2.75 in head; second anal spine strong, longer than third, about 2 in head; pectoral large, its length a little less than that of head, the lower 11 rays and the upper 5 unbranched, the middle 3 branched.

Color in alcohol, a dark area on upper part of side just behind opercular flap and extending on spinous dorsal where it is mottled with white; a large black area on side under soft dorsal and extending on to it; pectoral, ventral, and anal mottled with dark; 3 black bars on caudal, one at base.

This species appears to be related to *Scorpæna plumieri* Bloch, from which it differs chiefly in the entire absence of a supraocular flap, the shorter maxillary, and in having 5 (instead of only one) of the upper rays of the pectoral branched.

The collection contains but one specimen of this species. It was taken May 15 in a fish pot in Carlisle Bay, Barbados.



We take great pleasure in naming this interesting species for Charles Cleveland Nutting, professor of zoology, University of Iowa, and director of the University of Iowa Expedition to Barbados and Antigua in 1918, in recognition of his valuable studies of the aquatic fauna of the West Indies.

The type is in the Museum of the State University of Iowa.

51. *Cephalacanthus volitans* (Linnæus). Flying Robin;  
Flying Gurnard.

*Trigla volitans* Linnæus, Syst. Nat., ed. 10, 302, 1758.

*Cephalacanthus volitans*, Jordan & Evermann, op. cit., 2183, pl. 323, fig. 778; Evermann & Marsh, op. cit., 285, fig. 86.

One specimen (no. 91), 12.75 inches long, obtained June 4, at Barbados.

Head 4; depth 5.7; D. II-IV, 8; A. 6. Pectorals developed into long wing-like structures extending to caudal peduncle; head incased in a bony case; preopercular spine very long.

Color in alcohol greenish, lighter below; pectorals darker; soft dorsal rays with dark spots.

52. *Antennarius multiocellatus* (Cuv. & Val.).

Tiger Fishingfrog.

*Chironectes multiocellatus* Cuv. & Val., Hist. Nat. Poiss., XI, 422, 1837, Martinique.

*Antennarius multiocellatus*, Jordan & Evermann, op. cit., 2724.

One specimen (no. 90), 4.5 inches long, taken at Barbados.

Anterior dorsal spine terminating in 2 cutaneous flaps or bait, the second spine slightly longer than eye, its origin on line with anterior edge of orbit, the third thick and connected with the dorsal by a wide, thick membrane; no dermal flaps.

Color in alcohol yellowish, with several black spots or ocelli, there being 2 very distinct ones on soft dorsal, 3 on caudal, and others on various parts of body.

53. *Dibranchius atlanticus* Peters.

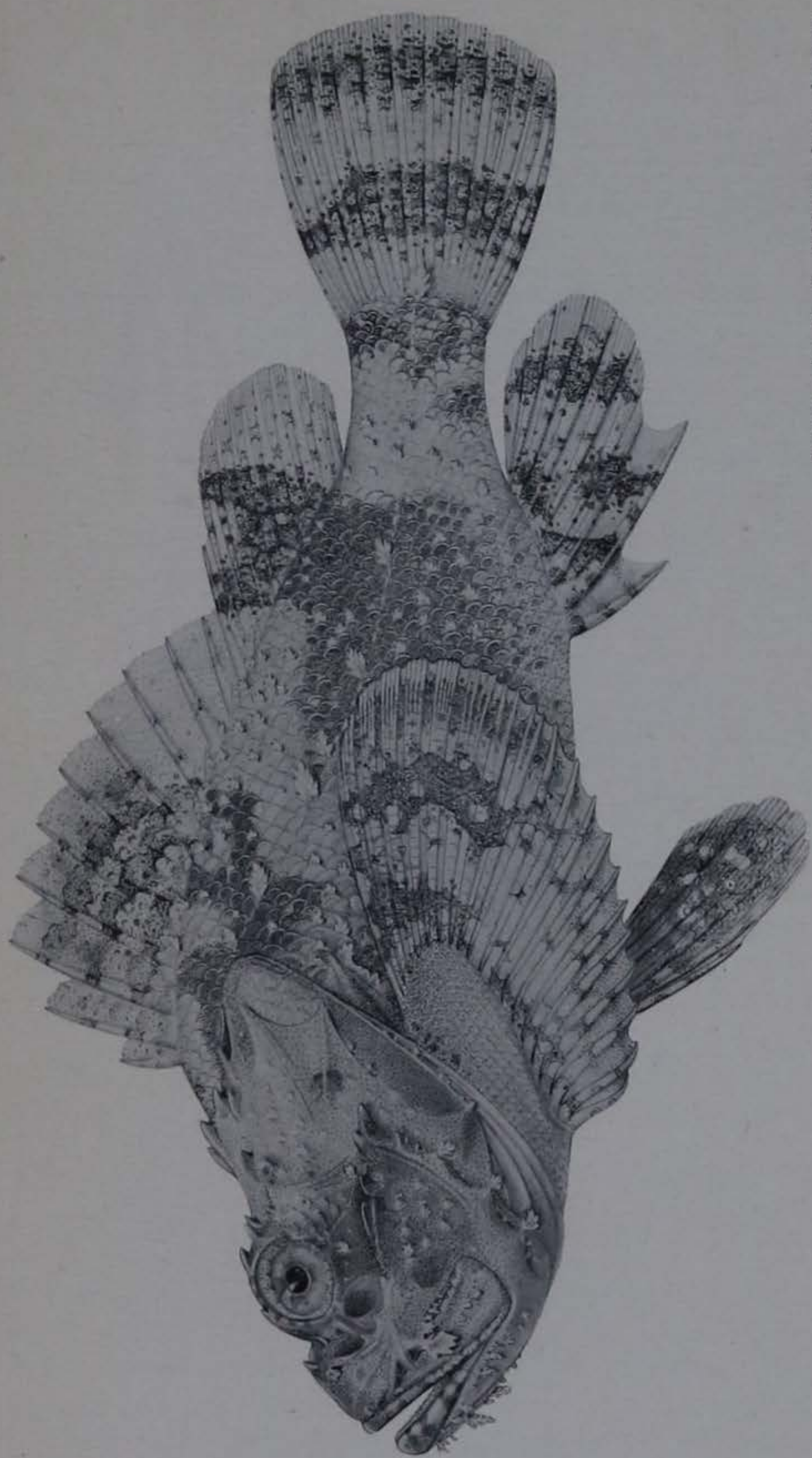
*Dibranchius atlanticus* Peters, Monats. Kon. Akad. Wiss. Berlin, 1876, 736 with plate, West Africa; Jordan & Evermann, op. cit., 2743.

One specimen (no. 89), 10.5 inches long, taken July 4, at Needham Point, Barbados.

Disk somewhat triangular; forehead and snout depressed; snout less than eye; body covered with strong tubercles and short spines; no teeth on vomer or palatines.

Color in alcohol grayish above, lighter below; caudal blackish at tip.





Drawing by W. C. Atkinson from the type

*Scorpaena nuttingi* Evermann and Seale, new species



## REPORT ON THE CHILOPODA AND DIPLOPODA

Collected by the Barbados-Antigua Expedition from the  
University of Iowa in 1918

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### CHILOPODA

Specimens of two species of chilopods were secured by the Expedition on Barbados Island, one of these being a geophiloid form of the genus *Mecistocephalus*, the other a scolopendroid of the typical genus *Scolopendra*.

#### Order SCOLOPENDROMORPHA

#### Family **Scolopendridæ**

#### *Scolopendra subspinipes* Leach.

Trans. Linn. Soc. London, XI (1814), p. 383.

Of the seven or eight large centipeds of the genus *Scolopendra* recorded from the West Indies, the present species and *Scolopendra alternans* Leach are much the most common and widespread. *S. alternans* is a characteristically West Indian form and the more abundant generally speaking, while *S. subspinipes* is apparently of oriental origin though now spread over all the warmer regions of the earth excepting about the Mediterranean Sea. It has been recorded previously from Barbados while *S. alternans* has not, and it is possible that the latter, the native species, has been there wholly displaced.

While in the East Indian and adjacent regions *S. subspinipes* presents a number of well-marked varieties, only the *forma typica* is known to occur in the West Indies, and the specimens from Barbados conform fully to it. The species sometimes attains a length of 200 mm.

Six medium and small sized specimens were taken by A. O. Thomas at Speighstown, Barbados, May 19, 1918.



*Scolopendra alternans* Leach

Trans. Linn. Soc. London, XI (1812), p. 383.

This is a characteristically West Indian species which, in general, is more abundant on the islands than the preceding species. In general appearance the two species are similar and both attain a maximum length of about 200 mm. *S. alternans* may be distinguished from *S. subspinipes* in having numerous spines on the third joint of the anal legs in place of the two larger ventral ones in the latter species; also in having dorsal spines at the end of the third joint of the penult legs where *S. subspinipes* has none.

*S. alternans* has been recorded from Antigua by Pocock (Jour. Linn. Soc. London, XXIV [1893], p. 458). It has not as yet been noted from Barbados, although it in all probability occurs there.

## Order GEOPHILOMORPHA

Family **Mecistocephalidæ***Mecistocephalus maxillaris* (Gervais).

*Geophilus maxillaris* Gervais, Ann. Sci. Nat., ser. 2, VII (1837), p. 52.

This is also a tropicopolitan species. It is the only member of the genus known from South America and the West Indies. It is probably a more abundant form than records indicate, as it is small, commonly measuring well under 40 mm. in length, and usually is found buried in the earth. It is not infrequently found in the soil about plants imported to the United States from South America, the writer having identified specimens thus taken at quarantine at New York, Philadelphia and Washington, D.C. It has also been found in botanical gardens at Hamburg and Paris, and was first described from a specimen found in the latter locality.

One specimen taken at St. Michaels, near Bridgetown, Barbados, by D. Stoner in May, 1918.

## DIPLOPODA

As in the case of the chilopods, very few kinds of diplopods are as yet known to occur on Barbados and Antigua, only four species having been recorded. The diplopod material of the present expedition examined by the writer was all taken on Barbados by Prof. Stoner and represents two of these species,



*Orthomorpha coarctata* (Saussure) and *Rhinocricus monilicornis* (Porat). The four species are given below.

Superfamily SPIROBOLOIDEA

Family **Rhinocricidæ**

*Rhinocricus monilicornis* (Porat)

*Spirobolus monilicornis* Porat, Bih. Svensk. vet.-akad. Handl., IV, no. 7, (1876), p. 31.

*Rhinocricus monilicornis* Pocock, Jour. Linn. Soc. London, XXIV (1894), p. 499.

*Spirobolus heilprini* Dollman, Proc. Acad. Nat. Sci. Phil., (1889), p. 127.

*Rhinocricus monilicornis* Chamberlin, Bull. Mus. Comp. Zool., LXII, (1918), p. 200; Ann. Ent. Soc. America, XIII, (1920), p. 275.

Eight specimens of this species were taken on Barbados by Prof. Stoner. The form had been previously recorded from this locality by Pocock (as cited above). *R. monilicornis* is also known from Haiti, Trinidad, Tobago and South America as well as from the Bermuda Islands, where it seems to be common.

*Rhinocricus arboreus* (Saussure)

*Julus arboreus* Saussure, Linnæa ent., XIII, (1859), p. 331.

*Spirobolus (Rhinocricus) arboreus* Karsch, Zeits. naturwiss., (1881), ser. 3, VI, (1881), p. 8.

*Rhinocricus arboreus* Pocock, Journ. Linn. Soc. London, XXIV, (1894), p. 493, pl. 38, f. 4.

*Rhinocricus arboreus* Chamberlin, Bull. Mus. Comp. Zool., LXII, (1918), p. 197; Proc. U. S. Nat. Mus., LXI, no. 10, (1922), p. 9.

This large milliped, originally described from St. Thomas Id., is also known from Porto Rico, where it is common, Culebra, St. Croix and Antigua. It has not been recorded from Barbados. Presumably it takes its name from the fact that it is said to ascend trees after the manner of certain large species of the allied genus *Dinematocricus* of the Solomon and Fiji Islands and of the East Indies in general.

*Cubobolus politus* (Porat)

*Spirobolus politus* Porat, Ann. Soc. ent. Belg., XXXII, (1888), p. 243.

*Rhinocricus politus* Pocock, Journ. Linn. Soc. London, XXIV, (1894), p. 488.

This species is known only from the original description, which was based upon specimens from Antigua. In lacking scobina it apparently belongs to the group of species separated by the writer from *Rhinocricus* under the generic name *Cubobolus* (Proc. U.S.N.M., no. 10, LXI [1922] p. 10.)



## Superfamily POLYDESMOIDEA

Family **Strongylosomidæ***Orthomorpha coarctata* (Saussure)

*Polydesmus coarctatus* Saussure, Mem. Myr. Mex., (1860), p. 39, f. 18.

*Orthomorpha coarctata* Pocock, Ann. Mus. civ. Genoa, ser. 2, XIV, (1895),  
p. 809.

*Orthomorpha coarctata* Chamberlin, Bull. Mus. Comp. Zool., LXII, (1918),  
p. 245.

A number of specimens of this species were taken on Barbados. Although doubtless originating in the East Indian region, the species is now tropicopolitan. It is one of the forms most commonly transported by ship along with plants from tropical countries and is often thus intercepted at quarantine in ports of the United States. It is now well established throughout the West Indies, in Central America, and in other portions of the warmer section of the Western Hemisphere.



# THE GENUS HOLOPUS, WITH THE DESCRIPTION OF A HITHERTO UNRECORDED SPECIMEN OF *H. RANGII*

Collected by the Barbados-Antigua Expedition from the University of Iowa in 1918

FRANK SPRINGER

## INTRODUCTION

The island of Barbados is especially associated in the minds of naturalists with the curious crinoid genus *Holopus*. Of the single recent species of this genus only eleven specimens are known, of which certainly six and probably seven (possibly eight) are from Barbados.

In view of the interest attaching to this form, upon which the literature is widely scattered and largely inaccessible to the average student, it has seemed advisable to give here a detailed account of it, reproducing also the more important of the pictures previously published.

In addition to the recent *H. rangii* d'Orbigny (including *H. rawsoni* Gray) the genus may also include *Holopus spilecense* (Schlüter) from the Italian Tertiary, originally described as *Cyathidium*, but afterwards referred to the present genus by Jaekel.<sup>1</sup>

## HISTORICAL ACCOUNT

The first known specimen of *Holopus* was obtained in the island of Martinique by M. Sander Rang, who procured it, while it was still alive, from a fisherman. He sent it to Professor Alcide d'Orbigny, and the latter in 1837<sup>2</sup> published a very detailed description, calling it, after its discoverer, *Holopus rangii*. The original account of this extraordinary animal naturally attracted wide attention, and it was reprinted in various French, English and German journals.

D'Orbigny made a section of the column of this specimen,

<sup>1</sup> Zeitschr. d. Deutsch. geol. Gessell. 1891, p. 619.

<sup>2</sup> Magazin de Zoologie, 7me Annee, 1837, Cl. X, pp. 1-8.



and found it to be hollow, the cavity occupying its entire length; he assumed that this cavity contained the viscera. A remarkable feature of this individual was that it possessed only four rays and eight arms; this was recognized by d'Orbigny as a curious anomaly.

After d'Orbigny's death his entire museum was purchased by the Jardin des Plantes (Museum d'Histoire Naturelle), where his specimen of *Holopus* was examined by Sir Wyville Thomson in 1867.

Roemer in Bronn's *Lethaea Geognostica*, 1856, p. 226 (followed by Bronn in his "Klassen und Ordnungen des Thier-Reichs," published in 1861) proposed a new family, *Holopidæ*, for the reception of *Holopus*.

In 1862 Dujardin and Hupe, in their "Histoire naturelle des Zoophytes Échinodermes," stated that from the published description and figures of *Holopus* they were strongly inclined to consider it as something quite different from an echinoderm, and suggested that it might be a barnacle; they retained for it the family name *Holopidae*.

In 1871 Dr. J. E. Gray<sup>3</sup> published the following note from Mr. (later Sir) Rawson W. Rawson, C.B., the Governor of Barbados, together with a figure of a specimen of *Holopus* lacking the bivial arms:

"I have procured a specimen of a *Pentacrinus* from the north of the island of Barbados, dredged or, rather, picked up, in about 5 fathoms water. It is ink-black, a portion broken so as to show the interior of the contracted armlets and the pentacrinial formation of the mouth or entrance of the central canals. Do you know what it is? I am under the impression of having seen an engraving of such a zoophyte, but cannot find it."

Mr. Rawson added in regard to the local habitat of this form and of the species of *Isocrinus*:

"I believe that they are all procured on the same bank, which, instead of five or six miles from the shore, as I was first informed, cannot be more than a mile, within the hundred fathom line."

Dr. Gray at once recognized the figure as representing a

<sup>3</sup> Ann. and Mag. Nat. Hist., ser. 4, VIII, pp. 394-396, with a figure.



species of d'Orbigny's genus *Holopus*, of which he gives a short history. He says further that—

“there are certain points in which the form of the arm in Mr. Rawson's figure is very unlike that of the species from Martinique which d'Orbigny has called *H. rangii*. I would, therefore, propose to distinguish the Barbados specimen by the name *H. rawsoni*, and hope very shortly to be able to give a more detailed description of this most interesting discovery in crinoidal genera.”

In December, 1871, the “Hassler” with Professor Louis Agassiz on board visited Barbados, where she dredged in various depths between 80 and 120 fathoms off Sandy Bay on the western (leeward) coast. In his memoir on the crinoids and corals of the “Hassler” expedition Count Pourtalès says of Barbados that—

“It is a well-known locality for *Pentacrinus asterias* and *mülleri*, and the second specimen of *Holopus rangii* d'Orbigny known to science, in the possession of Governor Rawson of Barbados, was brought up on a fisherman's hook in the same vicinity. We had not the luck to find either of these, though numerous joints of the stem of *Pentacrinus* were contained in the sand.”

The specimen of *Holopus rangii* to which he refers is evidently the one from which the figure sent to and published by Dr. Gray was drawn; and the fact that Governor Rawson loaned it to Professor Agassiz for study and description accounts for the non-appearance of Dr. Gray's projected memoir on the genus.

During his last days at the Museum of Comparative Zoology Professor Agassiz was occupied in preparing a paper on Sir Rawson Rawson's specimen of *Holopus* for the zoological results of the “Hassler” expedition. After his death the figures which had been drawn for him by Mr. E. Konopicky were published in 1874, together with a short description of the specimen by Count Pourtalès.<sup>4</sup> This description is as follows:

“The specimen was attached by a broad, incrusting calcareous base, but slightly more expanded than the body, which is

<sup>4</sup> Illustrated Catalogue, Mus. Comp. Zool., No. VIII (1874), p. 51, pl. 10.



thick, inversely conical, bent towards one side, of a hard, semi-calcareous substance, having under a magnifier a very delicate shagreen-like appearance. There are no sutures discernible with certainty, though in some parts there appear to be faint indications of them. I did not feel justified in making attempts to render them more apparent by preparation. There are two rows of blunt tubercles on the body part, corresponding to the middle of each arm; a small tuberculated area is also noticeable near the border of the calicle between these rows, and scattering tubercles are found over other parts of the body. Ten arms originate in pairs from five axial joints; the original specimen of d'Orbigny is described as having had but eight, and was certainly anomalous. The axial joints are pentagonal with rounded angles, hemispherically swollen and tuberculated in the middle, closely joined to each other laterally; the tubercles on these joints are in three irregular rows, one in the middle and one corresponding to the middle of each arm. The inside of these joints is deeply channeled in the middle. The arms are composed of thick, short joints, wedge-shaped, swollen and tuberculated; the articulations form a deep transverse furrow. There are no syzygies. When contracted the arms are rolled in a spiral, and pressed laterally against one another so as to enclose a hermetically closed cavity. At the eighth or tenth joint the arm contracts suddenly, and becomes wedge-shaped outside, so as to fit more closely against its neighbors, the rest of the arm being rolled up inside of the cavity. The cirrhi of the arms are formed of broad, flat joints, fitting also closely to their neighbors, and rolled up spirally towards the ambulacral channel of the arm when contracted. The mouth is surrounded by five triangular plates, by which it can be apparently almost or entirely closed. These pieces are deeply and irregularly corrugated on the outside. The intervals of the plates or angles of the mouth correspond to the ambulacral channels. There is a small triangular plate in one of the interambulacral spaces inside of the axial joints, which is probably an anal plate, but no opening can be detected near it. The internal or digestive cavity could not be examined.

"The specimen was obtained at Barbados by a fisherman, who brought it from deep water upon his hook; it has lost four of its arms, but is otherwise complete. It is dry and of black color, somewhat lighter on the arms. The whole specimen in its contracted state is about one inch and three-fourths high."

From a comparison of the figures it seems reasonably certain that the peculiarly distorted specimen described by Pourtalès was the same as that mentioned by Gray for which he suggested the name *Holopus rawsoni*.



At a meeting of the Royal Society of Edinburgh held on June 4, 1877, Professor Sir C. Wyville Thomson discussed the structure and relationships of the genus *Holopus*, basing his remarks upon a specimen loaned him by Sir Rawson W. Rawson.<sup>5</sup>

Sir Wyville states that a second specimen in the collection of Governor Rawson had been lent by him to Professor Louis Agassiz at the time of the visit of the "Hassler" to Barbados; and that Professor Agassiz intended to publish a full description of the specimen, but was prevented from so doing by failing health, and after his death the figures which he had prepared were published by his son Alexander Agassiz, with a short note by Court Pourtalès, in the Zoological Results of the "Hassler" expedition.

This second specimen is evidently the one of which a figure was published by Gray, who, however, never saw it, and which was described in detail by Pourtalès in connection with the figures by Konopicky. Gray gives the depth of the habitat as 5 fathoms, while Pourtalès says it was brought up from deep water. But Sir Rawson states that while at first he believed it to have come from deep water, he later found that it actually came from shallow water.

Sir Wyville says that during the last few years (preceding 1877) three specimens of *Holopus rangii* had fallen into Sir Rawson Rawson's hands. All were brought up on fishermen's lines from deep water off Barbados. One is very complete in all important parts, wanting only the two bival arms, but retaining the orals. The second is a little larger; it lacks the orals and the bival arms. With Sir Rawson's permission he boiled this specimen down in order to figure and describe the separate parts. The third specimen is quite perfect, but very young, only 8 mm. in height.

Besides these three specimens, of which the first is evidently the one mentioned in the letter from Governor Rawson to Dr. Gray and subsequently loaned to Professor Agassiz, Sir Wyville knew of only one other; this was shown at the Philadelphia Exhibition, and was afterwards purchased by the Museum of Comparative Zoology.

Sir Wyville believed that the column, or "tube-like body

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<sup>5</sup> Proc. Roy. Soc. Edinburgh, IX (1876-77), p. 405.



chamber," of *Holopus* was formed of the basals, radials, and probably also the primary brachials fused together. He noticed that the upper portion of the hollow column expands slightly, and its thickened upper border is divided into five well developed facets for the articulation of the five arm pairs, each facet bearing an axillary followed by two arms. These facets, he concluded, represent the upper surfaces of the primibrachs; but, if so, they differ from the primibrachs of all other recent crinoids in being united with the axillaries by a true muscular articulation instead of by an articulation of the non-muscular type. He suggests the alternative that they may be the distal articulating surfaces of the radials, in which case the following segments may be formed of the two primibrachial ossicles coalesced, and the non-muscular articulation between them obliterated; or, he says, there may be only one radial and one primibrach ossicle. He describes the upper border of the cup bearing the facets as being very irregular in thickness, and in all the specimens which he examined, including d'Orbigny's, one side of the border is much thicker, and consequently higher, than the other, and the three arm pairs articulated to it are much larger than those articulated to the opposite side. There is a very marked division into bivium and trivium, and consequently a bilateral symmetry underlies the radial arrangement. The axillaries are each succeeded by two series of about eight similar thick wedge-shaped brachials, very convex externally, and giving off laterally, alternating on either side of the arm, very broad flat pinnules each consisting of about six plate-like segments. The brachials are also provided with strong lateral processes forming a wall on either side of the radial groove, and the sides of adjacent series of these first eight brachials are marked with corresponding grooves and ridges, so that, although from the presence of articulating ridges of varying degrees of obliquity and of muscular impressions the proximal portions of the arms must be capable of some motion, that motion would appear to be slight. After about the eighth the brachials suddenly contract in size and become greatly compressed, and this narrow series extends to about sixteen in number, gradually tapering to the end of the arm. The facets on the edge of the hollow column he describes as follows:



"Each facet is traversed by a transverse articulating ridge, a little in front of which there is the mouth of the tube which lodges the sarcode axis of the ossicles, and a little behind its center there is a somewhat longer aperture which appears to lead into the cancellated structure of the outer part of the wall. There are two large shallow muscular impressions on the surface of the facet on the proximal aspect of the transverse ridge. A vertical mark, sometimes a groove and sometimes a ridge, runs from the center of each articulating facet down the inside of the wall of the hollow column for about two-thirds of the depth of the cavity, where it is lost. At the bases of the arms, just above the edge of the cup, five thick calcareous bosses, each composed of the contiguous lateral processes of two axillaries, project interradially into the cup, and opposite these five rather large triangular plates meeting in the center of the disc, form a low pyramid covering the mouth; these oral plates are inter radial, and the spaces between them radial, corresponding with the arm grooves."

Sir Wyville notes that d'Orbigny describes the animal as possessing no anal opening, and says that this is probably the case, "but the material is still too scanty to admit of the full examination of a complete specimen of the skeleton, and the soft parts are unknown."

Sir Wyville concludes that *Holopus* is especially characterized among living crinoids by the absence of an articulated column, or its representative, the centrodorsal; by the viscera being lodged in a hollow peduncle with a continuously calcified wall; and by the absence of an anal opening. The similarity of *Holopus* and *Cyathidium*, between which types he sees no distinction of generic value, is noted.

In 1878 two figures drawn by J. Henry Blake from preliminary sketches by Alexander Agassiz of a young *Holopus* dredged in 100 fathoms by the "Blake" off Bahia Honda, Cuba, in 23° 01' N. lat., 83° 14' W. long., were published, together with a descriptive note by Count Pourtalès.<sup>6</sup>

Portalès says:

"The specimen is attached to a piece of rock, and was not detected until it had become dry. The general shape is a truncated cone when contracted, with irregular contour of attachment. The body part is very short, spreading out a little at the foot; surface granulated or shagreen-like, with a few small

<sup>6</sup> Bull. Mus. Comp. Zool., V (1878), p. 213.



tubercles scattered over it. No trace of divisions can be detected in this part. Above, there are two circles of five plates each, fitting closely together and concealing the arms entirely. The lower plates are pentagonal with rounded corners, the upper and lower sides being parallel. The lower sides do not form a continuous line from plate to plate, so that there are small triangular spaces left between them. There is a row of tubercles on each side of a plate, and one in the middle forming a ridge which projects a little downward over the lower edge of the plate. On the upper edge of these plates are articulated five smaller triangular ones, firmly closed together. They have also a ridge in the middle in continuation of the ridge in the lower plates. The larger pentagonal plates are the radial axillaries of Sir Wyville Thomson, but the smaller triangular ones seem to become fused with them in the adult. Color black. Diameter at base 3 mm.; height a little over 1 mm."

I think it well here to observe in regard to this young specimen that there is room for considerable doubt whether it belongs to the genus *Holopus*. There are but five arms, forming a tightly closed pyramid, without any sign of an axillary plate such as should appear at any post-larval stage of *Holopus*; and the facets for the reception of the arm bases incline inward, instead of outward or horizontal as in typical specimens. In the latter respect it is more like the fossil genus *Cyathidium*, described in 1847 by the Danish author Steenstrup, from the upper chalk of Denmark; and also in the tightly closed pyramid, which has by the later discoveries of Brunnich Nielson<sup>7</sup> been shown to be the condition of the arms in *Cyathidium*, which however has at least three axillary pieces.

Dr. P. Herbert Carpenter in 1884<sup>8</sup> gave a very detailed account of this genus. He defined the family Holopidæ as follows:

"Basals and radials completely ankylosed into an asymmetrical tube-like calyx which is fixed by an irregular expanded base. On the upper edge of the cup are five unequal articular surfaces for the attachment of the second radials [*i.e.*, IBr]. Arms ten, massive, and closely inrolled. Disk relatively small, with a central mouth protected by five oral plates, between which and the edge of the cup is a very narrow irregular pave-

<sup>7</sup> Crinoiderne i Danmarks Kridtaflejringer, 1913; Jaekel in Pal. Zeitschr., 1914, p. 390.

<sup>8</sup> Challenger Reports, part 32, Stalked Crinoids, pp. 197-217.



ment of smaller plates. Anus probably present, but not yet observed."

Speaking of the first specimen acquired by Sir Rawson Rawson, he states that it was placed by him in the hands of Prof. Louis Agassiz during the stay of the "Hassler" at Barbados in 1872. Prof. Agassiz intended to publish a full description of the specimen, but was prevented from doing so by failing health, and after his death the figures which he had prepared were published by Mr. Alexander Agassiz, together with a short descriptive note by Count Pourtalès. He says that this specimen was subsequently entrusted by Sir Rawson Rawson to Sir Wyville Thomson, together with two others which he had obtained in 1876 after the publication of Pourtalès' notice of the first one.

He says that the second of the specimens mentioned by Sir Wyville Thomson seems to have been the original specimen described by Pourtalès, from which the oral plates had dropped away; and as it was gradually falling to pieces from natural decay Sir Rawson Rawson allowed it to be dissected. The figures on plate 3 of the "Challenger" report, with the exception of fig. 2, and figs. 1-4 on plate 5, show the results of this process. Fig. 2 on plate 3 is a slightly idealized view of the interior of the cup so as to show the oral plates of the large specimen represented in plate 2. This was supposed by Sir John Murray to belong to Sir Rawson Rawson, and Carpenter says that as it corresponded to the first specimen on Sir Wyville's list he imagined this to be the case; but Sir Rawson Rawson did not recognize it as his, and Carpenter, therefore, concluded that it is the mutilated dry specimen which Professor Agassiz told him was sent by him to Sir Wyville with permission to cut it up for details. In like manner Sir Rawson Rawson thought it possible that the original of plate 4 might be his young specimen mentioned by Sir Wyville as only about 8 mm. in height, but as Professor Agassiz told Carpenter that he also sent Sir Wyville a small individual, Carpenter believed that two specimens had somehow been mislaid. The specimen which was shown at the Philadelphia Exhibition, and was subsequently bought by the Museum of Comparative Zoology, was the original of plate 1 of the "Challenger" report. It was ob-



tained by Mr. Wilderboer, the collector for Sir Rawson Rawson, after the latter had left Barbados, and having come into the hands of Alexander Agassiz, it was sent by him to Sir Wyville Thomson, together with the *Holopus* material obtained during the dredging expeditions of the "Blake." This consisted of the very young individual dredged at Station 22, off Bahia Honda, Cuba, in 100 fathoms, and a single post-radial series dredged at Station 157, off Montserrat, in 120 fathoms.

Carpenter noticed that the pentagonal figure indicating the position of the fuleral ridges on the articular faces of the radials, and the central canals, can be traced almost to the bottom of the hollow cylinder forming the column. From analogy with other crinoids he believed that the small portion of the calyx tube between the limit of the pentagonal figure and the ends of the central canals and the spreading base consists of closely anchylosed basals, the presence of which was taken for granted by Sir Wyville Thomson. He found that the calyx tube narrows rapidly downward, and its interior is marked by five vertical ridges corresponding with the radials in position. They are fairly distinct at the level of the section just above the portion formed by the supposed basals, but become less marked as they proceed downward, and, being composed of the whiter, less dense, network, disappear together with it. They extend upward to the edge of the cup at the intermuscular notches, although they are much less distinct on some of the radials than on the others. They thus occupy the position of the ventral radial furrows which are often so marked on the interior of the calyx in other crinoids.

Carpenter pointed out that on the bivial arms of the large specimen in the collection of the Museum of Comparative Zoology (No. 5 in the appended list of known specimens; Cat. No. 21, M.C.Z.) there are two primibrachs which look as if they were articulated rather than suturally united, while on the trivial arms there is only one. He believes that the evidence is sufficient to bear out the statement that *Holopus* has two primibrachs which are closely united by syzygy; he says that we should accordingly expect to find a similar syzygial union between the first and second brachials, but that of this there is no evidence whatever. He notes the complete absence of syzygies in the arms.



Carpenter noted that the outer surfaces of the axillaries are produced dorsally for a considerable distance beyond the edges of the articular faces, as is the case with all the lower brachials, and they fit very closely against their fellows, their sides being flattened and more or less marked by ridges and furrows which interlock with those on the adjacent axillaries; these furrows are also apparent on the sides of the lower brachials. The muscle plates of the axillaries, and in a lesser degree also those of the brachials, are greatly thickened, and their upper edges are cut out into coarse teeth.

There is a large food groove on the upper surface of each arm and pinnule. The large size of the paired flexor muscles uniting the brachials would seem to give the power of rolling in the arms very rapidly and completely, while the small, but very close and compact, bundles of elastic ligaments on the dorsal side of the articular ridges would help in the re-extension of the arms.

In both the larger and better developed trivial and the smaller bivial arms a variable number of the lower brachials are considerably larger than those which follow, and the passage from one type to the other is usually somewhat sudden; on the trivial arms there are generally from eight to ten of these large massive brachials, but on the bivial there are only about seven, six, or even less. The shape of these lower brachials is rather variable; they may be roughly oblong, as is the case with the first two or three, or their edges may be oblique so as to give them a truncated wedge-like form. The more wedge-shaped these brachials are, owing to the obliquity of their terminal faces, the greater is the inequality in the size of the muscle plates on the two sides of the median groove. The pinnule socket of these wedge-shaped brachials is on the thickened upper edge of the higher muscle plate. The general character of these lower brachials is much less regular and symmetrical than is the case in other crinoids, so that many of them are more or less of an aberrant nature. In some few cases the brachial is smaller than usual, and triangular, not extending completely across the arm, so that the brachials above and below it come into contact with one another; sometimes, again, a first brachial becomes unusually large. The longest arms seem to have about



eighteen small distal brachials, raising the total number of brachials to between twenty-five and thirty.

The longer outer sides of all the brachials bear the pinnules. That of the first brachial is comparatively small, and is attached close to the distal edge of the segment; the next pinnule is invisible in all the specimens, but those of the third and following brachials are much larger and have broad basal segments that gradually come to occupy more and more of the whole surface of the brachials to which they are attached; in fact the bases of the pinnules of alternate brachials that are borne upon the same side of the arm are only just separated from one another by the narrow ends of the intervening brachials which have their pinnules on the opposite side. The pinnules are rolled in upon themselves in exactly the same way that the arms are. The four or five basal segments are very broad, but the rest of the pinnule tapers away rather rapidly. The segments are united by paired muscular bundles, which is a somewhat unusual condition.

The central mouth is protected by five large and triangular oral plates which are opposite the clavicular pieces of the united radials. The lateral edges of these plates are more or less cut into false teeth, while the raised central portion is pierced by from fifteen to twenty minute holes, the water pores. The bases of the orals seem sometimes to rest directly against the edge of the radials, while they are sometimes separated from this edge by an irregular row of small triangular plates. Carpenter says it is not unlikely that an anal tube is concealed somewhere or other among these plates, but he saw no certain traces of it in the dry specimen.

The food grooves which come away from the mouth between every two of the oral plates are continued out upon the axillaries and thence on to the arms. They occupy the deep channel between the large muscular processes at the sides of the segments, and in the dry specimen appear to be bordered by small irregular plates. These, however, do not seem to correspond either to the side plates or to the covering plates of other crinoids, for an examination of the spirit specimen shows that these small plates really belong to the tentacles, which are relatively large and stout. The bases of these tentacles are pro-



tected by scale-like plates formed of the usual calcareous reticulation; they are not easily made out at the edges of the brachial groove, but on the lower parts of the pinnules there seem to be from two to three tentacles on either side of each segment.

The general arrangement of the tentacles is the same as in other crinoids, but the epithelial layer covering them is, if anything, thinner than in *Heliometra glacialis*, though thrown into much stronger corrugations at the ends of the tentacles.

Carpenter found that cutting sections of a *Holopus* arm was an exceedingly difficult task, partly because of the rolled up condition, and partly because the calcareous substance of the skeleton is so much denser than that of other crinoids, so that the organic base which is interpenetrated by it and remains behind after decalcification has nothing like the consistency that we meet with in the corresponding parts of the comatulids or of *Ilycrinus*. The presence of large bundles of muscles and ligaments without any helping syzygies also increases the difficulty of all attempts to obtain thin sections.

He found that the anatomy of a *Holopus* arm is similar in all essential respects to that of an ordinary crinoid. The axial cord traversing the central canal of the skeleton gives off its pinnule branches in the usual way, that is, alternately on opposite sides. These branches have a long distance to go before they reach the pinnules, owing to the attachment of the latter on the upper edges of the large muscle plates. As long as the branch remains in the substance of the brachial it does not take a straight course as is the case in the other crinoids, but is thrown into a series of loops in a dorsoventral direction, and after it enters the pinnule its course is still somewhat sinuous. These branches, like the main arm trunk, are relatively of very small size, which is perhaps to be accounted for by the fixed position of the animal. All the ambulacral structures of the *Holopus* arm are lodged in the deep median groove of its skeleton, and are usually small in comparison with the great transverse diameter of the ossicles. The cœliac canal is situated, as usual, between the two large muscle bundles, with a small genital canal separating it from the single subtentacular canal above. The epithelial lining is very much the same in character in all these canals, consisting of low, flattened cells. In *Holopus* the



difference between the excessively delicate epithelial layer lining the wall of the genital canal and the well developed cellular lining of the cœliac and subtentacular canals is much less marked than in other types. The genital cord is of essentially the same nature as in the other crinoids, though it is of a much less branching character in the axillary than is usually the case so near the disc. It is connected with ovaries alternately on opposite sides of the arm from about the first to the fifteenth brachial. The ovaries are short and stout, and confined to the pinnule bases in the broader lower parts of the arms; but where the segments are smaller the ovaries appear immediately beneath the water vessel, and the boundaries between the three arm canals cannot be traced. The ova, of which all stages are visible, are more like those of *Heliometra glacialis* than is the case in many comatulids, but they are somewhat larger, reaching a diameter of 0.22 mm., while 0.1737 mm. is the size of the largest ovum of *Heliometra glacialis* which was measured by Ludwig.

Carpenter remarks that all the specimens of *Holopus* which have been preserved in the dry state are of a dull dark green tint, sometimes verging on black; but Mr. Agassiz records that on one occasion, off Montserrat, the "Blake" dredged an imperfect whitish specimen.

Carpenter treated one of the dry specimens of *Holopus* with alcohol and obtained a dull green solution with a red fluorescence. Professor Moseley examined this with the spectroscope, and found the coloring matter to be identical with the pentacrinin which he had discovered in the pentacrinites dredged by the "Challenger" in the Pacific and in the East Indian archipelago.

Carpenter discussed at considerable length the systematic position and relationships of *Holopus*; he associated with it in the family Holopidæ the genera *Eudesicrinus*, *Cyathidium* and *Cotylecrinus*.

In 1891 Jaekel<sup>9</sup> in a paper "Ueber Holopocriniden" discussed the genus *Holopus*, associating with it in the same family Holopocrinidæ the genera, *Cyrtocrinus*, *Schlerocrinus*, *Tetanocrinus*, *Gymnocrinus*, *Eugeniocrinus*, *Phyllocrinus* and ? *Tormocrinus*.

<sup>9</sup> Zeitschr. d. Deutsch geol. Gesell. XLIII, Heft 3, p. 612.



In 1913 Springer and Clark<sup>10</sup> placed *Holopus*, together with *Cotyloderma* (*Cotylecrinus*) and *Cyathidium* (*Micropocrinus*) in the family Holopidæ, the last (eighth) family of the order Articulata as understood by them.

From a detailed study of the contrasting pairs of characters used in differentiating the recent crinoids Mr. A. H. Clark in 1915<sup>11</sup> arrived at the conclusion that *Holopus* is in reality a highly specialized type, on a par with, or even possibly in advance of, the pentacrinites and the comatulids, and much in advance of all the other recent forms. In 1919<sup>12</sup> the same author expressed the opinion that, in spite of their extraordinary superficial dissimilarity, the pentacrinites, the comatulids and *Holopus* are very closely related. He says that in the pentacrinites the column is enormously developed; so rapid is the growth that the proximales as they are continuously formed beneath the calyx never succeed in becoming attached to it, but are continuously pushed outward by the formation of new proximales between the last formed and the calyx; the proximales later become separated by the intercalation of other columnals, appearing in the fully developed column as the cirriferous nodals. The basals are much reduced and lie horizontally. In the comatulids a short column is formed and a proximale appears which, becoming firmly attached to the calyx, increases enormously in size, and, the larval column being discarded, contains the entire adult stem. The basals, in nearly all the types, become metamorphosed into an internal septum and entirely lose their original character. The base therefore is entirely composed of radials, practically horizontal in position, plus the proximale. In *Holopus* the same line of specialization has apparently been followed further; the column and the basals have disappeared, and the attachment is by means of the radials, which in the comatulids dominated the base. It is conceivable that the very young *Holopus* is essentially like a short-stemmed comatulid in which the radials, growing very rapidly, form a cylindrical ring with the basals, spread outward until they all lie in the same

<sup>10</sup> In Zittel-Eastman, Text-book of Paleontology. 2nd Edition, p. 241.

<sup>11</sup> Phylogenetic study of the Recent Crinoids, *Smiths. Misc. Coll.*, 65; no. 10 (Aug. 19, 1915).

<sup>12</sup> *Jour. Washington Acad. Sci.*, IX (1919), p. 136.



plane, closing the proximal end, and that this ring becomes attached by its lower border to the object upon which the larva rests.

#### THE KNOWN SPECIMENS OF HOLOPUS RANGII

##### 1. Martinique (Pl. I, figs. 1, 2).

Caught by a fisherman and given to M. Sander Rang while still alive; by him presented to M. Alcide d'Orbigny, who described it in 1837.

Figured by d'Orbigny in "Magasin de zoologie, 7ieme annee, classe X, pl. 3, 1837."

Purchased by the Muséum d'Histoire Naturelle at Paris, and there examined by Sir Wyville Thomson in 1867.

Type of *Holopus rangii* d'Orbigny, 1837, this species being the type of the genus *Holopus*.

##### 2. Barbados (Pl. I, fig. 3).

Found in 5 fathoms, but at first thought to have been brought up from "deep water."

Originally in the collection of Sir Rawson W. Rawson.

Governor Rawson sent a sketch of it, with a short note, to Dr. J. E. Gray, both of which were published by the latter in 1871. The specimen was not sent to Dr. Gray.

During the visit of the "Hassler" to Barbados in December, 1871, Governor Rawson loaned this specimen to Professor Louis Agassiz for the latter to describe and figure. His figures with a description by Count Pourtalès were published, after his death, in 1874.

This is probably the first specimen listed by Sir Wyville Thomson in 1877.

Figured by J. E. Gray, "Annals and Magazine of Natural History," series 4, vol. 8, 1871, p. 394; (L. Agassiz) Pourtalès, Illustrated Catalogue of the Museum of Comparative Zoology, vol. 4, No. 8, February 1874, pl. 10, figs. 1-9.

Type of *Holopus rawsoni* Gray, 1871.

In the British Museum.

##### 3. Barbados.

Originally in the collection of Sir Rawson W. Rawson.

This is the second specimen listed by Sir Wyville Thomson, which was boiled down to allow of the description of the disassociated parts.



Figured by P. H. Carpenter, "Challenger" Reports, part 32, Stalked Crinoids, 1884, pl. 3, figs. 1, 3-16; pl. 5, figs. 1-8.

Destroyed.

4. Barbados (Pl. I, figs. 4, 5).

Originally in the collection of Sir Rawson W. Rawson.

This is the third specimen listed by Sir Wyville Thomson, which was "quite perfect, but very young, only 8 mm. in height."

Figured by P. H. Carpenter, "Challenger" Reports, part 32, Stalked Crinoids, 1884, pl. 4, two figures.

In the British Museum.

5. Barbados (Pl. I, figs. 6, 7).

Collected by Wilderboer, the collector for Sir Rawson W. Rawson, after the latter had left Barbados.

This specimen was shown at the Philadelphia Exhibition, and afterwards purchased by the Museum of Comparative Zoology, Cambridge, Massachusetts.

Figured by P. H. Carpenter, "Challenger" Reports, part 32, Stalked Crinoids, 1884, pl. I, figs. 1, 2.

In the Museum of Comparative Zoology (Cat. No. 21).

6. Cuba; off Bahia Honda (23° 01' N. lat., 83° 14' W. long.); 100 fathoms. Dredged by the "Blake" in 1877, Station 22 (Pl. II, figs. 10, 11).

Figured by Pourtalès, Bulletin of the Museum of Comparative Zoology, vol. 5, No. 9, 1878, pl. 2 (opposite p. 213); P. H. Carpenter, "Challenger" Reports, part 32, Stalked Crinoids, 1884, pl. 5, figs. 9, 10.

In the Museum of Comparative Zoology (Cat. No. 22).

7. Montserrat; 120 fathoms; "Blake" Station 157.

An incomplete specimen, most of which was dissected by P. H. Carpenter; the only one ever examined before being dried.

Figured by P. H. Carpenter, "Challenger" Reports, part 32, Stalked Crinoids, pl. 5a, figs. 1-3, pl. 5b, figs. 1-5, 5c, figs. 1-3.

In the Museum of Comparative Zoology (Cat. No. 23; part of an arm).

8. Bermuda.

Mentioned by Sir Wyville Thomson in "The Atlantic," London, 1877, p. 321. P. H. Carpenter says: "During the stay of the "Challenger" at Bermuda Sir Wyville Thomson obtained



from a local collector 'a small worn and rounded fossil which seemed to be the cup of a crinoid allied to *Holopus*.' Prof. Moseley tells me that he thinks it was a recent specimen in the dry state; but since it has unfortunately been lost, I am unable to say anything as to its nature."

9. ? Locality (Pl. II, figs. 8, 9).

P. H. Carpenter says: "This was supposed by Mr. [Sir John] Murray to belong to Sir Rawson Rawson . . . .; but Sir Rawson Rawson does not recognize it as his, and I conclude, therefore, that it is the mutilated dry specimen which Prof. Agassiz informs me was sent by him to Sir Wyville with permission to cut it up for details."

It cannot be the same as No. 2, as it is not distorted, and has seven arms remaining instead of only six.

Figured by P. H. Carpenter, "Challenger" Reports, part 32, Stalked Crinoids, 1884, pl. 2, two figures; pl. 3, fig. 2.

Present location not known.

10. Barbados.

A specimen at present in the hands of a dealer at Bridgetown.

11. Barbados (Pl. III, figs. 12-16).

The specimen described below, in the author's collection now in the United States National Museum. It was obtained from a local dealer by the Messrs. Ward of Rochester, New York, from whom I purchased it about twelve years ago; it was said to have been picked up on the shore after a storm.

#### A NEW SPECIMEN OF *HOLOPUS RANGII*

The specimen is quite complete, having the normal number of arms, 4 in the bivium and 6 in the trivium. The color is a dull dark green. The height, measured from the base of attachment, is 35 mm.; diameter at zone of greatest width, 23 mm.

It is believed that a few figures of this specimen reproduced from photographs will furnish a useful addition to our knowledge of this singular form.

In view of the ample descriptions quoted in the preceding pages it seems unnecessary to describe the specimen in detail; but I would like to call attention to the oral plates, which are extremely well preserved, Carpenter's figure of them being as he said, "somewhat idealized." Although they lie within a dark



cavity, Dr. Wilson has succeeded by the use of a powerfully projected light in securing a photograph with sufficient enlargement to show the structure of these plates with a minuteness of detail never before obtained; the perforation by the water-pores is remarkably distinct. The depth and narrowness of the groove on the ventral surface of the arms, in which the soft structures lie, should also be noticed.



PLATES



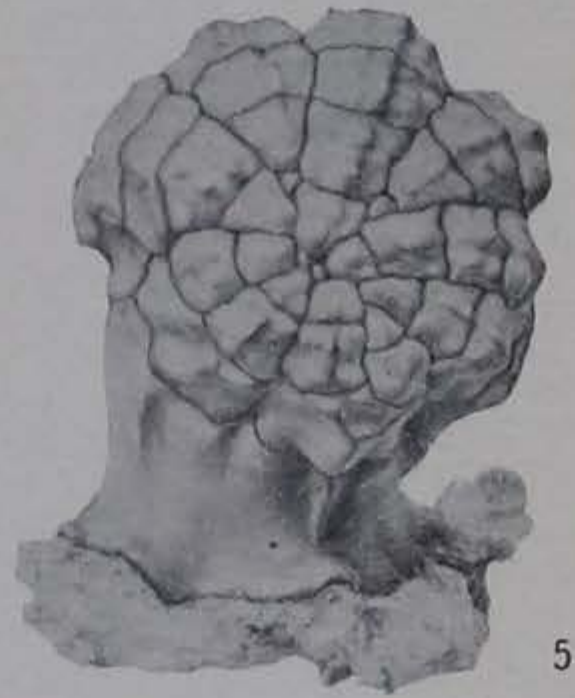
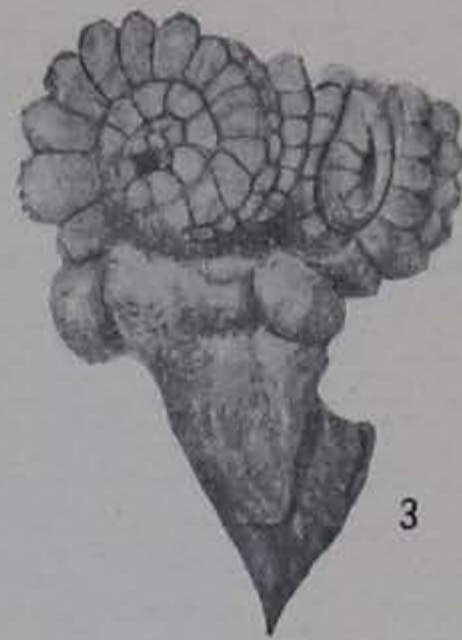
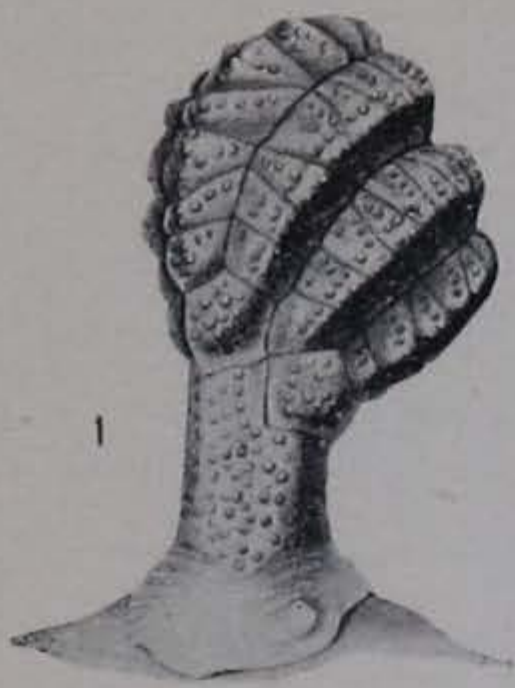
## PLATE I

### Figures of *Holopus* from various authors

- Fig. 1. The type specimen of *Holopus rangii*, from Martinique; No. 1 in the list of known specimens (from d'Orbigny).
- Fig. 2. The same specimen; transverse section of stalk to show the internal structure (from d'Orbigny).
- Fig. 3. The type specimen of *Holopus rawsoni*, from Barbados; No. 2 in the list of known specimens (from Gray after Rawson).
- Fig. 4. A young specimen from Barbados only 8 mm. in height; No. 4 in the list of known specimens (from P. H. Carpenter) x 5.
- Fig. 5. Another view of the same specimen (from P. H. Carpenter) x  $1\frac{1}{2}$ .
- Fig. 6. The largest specimen examined by Carpenter, from Barbados; No. 5 in the list of known specimens (from P. H. Carpenter) x  $1\frac{1}{2}$ .



PLATE I





## PLATE II

Figures of *Holopus* from various authors

- Fig. 8. A specimen of unknown origin; No. 9 in the list of known specimens (from P. H. Carpenter) x  $1\frac{1}{2}$ .
- Fig. 9. Another view of the same specimen (from P. H. Carpenter) x  $1\frac{1}{2}$ .
- Fig. 10. A very young specimen from Cuba, viewed from above; No. 6 in the list of known specimens (from Pourtalès) x 15.
- Fig. 11. The same specimen, viewed from the side (from Pourtalès) x 15.



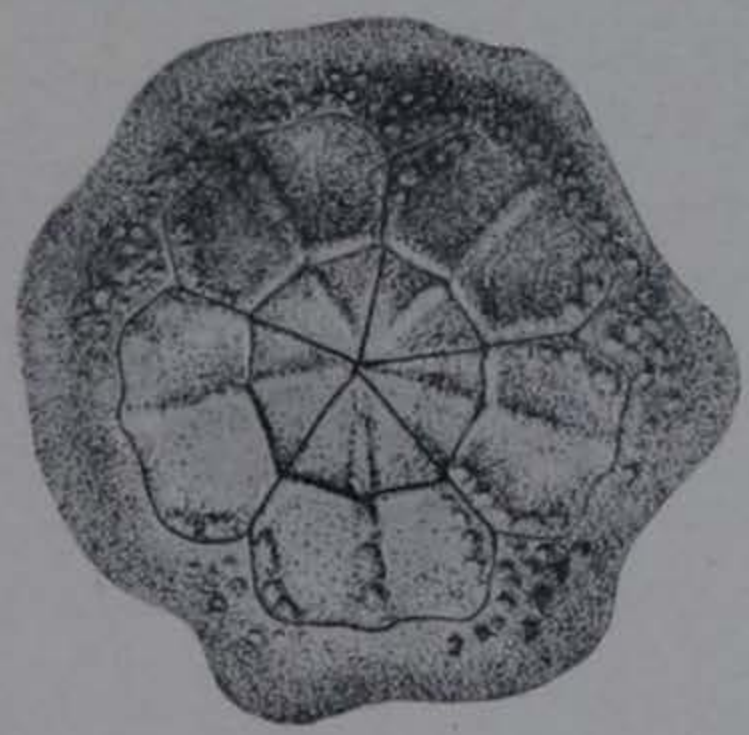
PLATE II



8



9



10



11



### PLATE III

A hitherto unrecorded specimen of *Holopus rangii* from Barbados

- Fig. 12. Lateral view of complete crown with encrusting base, from the trivial side. x 4/3
- Fig. 13. Lateral view of interior, with bivial and one trivial arms removed; showing position of orals within a deep cavity. x 4/3
- Fig. 14. Ventral view of same structures; articulating surface of brachials is well shown. x 4/3
- Fig. 15. The orals: unretouched photograph. Note the water-pores, and remnants of minute plates in the ambulacral furrows and some between the proximal ends of the orals and surrounding plates. x 5
- Fig. 16. Terminal part of an arm, showing the position of pinnules upon alternate brachials. x 8/3

The specimen is in the author's collection, now in the United States National Museum.



PLATE III



12



13



16



15



14



# REPORT ON THE MACRURA, ANOMURA AND STOMATOPODA

Collected by the Barbados-Antigua Expedition from the  
University of Iowa in 1918

WALDO L. SCHMITT

Curator of Marine Invertebrates, U. S. National Museum, Washington, D. C.

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## INTRODUCTION

Until now scarcely more than fifty<sup>1</sup> valid species of macruran, anomuran, and stomatopod crustacea have been recorded from or within the hundred fathom line off Barbados. Though the Expedition secured a little less than half, twenty, of these, it did return forty-one other valid species, four doubtful determinations, at least four "species?" and two distinct varietal forms, of which probably all except three from Antigua, noted below, constitute new records; these additions are:

*Penæopsis smithi* Schmitt  
*Sicyonia edwardsi* Miers  
*Leptochela carinata* Ortmann  
*Crangon candei* (Guérin)  
*Crangon barbadensis*, new species  
*Crangon cristulifrons* (Rathbun)  
*Crangon rathbunæ*, new species  
*Crangon verrilli*, new species  
*Crangon nuttingi*, new species  
*Crangon packardi* (Kingsley)  
*Crangon*, species ?  
*Synalpheus fritzmuelleri elongatus* Coutière  
*Synalpheus minus* (Say)  
*Synalpheus brevicarpus* (Herrick), variety?  
*Synalpheus mcclendonii* Coutière  
*Synalpheus pandionis* Coutière  
*Synalpheus herricki* Coutière?  
*Synalpheus*, species near *lavimanus* (Heller)  
*Synalpheus*, species?

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<sup>1</sup> Based on the reports cited in the Bibliography.



*Jousseaumea trigona* Rathbun  
*Automate kingsleyi* Hay  
*Trachycaris rugosus* (Bate)  
*Lysmata intermedia* (Kingsley)  
*Thor paschalis* (Heller)  
*Macrobrachium savignyi* (Bate)  
*Macrobrachium*, species?  
*Periclimenes antiguensis*, new species  
*Xiphocaris elongata* (Guérin)  
*Ortmannia serrei* Bouvier  
*Panulirus argus* (Latreille)  
*Petrolisthes marginatus* Stimpson  
*Petrolisthes jugosus* Streets  
*Petrolisthes amœnus* (Guérin)  
*Pisosoma riisei* Stimpson  
*Porcellana sayana* (Leach)  
*Porcellana soriata* Say  
*Pachycheles ackleianus* Milne-Edwards  
*Pachycheles pilosus* (Milne-Edwards)  
*Upogebia affinis* (Say)  
*Upogebia* (*Gebiopsis*) *operculata*, new species  
*Glypturus branneri* Rathbun  
*Glypturus acanthochirus* Stimpson?  
*Callianidea lævicauda* Gill  
*Paguristes grayi* Benedict  
*Clibanarius tricolor* (Gibbes)  
*Petrochirus bahamensis* (Herbst)  
*Dardanus venosus* (Milne-Edwards)  
*Catapagurus*, species?  
*Lepidopa scutellata* Stimpson?  
*Gonodactylus oerstedii* var. *curacaoensis* Schmitt  
*Gonodactylus oerstedii* var. *spinulosus*, new variety

As will be noted, there are included six apparently new species and one new variety: *Crangon barbadensis*, *C. rathbunæ*, *C. verrilli*, *C. nuttingi*, *Periclimenes antiguensis*, *Upogebia* (*Gebiopsis*) *operculata*, and *Gonodactylus oerstedii* var. *spinulosus*.

The twenty species — or their synonymical forms — which seem to have been listed as occurring at, or off Barbados, within the hundred fathom line, are:

*Crangon nigrospinatus* (Rankin)  
*Crangon formosus* (Gibbes)  
*Crangon cylindricus* (Kingsley)  
*Crangon armillatus* (Milne-Edwards)  
*Crangon bahamensis* (Rankin)



*Synalpheus longicarpus* (Herrick)  
*Tozeuma serratum* (Milne-Edwards)  
*Macrobrachium jamaicense* (Herbst)  
*Stenopus semilævis* von Martens  
*Parribacus antarcticus* (Lund)  
*Munida irrasa* Milne-Edwards  
*Munida iris* Milne-Edwards?  
*Petrolisthes galathinus* (Bosc)  
*Petrolisthes tridentatus* Stimpson  
*Petrolisthes magnifica* (Gibbes)  
*Megalobrachium poeyi* (Guérin)  
*Calcinus tibicen* (Herbst)  
*Cænobita clypeatus* (Herbst)  
*Hippa cubensis* (Saussure)  
*Gonodactylus oerstedii* Hansen

Three species not represented in the Barbados collections were taken at Antigua: *Sicyonia edwardsii* Miers, *Periclimenes anti-guensis*, new species, *Paguristes grayi* Benedict.

I am indebted to Dr. Mary J. Rathbun for helpful guidance in the determination of this collection, and to Professor Nutting for the opportunity afforded of studying it; in appreciation of these facts, I have named one of the several new species for each of them. The pen and ink drawings of the new species were made by Mr. J. F. Müller of the U. S. Bureau of Fisheries.

The types are in the Museum of the State University of Iowa.



## LIST OF SPECIES

## Order DECAPODA

## Family Peneidæ

*Penæopsis smithi* Schmitt

*Penæopsis smithi* Schmitt, Macruran, Anomuran and Stomatopod Crustacea, collected at Curaçao by Dr. C. J. van der Horst in 1920.

Bijdragen tot de Dierkunde, Amsterdam, XXIII (1924), p. 62, text figs. 1, 2.

Bathsheba; 8 ♂ 4 ♀. Pelican Island, tide pools, May 11; 2 ♀. English Harbor, 3; 1 ♂.

Of the four females taken at Bathsheba, the third abdominal somite of the two larger specimens, respectively 48 and 49 mm. in length, shows distinct though not at all prominent longitudinal carination for about the middle third of its length, or a little more. This carina, such as it is, is low and inconspicuous and does not rise above the general level of the surface of the somite, being scarcely more than indicated by two slight pubescent depressions one either side of the median line of the middle third of the dorsum, and very unlike the well marked, raised carina found on the third somite of *P. goodei*. This carina is not in evidence in the males, in the smaller, 28 and 38 mm. long, Bathsheba females, or in the two from Pelican Island, of which the larger, 45 mm. long, individual is about the size of the 43.5 mm. long, type female from Curaçao. It seems almost that the weak carination is but an indication of full maturity in the female sex. The distinctive thelycum, and the slender median point of the telson still sharply differentiate this species, as does to a lesser degree the non-carinated third abdominal somite of the males and younger females, and the weakly carinated third somite in the more mature females; the larger males, of more than 40 mm. in length do show a faint angle only, across the posterior end of the median line of the third abdominal somite, the merest suggestion of a carina, if it can be recognized as such at all.

*Sicyonia edwardsii* Miers

*Sicyonia edwardsii* Miers, Ann. Mag. Nat. Hist., (5), VIII (1881), p. 367. Milne-Edwards and Bouvier, Mem. Mus. Comp. Zoöl., XXVII, no. 3 (1909), p. 251, pl. 8, figs. 1-3.

English Harbor, electric light; 1 ♀.



Family **Pasiphaeidae***Leptochela carinata* Ortmann

*Leptochela carinata* Ortmann, Dekapoden u. Schizopoden, Ergeb. d. Plankton Exped., XLI (1893), pl. 4, fig. 1. Rathbun, Bull. U. S. Fish Comm., XX, pt. 2, 1900 (1901), p. 127.

Sta. 87; 1 ♀ ovig. Sta. 79; 1 ♀ ovig.

Family **Crangonidae***Crangon candei* (Guérin)

*Alpheus candei* Guérin, in La Sagrás Hist. Cuba, pt. 2, VII (1857), p. 19, pl. 2, fig. 9; Coutière, Proc. U. S. Nat. Mus., XXXVII (1910), p. 486, text fig. 1.

*Alpheus dentipes* Rathbun, Bull. U. S. Fish Comm., XX, pt. 2, 1900 (1901), p. 105.

*Alpheus candei* or *Crangon candei* Verrill, Trans. Conn. Acad. Sci., XXVI (1922), p. 68, text fig. 5b; pl. 19, figs. 3a-d; pl. 20, fig. 1; pl. 21, figs. 6, 6a; pl. 24, figs. 2-4; pl. 25, figs. 7, 8; pl. 29, figs. 1a-t.

Off the Castle, E. side Barbados, 1-4 fathoms; two specimens. Pelican Island, May 13; three specimens. From coral rock, May 31; two specimens.

Based on published descriptions there are few, if any, valid differences distinguishing this species from the Mediterranean *C. dentipes* of the same author.<sup>1</sup> The entire National Museum collection of Alpheids is in the hands of Dr. Coutière, Ecole Supérieure de Pharmacie, Paris, so it is not possible to add much regarding either species at this time. Coutière seems to have considered the Tortugas specimen he referred to *C. candei*, as quite distinct from *C. dentipes*, as he does not even mention the latter in his redescription of the former (*loc. cit.*).

The only possible difference that I am able to detect at the present time, in view of our limited knowledge of *C. candei*, is in the shape of the movable finger of the larger hand. Coutière figures this (*loc. cit.*, fig. 1 b, b<sup>1</sup>) as gradually tapering toward the more or less acuminate tip, which is much more slender, not as wide or thick as the finger is at the middle of its length; in *C. dentipes* it seems that the movable finger has a more or less swollen, blunt, or truncated end, the finger being at least as thick or thicker terminally than at the middle of its length. However this may be, Verrill appears to have had both types of hands represented among his Bermuda *candei*. His plate

<sup>1</sup> Guérin, Expéd. Sci. Morée, Zool., (1832), p. 39, pl. 27, fig. 3.



19, figures 3c and 3b, and plate 21, figure 6, show a tapering movable finger, while figures 3a, and 3d, on plate 19 seem to have the movable finger terminally blunt and swollen. They are so in the specimens I have here, and recently elsewhere<sup>2</sup> referred to this species.

Whether this difference is constant, and so of specific or at least of varietal value, or possibly dimorphic, I am unable to say. Guérin's figure of the movable finger, by the way, reproduced by Verrill (pl. 25, figure 8), might be of either character.

Coutière's specimen lacked the second legs; Verrill's drawing (*loc. cit.*, pl. 29, figs. 1 l', 1 l'' a) of one of the members of this pair agrees with the specimens before me, but the type of larger chela possessed by the specimen in question is not ascertainable from the text. As regards the legs of the third pair, in my specimens as in Verrill's the merus carries below at the distal end a small spine, and such a spine is also present in Coutière's *C. candei*, which I have examined, though not detected by him, for he described the merus as unarmed.

*Crangon barbadensis*, new species

Off the Castle, E. side Barbados, 1-4 fathoms (type locality); 2 ♂ 4 ♀ (2 ovig.). Off the Crane, Barbados, from old coral rock; 1 ♀. Pelican Island, Barbados, tide pool; two specimens.

This species is one of a small group having the outer margin of the antennal scale armed with a more or less forwardly directed spine or spine-like process. The only other species, similarly armed, of which I am aware, are *C. malleator* (Dana)<sup>3</sup> and *C. belli* Coutière<sup>4</sup> from Fernando Noronha. The front, rostral carina and orbital depressions somewhat resemble *C. cristulifrons* (Rathbun) (below, p. 73), though the carina is faintly discernible for a greater distance behind the posteriorly sharply demarked, orbital depressions; the orbital hoods are unarmed, being anteriorly rounded; the antennular peduncles are quite slender, the first joints are maybe one-third longer than the terminal ones, and the second about twice as long as the first, a little better than three times the third, and nearly four times as long as wide; in this respect our species differs markedly from *C. belli*, which is otherwise more nearly related possibly

<sup>2</sup> Macruran, Anomuran and Stomatopod Crustacea collected at Curaçao by Dr. C. J. van der Horst in 1920. *Bijdragen tot de Dierkunde*, Amsterdam, XXIII (1924), p. 64.

<sup>3</sup> Dana, *Crust. U. S. Expl. Exped.*, I (1852), p. 557; atlas, 1855, pl. 31, figs. 9a-h. Coutière, *Ann. Sci. Nat., Zool., Paris*, (8), IX, p. 146, text fig. 140, p. 219, fig. 262.

<sup>4</sup> *Bull. Soc. Ent. France*, (1898), p. 149, text figs. 1, 1a.



than any other species; *C. belli* has comparatively stout antennular peduncles, the longest, the middle joint being less than twice as long as wide, but equal to the length of the first, and one-half the third taken together; the antennular scale reaches but two-thirds the length of the basal joint of the peduncle, in *C. belli* about to the end; the basal antennal scale is longer, attaining about the distal margin of the first joint of the antennular peduncle; the antennal scale, though much shorter than the antennal peduncle is yet considerably longer than the antennular peduncle, exceeding it by a little more than the length of the distal joint, the scale is almost all "spine" as the blade is much reduced in size, and short; in *C. belli* the antennal scale about equals the antennal peduncle in length; the large hand is notched above and below; the fingers of the smaller chela about equal the palm in length, the movable one being more or less *Balaniceps*-shaped in the male; the carpal joints of the second legs diminish in the following order, 1, 2, 5, 4, 3; the first equals the second and third together, or a little more, the fourth is a little longer than the third, the fifth equals the combined length of the third and fourth articles or two-thirds of the second; here again *C. belli* differs markedly from our species, as Coutière says, the first carpal joint of the second legs equals two-thirds the length of the first; in our species the first is as long as the second and third together; the meri of the third and fourth legs are stout, and not spined beneath.

The telson is quite rectangular with a slightly convex, squarish, truncate end, and subparallel sides; it is deeply sulcate on the median line, and the dorsal spines are inserted on prominent longitudinal ridges, either side of the median groove; the 4.75 mm. long telson of the type is about 2.5 mm. wide at its distal extremity and 3 mm. wide proximally.

The carapace and rostrum of the male holotype from off the Castle, E. side of Barbados, measure 14 mm. long; abdomen and telson 20 mm., telson 4.75 mm. large hand 18 mm. long, 7 mm. wide; small hand 12.3 mm. long, 4 mm. wide.

*Crangon nigrospinatus* (Rankin)

*Alpheus nigro-spinatus* Rankin, Ann. N. Y. Acad. Sci., XI (1898), p. 249, pl. 30, fig. 6.

*Alpheus malleator* var. *edentatus* Zimmer, Zool. Jahrb., Suppl. 11, hft. 3, 1913, p. 387, text figs. G-M.

Off the Castle, E. side of Barbados, 1-4 fathoms; 1 ♂ 2 ♀. Off the Crane, Barbados, from old coral rock; one specimen. Barbados, from coral heads, June 4; four specimens.

Except in a few minor points the specimens before me agree well with Rankin's description. The rostral point is a little longer than the orbital spines and not just equal to them in length; on the inner side of either orbital spine there is a slight convexity in the frontal margin, the rounded border of the orbital hood passing over more abruptly into the inner margin



of the spine than on the outer side. The antennular scale, as figured by Rankin appears to be but half the length of the first joint of the peduncle, in our specimens it is almost as long as the first joint; basal antennal spine as long as the antennular scale not exceeding the first joint of the peduncle as in Rankin's figure. The groove on the outer surface of the immovable finger of the larger hand is more marked or evident than shown in Rankin's figure of the species. The second and fifth carpal articles of the second legs are each a little shorter than half the first; Rankin says a little longer than half the first, but in his figure, while the second article is about equal to half the first, the fifth is less than half.

Zimmer considered a specimen from Barbados, which undoubtedly represents this species, a variety of *C. malleator* (Dana).<sup>5</sup> Dana's species differs, however, in a number of important characters: the rostrum is quite flattened, broad and "under-cut" at the sides, in *nigrospinatus* it is but a dorsally blunt carina; the small accessory or secondary teeth on the orbital hoods, between the orbital hoods and the rostrum are well marked in specimens of *C. malleator* as small as 15 mm. long, in *nigrospinatus* the corresponding portion of the medial border of the orbital hoods shows no more than a slight convexity if that; the antennular scale is shorter than the first segment of the peduncle, the second segment is scarcely, if twice the length of the third; the basal antennal spine reaches nearly to the middle of the second segment of the antennular peduncle; the antennal scale is but very little longer than the antennular peduncle and shorter than the antennal peduncle, in *C. nigrospinatus* the spine of the scale is as long as the antennal peduncle being distinctly longer than the antennular peduncle. *C. malleator* is a very distinctive species by virtue of the outwardly directed, forward turned, process near the base of the outer margin of the antennal scale (already referred to, above, p. 70); this proximo-lateral angle has surely been exaggerated in Zimmer's figure (G) of his Barbados specimen, but even so, it is yet quite unlike the long tubercular, or spine-like basal projection of *C. malleator*; in *C. nigrospinatus*, this outer, proximal

<sup>5</sup> Crust. U. S. Expl. Exped., I (1852), p. 557, atlas (1855), pl. 31, figs. 9a-h.



angle of the antennal scale, is not at all noticeably produced; the groove which runs the length of the outer face of the immovable finger of the larger hand of *C. malleator* is longer than in *C. nigrospinatus* in that it extends back on to the palm for a distance about equal to its length in front of that point; moreover the upper margin and a considerable portion of the inner faces of both chelae are distinctly tubercular in *C. malleator*, and the same areas merely punctate in *C. nigrospinatus*, though hairy in both species; the dactyls of the ambulatory legs are biunguiculate in both species though the fact is not mentioned by Rankin, nor discernible in his figure of *C. nigrospinatus*.

*Crangon formosus* (Gibbes)

*Alpheus formosus* Gibbes, Proc. Amer. Assoc. Adv. Sci., III (1850), p. 196 [32]; Rathbun, Bull. U. S. Fish Comm., XX, pt. 2, 1900 (1901), p. 106.

*Alpheus panamensis* Zimmer, Zool. Jahrb., Suppl. 11, hft. 3, (1913), p. 391, text figs. N-V.

*Alpheus formosus* or *Crangon formosus* Verrill, Trans. Conn. Acad. Sci., XXVI (1922), p. 84, text fig. 5d, ? text fig. 6a; pl. 19, figs. 1, 2; pl. 20, fig. 3; pl. 23, fig. 5, a, b; pl. 20, fig. 4, a-u; pl. 25, figs. 6, 6a.

Pelican Island, tide pool, May 11; 1 ♀ ovig. Barbados, from coral heads; one specimen. English Harbor, 7; 1 ♀ ovig. English Harbor; one specimen.

The second and fourth specimens are without chelae, and though the rostra look somewhat like *C. panamensis* (Kingsley) as figured by Coutière,<sup>6</sup> the second legs by comparison are like the unmistakably *formosus* forms. What the relations of the carpal joints of the second legs of *C. panamensis*<sup>7</sup> are, I do not know.

*Crangon cristulifrons* (Rathbun)

*Alpheus obeso-manus* Pocock, Jour. Linn. Soc. London, Zool., XX (1890), p. 520, (*nec* Dana).

*Alpheus cristulifrons* Rathbun, Proc. Wash. Acad. Sci., II (1900), p. 152; Bull. U. S. Fish. Comm., XX, pt. 2, 1900 (1901), p. 106.

Okra Reef, Barbados, 16, May 13; three specimens. Barbados, May 15; 6 (3 ovig.). Barbados, May 22; one specimen.

<sup>6</sup> Ann. Sci. Nat., Zool. Paris, (8), IX (1899), p. 89, text fig. 50.

<sup>7</sup> Kingsley, Bull. U. S. Geol. Survey, IV, art. 8 (1878), p. 192.



*Crangon cylindricus* (Kingsley)

*Alpheus cylindricus* Kingsley, Bull. U. S. Geol. Survey, IV, art. 8, (1878), p. 192. Coutière, Ann. Sci. Nat., Zool., Paris, (8), IX (1899), p. 81, text fig. 44, p. 228, text fig. 278. Zimmer, Zool. Jahrb., Suppl. 11, hft. 3, (1913), p. 394.

D.S. 1, May 13; one specimen. D.S. 20; 2 (1 ovig.). Barbados, May 15; one specimen.

After examining the specimens here listed, with front and large chela closely approximating Coutière's figures, of which the first only is cited by Zimmer, I find I must have been mistaken recently<sup>8</sup> in thinking his specimens should be considered as *C. cristulifrons* (Rathbun). From this species *C. cylindricus* differs in having an unkeeled rostrum, a characteristic large chela, figured by Coutière (*loc. cit.*, text fig. 44), quite different from the rather *Synalpheus*-like hand, though with thick, curved, swollen finger, of *C. cristulifrons* not greatly unlike the hand of *C. crinitus* also figured by Coutière (*loc. cit.*, p. 226, text fig. 273); the second legs have differently divided carpi, in *C. cylindricus* as Kingsley has it, "carpus of second pair jointed, first pair equalling the following three; second as long as third and fourth which are equal, fifth longer than fourth," while in *C. cristulifrons* "the carpal joints of the second pair diminish as follows: Second, fifth, first, fourth and third; the second being as long as the third, fourth and fifth together" (Rathbun); in the latter the meri of the third and fourth legs are spined beneath, in the former they are unarmed.

*Crangon rathbunæ*, new species

D.S. 20; 3 (1 ovig.). Okra Reef, Barbados, May 13; 20 (7 ovig.). Barbados, May 15; 4 (1 ovig.). Needham's Point, Barbados, May 18; 5 (3 ovig.); the complete ♀ is the type. Barbados, coral rock, May 31; 9 (4 ovig.). Barbados from coral heads, June 4; 3 (1 ovig.).

A species which resembles some of the members of the *obeso-manus* group of "Alpheids,"<sup>9</sup> though the dactyl does not seem quite so typically hammer-shaped.

<sup>8</sup> Macruran, Anomuran and Stomatopod Crustacea, collected at Curaçao by Dr. C. J. van der Horst in 1920. Bijdragen tot de Dierkunde, Amsterdam, XXIII (1924), p. 65.

<sup>9</sup> Coutière, Ann. Sci. Nat. Zool., Paris (8), IX (1899), p. 351. De Man, Siboga Exped., monog. XXXIX a<sup>1</sup>, Decapoda, pt. 2, Alpheidæ, (1911), p. 307.



The emarginate front is very *Betaeus*-like, having much the shape and form of Bate's figures of his *C. malleodigitus* and *microstylus*,<sup>10</sup> especially the latter. The smooth, shining carapace is membranous, and subglobular or inflated to the extent of being strikingly Pontonid-like. For the sub-group to which this species is here assigned, the slender antennules and antennæ represent probably an extreme development; the median segment of the antennular peduncle is about six and one-half times as long as wide, about three times as long as the first, and four times the third segment; the flagella are about as long as the peduncle and nearly of the same length, the thicker being a little shorter than its companion; the antennal peduncle reaches about one-third the length of the median antennular segment, and its flagellum one-sixth its length beyond the longer, thinner, antennular flagellum; the antennal scale is more or less reduced though from two-thirds to three-fourths the length of the antennal peduncle, blade not differentiated from spine; the antennular scale likewise very small, being a mere basal lobule on the outer side of the first joint of the peduncle.

The more or less cylindrical larger hand is about three times as long as wide (high); the longer diameter of the movable finger is a little less than the distal width of the palm, in dorsal view behind the articulation of the finger; the larger hands of the smaller specimens are relatively more slender, more cylindrical, and with proportionately, slightly larger movable fingers; the smaller chela is long and slender in the few specimens retaining the first legs; this hand of the pair is as long as the palm of the larger hand from the articulation of the movable finger to the base; the slender, similar fingers of the smaller chela in length about equal two-thirds the palm. The first carpal joint of the second legs is about four-fifths of the second and longest; the third, fourth and fifth are nearly all of the same length, their combined length making up just half of the entire length of the carpus; the third is slightly shorter than the fourth and this in turn is a little less than the fifth in length; the chela is as long as the fourth and fifth joints taken together; the fingers equal about two-thirds the palm, or two-thirds of the entire hand in length. The meral joints of the ambulatory legs are unarmed beneath, that of the third legs being just a little better than three times as long as its greatest width.

The triangular telson is most peculiar for an Alpheid: there are no dorsal spines, and either margin is armed at about one-eleventh the length of the telson from the distal lateral angles, with a small spine; the end of the telson carries three pairs of spines of which the "sub"-median pair is the largest and the external the smallest; between the submedian spines there are about seven principal setae and a number of shorter ones; the greatest width of the telson near its base is just about three-fifths its length, the width of the distal extremity about one-seventh.

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<sup>10</sup> Challenger Rept., Zool., XXIV, [pt. 52] (1888), pp. 565 and 566, and pl. 101, figs. 5 and 6, respectively.



The specimens de Man<sup>11</sup> and Coutière<sup>12</sup> identify with Bate's *malleodigitus* and *microstylus* already referred to, are figured as showing small rostral points or projections; however, Coutière did have three specimens of the latter species with the emarginate front described by Bate as typical, Coutière thinks the latter anomalous in view of their limited occurrence in his material; in the thirty odd specimens of *C. rathbunæ* there are none with other than the emarginate front.

The ovigerous female, designated as the type is smaller than the dissected, figured specimen: the carapace is 5 mm. long, the abdomen and telson 11, telson 2.5; the large hand is 6.2 mm. long and 2.3 mm. wide; the small hand 4.2 mm. and its movable finger measured from the articulation to the tip 1.75 mm. long.

*C. baculifer* Coutière<sup>13</sup> is the only other species of the *obesomanus* sub-group having the meri of the third legs unarmed, these joints are three and six-tenths times as long as wide at the middle; the second joint of the second legs is little longer than the first, and about as long as the third and fourth together, the third is very little shorter than the fourth, which is subequal to the fifth; the cylindrical large hand is five and a half times as long as wide; and the median joint of the antennular peduncle is one and one-half times as long as either of the other two.

*Crangon armillatus* (Milne-Edwards)

*Alpheus armillatus* Milne-Edwards, Hist. Nat. Crust., II (1837), p. 354.  
Zimmer, Zool. Jahrb., Suppl. 11, hft. 3, (1912), p. 401, text figs. K<sup>1</sup>-T<sup>1</sup>.

*Alpheus heterochælis* Rathbun, Bull. U. S. Fish Comm., XX, pt. 2, 1900 (1901), p. 107 (pars).

*Alpheus armillatus* or *Crangon armillatus* Verrill, Trans. Conn. Acad. Sci., XXVI (1922), p. 73, text figs. 5a, 6b; pl. 20, fig. 4b; pl. 21, figs. 4, 4a; pl. 23, fig. 4; pl. 26, figs. 1-1d; pl. 27, figs. 1-1s, and synonymy.

Pelican Island, shallow; one specimen. Pelican Island, tide pool; one specimen. Pelican Island, tide pool, May 11; 6 (3 ovig.). Pillars of Hercules, English Harbor, 4; one specimen. Pillars of Hercules, English Harbor; 3 (1 ovig.).

<sup>11</sup> *Op. cit.*, pp. 347 and 344, and pl. 14, figs. 70 and 68, respectively.

<sup>12</sup> Fauna Maldive and Laccadive Archipelagoes, II, pt. 4 (1905), p. 886, pl. 77, fig. 25, and p. 884, pl. 76, fig. 23, respectively.

<sup>13</sup> Bull. Soc. Philom. (9), X (1908), p. 206 [16]; see also de Man *op. cit.*, p. 314.



*Crangon verrilli*, new species

*Alpheus armillatus* or *Crangon armillatus* Verrill, Trans. Conn. Acad. Sci., XXVI (1922), p. 76, pl. 48, figs. 2-2n (part: specimen referred to on page 76, as *armillatus* var., "No. 735-b").

Barbados, in dead *Strombus* shells, May 29; 2 (1 ovig.); the ovigerous female is the type.

A species closely related to the preceding, but distinctive enough to be readily recognized. The rostrum in both species has the form of a sharp crest, which in *C. armillatus* widens abruptly behind into a flattened triangular area, which may be a little undercut at the sides, but anteriorly is continuous with and about on the level with the rostral crest; in *C. verrilli* behind the rostral crest there is an abrupt inverted flattened U-shaped area deeply undercut at the sides, and anteriorly except just where it is joined by the rostral crest, this in profile is quite concave longitudinally, and lies noticeably below the level of the U-shaped area; on either side between the rostral crest and the orbital hoods are well marked orbital depressions distinctly limited behind by the  $\Delta$  area in *A. armillatus* and the  $\Omega$ -shaped area in *C. verrilli*. In the former the rostrum appears to run forward only about half the length of the visible portion of the basal antennular segment, in the latter about or nearly to the end of that segment.

The antennules and antennular scales are about the same in both species; the blade of the antennal scale seems to be slightly narrower in *C. verrilli* and the basal antennal spine a little longer.

The hands of the first legs, though very similar, are a little differently proportioned in the two species: measured on the outer face along the median longitudinal axis. The portion of the hand lying before the line connecting the notches in the upper and lower margins of the hands is just about as long as the posterior moiety; in *C. armillatus* the posterior portion is but about two-thirds as long as the anterior portion. The smaller hand in *C. verrilli* is three times, or a little more, as long as the greatest width of the palm; in *C. armillatus* the length is from two and two-thirds to not exceeding two and three-fourths the greatest width.

The carpal joints of the second legs appear to have about the same relative length in both species; the joints diminish as follows: First, second, fifth, fourth, third; the first is as long as the second and third together, the second is from two-thirds to three-fourths the length of the first, the fourth appears a little longer than the third, the fifth is equal to the fourth and nearly half the third together.

The carapace and rostrum of the ovigerous female holotype measure 15 mm. in length, the abdomen and telson 25, and the telson 5 mm. long; the larger chela is 16 mm. long and 6.5 mm. wide.

*Crangon bahamensis* (Rankin)

*Alpheus hipphotoë* var. *bahamensis* Rankin, Ann. N. Y. Acad. Sci., XI, no. 12 (1898), p. 247, pl. 20, fig. 5.



*Alpheus hippothoë* var. *edamensis* ? Zimmer, Zool. Jahrb., Suppl. 11, hft. 3, (1913), p. 405, text figs. U<sup>1</sup>-Z<sup>1</sup>.

*Alpheus bahamensis* Verrill, Trans. Conn. Acad. Sci., XXVI (1922), p. 70, pl. 20, figs. 6, 6a, pl. 28, figs. 1, a-11, 2, 3-31.

Barbados, from coral heads, June 4; 7 (4 ovig.).

*Crangon nuttingi*, new species

Barbados from coral heads, June 4; one specimen. Pelican Island, tide pool, May 11; three specimens. Pelican Island, shallow (type locality); 1 ♂ 1 ♀ ovig., 1 juv.

Near *C. bahamensis* (Rankin). The rostrum extends forward about to the distal margin of the basal segment of the antennular peduncle; it is carinated, and the carina extends back behind the orbital hoods for about half its length; anteriorly, the rostral crest is distinctly keeled and prominent, posteriorly though higher, is broader and less conspicuous; the orbital hoods are unarmed and the rostro-orbital depressions are not sharply delimited behind, going over more or less gradually into the dorsum of the carapace. The antennular scale is as long as the first segment of the peduncle or a little longer; the antennal scale is scarcely, if at all longer than the antennal peduncle, the blade only reaches about to, or a little past the middle of the distal segment of the antennular peduncle, in *C. bahamensis* on the other hand the spine of the scale is distinctly longer than either the antennular or antennal peduncles; the basal antennal spine is short in both species; their larger chelae do not differ noticeably; the upper distal angle of the merus of the larger cheliped of *C. bahamensis* is markedly produced forming a blunt, spine-like process as figured by Rankin, though described by him as a sharp spine; such a spine does occur at the anterior inner angle of the merus; in our species the upper distal angle is not at all produced, being rounded off, and there is no spine at the inner angle; the fingers of the smaller chela are about as long as the palm. The second pair of legs have the first carpal joint longer than the second, in fact equalling the combined length of the second, third, and fourth articles together, the second joint is a little longer than the fifth, about one-seventh longer, the third is a little longer than the fourth, the two together are scarcely longer than the fifth; in *C. bahamensis* the first joint is shorter than the second, about two-thirds or three-fourths its length, the second equals the third, fourth, and half the fifth joints together, the third is a little shorter than the fourth which is in turn a little shorter than the fifth, the third is about two-thirds the length of the fifth joint, the fourth about three-fourths. The meri of the third and fourth legs are unarmed below, thus differing from *C. bahamensis* in which they are armed; the dactyls are simple in both species.

The carapace and rostrum of the male holotype together equal 14 mm. the abdomen and telson, 20.5, and the telson 4 mm.; the large hand is 20 mm. long by 8 wide, at widest point, the small hand is 10.5 mm. long by 3.5 mm. the greatest width of the palm.



This species differs from *C. heterochælis*, with which it also might be confused, in having a sharply carinated and longer rostral crest; the rostral crest too, is higher, rising just behind the orbital hoods and a little above their level, the hoods themselves are more abruptly domed, making the orbito-rostral depressions appear deeper and more sharply defined than in *C. heterochælis*. Furthermore, in the latter the blade of the antennal scale is about or nearly as long as the spine, distally truncate, bluntly rounded off, and three or four times wider than the adjacent portion of the spine; both blade and spine exceed the antennular peduncle; in *C. nuttingi* the spine exceeds the antennular peduncle a little and exceeds the blade considerably, the latter reaching about to the middle of the last segment of the antennular peduncle, distally it is sharply rounded off and narrow, scarcely wider than the adjacent portion of the spine. Paralleling the lower margin, on the inner face of the larger hand of *C. heterochælis* there is a distinct sulcus running from the notch to the articulation of the carpus, of which there is no trace in *C. nuttingi*, the inner face of the hand being merely a little flattened above the lower margin; moreover, the inner face of the fingers, and anterior portion of the palm are very hairy, while in *C. heterochælis* the hairs are few, and mostly marginal, so that the inner face of the hand is practically naked; in these particulars the larger hand of our species is like that of *C. armillatus*.

*Crangon packardii* (Kingsley)

*Alpheus packardii* Kingsley, Proc. Acad. Nat. Sci. Phila., XXXI, 1879 (1880), p. 417; Bull. Essex Inst., Salem XIV (1883), p. 118 [14], pl. 2, fig. 2. Zimmer (spelled *packardii*), Zool. Jahrb., Suppl. 11, hft. 3, (1913), p. 409, text figs. A<sup>2</sup>-G<sup>2</sup>.

*Alpheus packardii* or *Crangon packardii*, Trans. Conn. Acad. Sci., XXVI (1922), p. 80, pl. 20, figs. 2, 5; pl. 21, fig. 5; pl. 22, fig. 7; pl. 23, figs. 6c-d; pl. 25, figs. 4, a, b; pl. 31, figs. 1, b-l, 2, b-u, 3, u, t.

D.S. 1, May 13; one specimen. Barbados, from coral heads, June 4; one specimen.

*Crangon*, species ?

English Harbor, two incomplete specimens; front near *C. cylindricus* (above) but with much more slender ambulatory legs.

*Synalpheus fritzmuelleri elongatus* Coutière

*Synalpheus fritzmuelleri* Coutière, Proc. U. S. Nat. Mus., XXXVI (1909), p. 35, text figs. 18, 19. Zimmer, Zool. Jahrb., Suppl. 11, hft. 3, (1913), p. 382.

Okra reef, Barbados, May 13, 16; 8 (2 ovig.). Pelican Island, May 13; four specimens. Barbados, May 15; 16 (7 ovig.). Needham's Point, Barbados, May 18; 3 (1 ovig.). Barbados, May 22; four specimens. Barbados, coral rock, May 31;



3 (1 ovig.). Barbados from coral heads, June 4; 7 (4 ovig.). Barbados, 51; 1 ♀ ovig.

*Synalpheus minus* (Say)

*Alpheus minus* Say, Jour. Acad. Nat. Sci. Phila., I (1818), p. 245.—  
Coutière, Proc. U. S. Nat. Mus., XXXVI (1909), p. 43, text figs. 25-27.  
? *Synalpheus minus* Zimmer, Zool. Jahrb., Suppl. 11, hft. 3, (1913), p. 382.

Off Lord's Castle, Barbados, from sponges, 4-6 fathoms; four specimens. Off Lord's Castle, Barbados, from sponge in which strange tube dwelling annelid was found; one specimen. Off the Castle, E. side Barbados, 1-4 fathoms; 2 (1 ovig.). Barbados, from coral heads, June 4; four specimens.

*Synalpheus brevicarpus* (Herrick), variety ?

*Alpheus saulcyi* var. *brevicarpus* Herrick, Mem. Nat. Acad. Sci., V (1891), p. 383.  
*Synalpheus brevicarpus* Coutière, Proc. U. S. Nat. Mus., XXXVI (1909), p. 50, text figs. 29, 30.

Okra Reef, Barbados, May 13; four specimens. Pelican Island, Barbados, May 13; one specimen.

These specimens in many ways seem to represent *S. minus antillensis*, but having the *S. brevicarpus guerini* rostrum and lacking a spine on the upper angle of the basicerite, it seems that they had best be considered as a variety of *S. brevicarpus*.

In this connection I have examined specimens in the collections of the U.S. National Museum determined by Prof. Coutière. It appears that some of the specimens labelled *S. minus* have the basicerite more as in his figure of *S. brevicarpus guerini*, and that in the specimens of the type lot of the latter, that the basicerite is spined above as figured for *S. minus antillensis*. Did not the rostra of these several specimens so closely resemble the figures whose labels they bear, I would be inclined to think that they had become interchanged.

Having such a well developed spine at the upper angle of the basicerite, Coutière's specimens are *S. saulcyi* (Guérin) more certainly than he suspected at the time (*op. cit.*, p. 52).

*Synalpheus longicarpus* (Herrick)

*Alpheus saulcyi* var. *longicarpus* Herrick, Mem. Nat. Acad. Sci., V (1891), p. 383 (part).  
*Synalpheus longicarpus* Coutière, Proc. U. S. Nat. Mus., XXXVI (1909), p. 53, text figs. 31, 32.—Zimmer, Zool. Jahrb., Suppl. 11, hft. 3, (1913), p. 384, text fig. B.

Barbados, May 15; one specimen. D.S. 20; one specimen.



*Synalpheus mcclendoni* Coutière

*Synalpheus mcclendoni* Coutière, Proc. U. S. Nat. Mus., XXXVII (1910), p. 487, p. 3.

D.S. 1; 5 specimens.

*Synalpheus pandionis* Coutière

*Synalpheus pandionis* Coutière, Proc. U. S. Nat. Mus., XXXVI (1909), p. 67, text fig. 39.—Zimmer, Zool. Jahrb., Suppl. 11, hft. 3, (1913), p. 385, text figs. C-E.

Okra Reef, Barbados, 16, May 13; three specimens.

? *Synalpheus herricki* Coutière

*Synalpheus herricki* Coutière, Proc. U. S. Nat. Mus., XXXVI, 1909, pl. 71 text fig. 44.

Barbados; one specimen.

The smaller hand is wanting, and though not unlike *S. brooksi* Coutière (*op. cit.*, p. 69), the larger chela is not spined anteriorly as it is in that species; moreover the spines on the telson are larger and the joints of the antennular peduncle a little more slender than in *S. brooksi*.

? *Synalpheus*, species near *lavimanus* (Heller)

*Synalpheus lavimanus* Coutière, Proc. U. S. Nat. Mus., XXXVI (1909), p. 66, text fig. 38.

Needham's Point, Barbados, May 18; one specimen.

The front is like that figured by Coutière for *S. goodei occidentalis* (*op. cit.*, p. 59, and text fig. 34) but the telson has a wider posterior margin and the outer border of the outer branch of the uropods is not serrulate; the blade of the antennal scale is relatively as long as in the figured male of *S. goodei* Coutière (*op. cit.*, p. 58, text fig. 1a) and the sharp almost spinous upper angle of the basicerite is similarly produced.

*Synalpheus*, species ?

(incomplete specimens not determined).

D.S. 1; one specimen. D.S. 20; one specimen. D.S. 78; three specimens (dried). Needham's Point, Barbados, May 18; one specimen.

*Jousseaumea trigona* Rathbun

*Jousseaumea trigona* Rathbun, Bull. U. S. Fish Comm., XX, pt. 2, 1900 (1901), p. 111, text fig. 21.

Barbados, in *Strombus* shells, May 29; one specimen without legs.



*Automate kingsleyi* Hay

*Automate kingsleyi* Hay, Proc. Biol. Soc. Washington, vol. 30, 1917, p. 72. Hay and Shore, Bull. U. S. Bur. Fisheries, XXXV, 1915-16, (1918), p. 387, text fig. 10.

Pelican Island, Barbados, tide pool; one specimen. Pillars of Hercules, English Harbor; two specimens.

This species is not unlike *C. evermanni* Rathbun,<sup>14</sup> but as the first and second legs are more like those of the species described by Hay, I have so determined them.

## Family Hippolytidae

*Trachycaris rugosus* (Bate)

*Platybema rugosus* Bate, Challenger Rept., Zool., XXIV, [pt. 52], (1888), p. 579, pl. 104, fig. 2.—Rathbun, Bull. U. S. Fish. Comm., XX, pt. 2, 1900 (1901), p. 113.

*Trachycaris rugosus* Calman, Ann. Mag. Nat. Hist. (7) XXVII (1906), p. 33, in "Notes on some Genera of the Crustacean Family Hippolytidae."

English Harbor, 8; one specimen.

*Lysmata intermedia* (Kingsley)

*Hippolysmata intermedia* Kingsley, Proc. Acad. Nat. Sci. Phila., XXX (1878), p. 90 [2].—Rathbun, Bull. U. S. Fish. Comm., XX, pt. 2, 1900 (1901), p. 116.—Rapport van de Visscherij en de Industrie van Zee producten in de Kolonie Curaçao, uitgebracht door Prof. Dr. J. Boeke, pt. 2 (1920), p. 322, [6].

*Lysmata intermedia* Kemp, Rec. Indian Mus., X, pt. 2, no. 4 (1914), p. 112.

D.S. 20; one specimen; Barbados, 7; one specimen.

*Thor paschalis* (Heller)

*Hippolyte paschalis* Heller, Sitzb. Akad. Wissen., Wien, XLIV (1861), p. 276, pl. 3, fig. 24.

*Thor floridanus* Kingsley, Proc. Acad. Nat. Sci. Phila., XXX (1878), p. 95 [7].—Rathbun, Bull. U. S. Fish. Comm., pt. 2, 1900 (1901), p. 116.—Rapport van de Visscherij en de Industrie van Zeeproducten in de Kolonie Curaçao, uitgebracht door Prof. Dr. J. Boeke, pt. 2 (1920), p. 323 [7].—Verrill, Trans. Conn. Acad. Sci., XXVI (1922), p. 135, pl. 35, figs. 2-2f; pl. 41, fig. 1; pl. 46, figs. 2-2e; pl. 47, figs. 4, 4a.

*Thor paschalis* Kemp, Rec. Indian Mus., X (1914), p. 95, pl. 1, figs. 6-10 and synonymy.—Rec. Indian Mus., XII (1916), p. 387.

Barbados, Needham's Point, diver; one specimen. Barbados Sea, anemones; one specimen.

D.S. 78; one specimen (dried).

<sup>14</sup> Bull. U. S. Fish. Comm., XX, pt. 2, 1900 (1901), p. 112, text fig. 22.



*Tozeuma serratum* Milne-Edwards

*Tozeuma serratum* A. Milne-Edwards, Ann. Sci. Nat., Zool., Paris, (6), XI, art. 4 (1881), p. 16; Recueil de Figures de Crustacés nouveaux ou peu connus, pl. 29, 1883.

D.S. 79; one specimen.

## Family Palæmonidæ

*Macrobrachium jamaicense* (Herbst)

*Cancer (Astacus) jamaicensis* Herbst, Naturg. d. Krabben u. Krebse, II (1792), p. 57, pl. 27, fig. 2.

*Bithynis jamaicensis* Rathbun, Bull. U. S. Fish. Comm., XX, pt. 2, 1900 (1901), p. 123.

*Macrobrachium jamaicense* Rathbun, Proc. U. S. Nat. Mus., XXXVIII (1910), p. 561, pl. 51, fig. 1.

Bathsheba, freshwater; 1 ♂. Scotland valley, Barbados, freshwater stream; 1 ♂.

*Macrobrachium savignyi* (Bate)

*Brachycarpus savignyi* Bate, Challenger Rept., Zool., XXIV (1888), p. 795, pl. 129, fig. 4.

*Bithynis savignyi* Rathbun, Bull. U. S. Fish Comm., XX, pt. 2, 1900 (1901), p. 124.

*Palæmon savignyi* Verrill, Trans. Conn. Acad., XXVI (1922), p. 145, text fig. 11.

*Macrobrachium savignyi* Rathbun, Rapport van de Visscherij en de Industrie van Zeeproducten in de Kolonie Curaçao, uitgebracht door Prof. Dr. J. Boeke, pt. 2 (1920), p. 324 [8].

Needham's Point, Barbados, May 18; two specimens.

? *Macrobrachium*, species

Indian River, Barbados, May 21; three specimens.

Without the legs of the second pair which are wanting in each of these specimens, it is not possible to determine them satisfactorily. A rostral count gives 14 for two of the specimens and 15 for the third. One of the former is the largest of the three and measures about 27 mm. long; the rostrum is longer than the antennular peduncle and just about as long as the antennal scale, four of the dorsal teeth are on the carapace; the rostra are rather straight, the apices of the dorsal teeth being in about the same line which is inclined a little downwards from the third tooth to the tip; the first tooth is a little lower than the second, and the tip of the second is just below the level of the apex of the third which is the highest of the series. The shorter ramus of the bifurcate antennular flagellum is composed of 5-6 fused and 15-16 free articles; in one of the



specimens the latter count rises to 20. The mandible has a three jointed palp. The hepatic spine is well developed, and as characteristic of the genus, is situated a little below and not far behind the antennal spine. The fingers and palm of the first legs are subequal, the carpus is about twice as long as the chela and about equal to the merus in length; the dactyls of the last three pairs of legs are simple, long and slender, about one-fourth the length of the propodus. The telson is about as long as half the fifth and the sixth segments of the abdomen taken together.

*Periclimenes antiguensis*, new species

English Harbor, Antigua, electric light, July, 1918; 1 ♂ holotype.

Rostrum straight, distally a little upturned, as long as rest of carapace, and about two and a half times as long as the antennular peduncle; armed above with nine teeth, of which the first is about over the distal margin of the second segment of the antennular peduncle; dorsal teeth regularly spaced, distance from last tooth to the acute tip twice that between last tooth and the penultimate one; below there are six teeth, the first of which is about under the third dorsal and the last a little in advance of the last dorsal, the second is under fifth dorsal and the third, fourth and fifth about under the intervals between the sixth, seventh, eighth and ninth teeth above; behind the first dorsal tooth the upper margin of the rostrum broadens out to form an elongate, narrow-triangular, flattened area on a level and confluent with the dorsum of the carapace; supra-orbital or rather orbital "spine" a blunt prominence, the anterior margin of which in dorsal view forms approximately a right angle with its lateral margin which is parallel to the longitudinal axis of the carapace; apex of the angle slightly produced, and blunt, a little behind the anterior margin of the carapace, and about in line, in lateral view, with the lower margin of the eye-stalk; antennal spine well developed, hepatic spine wanting.

Basally the upper, outer, thicker antennular flagellum appears considerably swollen, due to the short, thick, closely apposed accessory or secondary "flagellum" which it carries; this apparently is made up of four free segments, in addition to, possibly, two or three others which are fused with the primary flagellum; the enlarged external view of the right antennule with respect to the greater part of the base of the bifurcate flagellum is largely tentative, as the mass of thick hairs covering the lateral face of the accessory flagellum made it virtually impossible to satisfactorily determine the exact segmentation; just before the beginning of its distal third the lower, medial margin of the basal segment of the antennular peduncle carries a stout spine; the eyestalk reaches about to the middle of the second segment; the second segment of the peduncle



is about half as long as the third, and the second and third together equal a little more than half, but not two-thirds the length of the visible portion of the first segment; the antennal peduncle is shorter than the eye-stalk, and in ventral view fails of reaching the distal margin of the basal segment of the antennular peduncle; antennal scale when directed straight forward about reaching the penultimate, dorsal, rostral tooth, the sharply angled inner, anterior "corner" of the blade is produced a little in advance of the spine.

The mandible is without a palp, and the third of the three maxillipeds alone, without an exopodite; the second, left maxilla somehow strayed in dissection, and the figured right seems to have lost its inner lobe or lobes, if present at all, though I suppose they must have been.

Chela of first legs slightly longer than the carpus and about seven-eighths the length of the merus; fingers a little more than two-thirds of the palm; there is a tuft of short hairs near the inner, ventral, posterior angle of the palm and another on the infero-distal angle of the carpus; only the left leg of the second pair is present, its fingers are long and slender, hooked at the tips and without teeth on their cutting edges, the movable finger is a little longer than the rest of the hand and the carpus taken together, the carpus two-fifths the length of the palm and very little longer than deep, merus a little more than four times the length of the carpus; ambulatory legs similar, dactyls slender, biunguiculate, without basal protuberance; dactyl of third leg slender, about two-fifths the length of the propodus and nearly half as long as the carpus; the carpus equals three-fourths the length of the propodus and about half or slightly more than half the length of the merus; propodus armed below with eight spines, including the one at the infero-distal angle.

The fifth and sixth abdominal somites are about of equal length, either being slightly less than half the length of the telson; abdominal pleura rounded beneath; telson long and narrow, tapering to the distal margin which is but one-fourth the width of the base of the telson; medially the telson is deeply sulcate, on the lateral ridges thus formed, there are two pairs of dorsal spines, the distal pair of which is just before the middle and the proximal pair at about one-sixth the length of the telson from its base; the sides, lateral margins, are about perpendicular to the dorsal surface; the distal margin of the telson is armed with two stout movable spines, attached to the middle of either half of the posterior margin, in width equalling one-fourth the length of the margin, and in length slightly exceeding it; at either postero-lateral angle is a small, slightly, inwardly curved spine in length equalling half the width of the adjacent large spine; between the pair of large spines are two slender, broken spines, or thick, stiff hairs diverging from either side of the slightly peaked mid-point of the posterior margin, the remaining portion of the longer of these slender spines is as long as the basal width of the large spines; the dorsal spines of the telson though as long as the posterior large spines, are much more slender, being half or less than half as thick or stout.



This species is put in the genus *Periclimenes* (*sensu lato*) for want of more suitable one. In Kemp's "Key to the genera of Pontoniinae"<sup>15</sup> it falls in the same section with *Pontonides* and *Balssia* to either of which it certainly does not belong, though the third maxilliped is not unlike that of the former figured by Borradaile.<sup>16</sup> Except for the lack of the exopodite on this member, the species is more nearly a *Periclimenes* than otherwise. The bifurcation of the thicker antennular flagellum, the anteriorly sharply angled blade of the antennal scale, the absence of the hepatic spine, the long slender fingers of the second leg in conjunction with a short carpus, and the occurrence of both pairs of dorsal spines on the proximal half of the telson are somewhat unusual for the genus. The posteriorly flattened, dorsal margin of the rostrum bears some resemblance to that presented by Borradaile's dorsal view of *Periclimenæus fimbriatus*.<sup>17</sup>

The carapace and rostrum of the male holotype are each 4 mm. long, abdomen and telson 11 mm., and the telson alone 3 mm. long.

#### Family **Atyidæ**

##### *Xiphocaris elongata* (Guérin)

*Hippolyte elongata* Guérin, in La Sagra's Hist. Cuba, VII (1857), p. 20; VIII, pl. 2, fig. 16.

*Xiphocaris elongata* Rathbun, Bull. U. S. Fish Comm., XX, pt. 2, 1900 (1901), p. 118.

Indian River, Barbados; four specimens. Fresh-water, north of Bridgetown, Barbados; six specimens.

##### *Ortmannia serrei* Bouvier

*Ortmannia serrei* Bouvier, Bull. Mus. Hist. Nat., Paris, vol. 15, 1909, pp. 331, 332 [3, 4].

Bridgetown Beach, Barbados; one ovigerous female.

#### Family **Stenopidæ**

##### *Stenopus semilævis* von Martens

*Stenopus semilævis* von Martens, Archiv f. Naturg., XXXVIII (1872), p. 144.—Rankin, Ann. N. Y. Acad. Sci., XI, no. 12 (1898), p. 241, pl. 39, fig. 2.

English Harbor, 1; one specimen. English Harbor; one ovigerous female. Pelican Island, tide pool, May 11; one specimen.

#### Family **Palinuridæ**

##### *Panulirus argus* (Latreille)

*Palinurus argus* Latreille, Ann. Mus. Hist. Nat., Paris, III (1804), p. 393.

<sup>15</sup> Rec. Indian Mus., XXIV, pt. 2 (1922), pp. 119-121.

<sup>16</sup> Trans. Linn. Soc. London, (2), Zool., XVII, pt. 3 (1917), pl. 57, fig. 28.

<sup>17</sup> *Op. cit.*, pl. 55, fig. 19b.



*Panulirus argus* Rathbun, Bull. U. S. Fish Comm., XX, pt. 2, 1900 (1901), p. 98.—Verrill, Trans. Conn. Acad. Sci., XXVI (1922), p. 7, text fig. 1, pl. 1, fig. 1; pl. 2, figs. 1, 2; pl. 3, figs. 1, 2; pl. 3a, figs. 2-6; pl. 8, figs. 2, 2a; pl. 9, fig. 1.

From fish pot near Pelican Island; 1 ♂, measured from tips of supraocular horns to end of telson, 170 mm. long.

Bathsheba, Barbados; one specimen of "puerulus," or natant stage; very probably this species.

### Family Scyllaridæ

#### *Parribacus antarcticus* (Lund)

*Scyllarus antarcticus* Lund, Skrivter af Naturhistorie-Selskabet, Copenhagen, II, hft. 2 (1793), p. 22.

*Cancer (Astaous) ursus major* Herbst, Naturg. d. Krabben u. Krebse, II (1793), p. 82, pl. 30, fig. 2.

*Parribacus antarcticus* Dana, Crust. U. S. Expl. Exped., I (1852), p. 517; pl. 32, fig. 6. 1855.

*Parribacous ursus major* de Man, Siboga Exped., Decapoda, pt. 3, monog. XXXIXa<sup>2</sup>, . . . Scyllaridæ . . ., p. 93.

Barbados, H; 1 ♂.

I have preferred not to follow de Man in changing the long used name of this species. There is no indication in either the work of Herbst or Lund, as to which is the earlier; current usage is certainly in favor of Lund's *antarcticus*.

### Family Galatheidæ

#### *Munida irrasa* Milne-Edwards

*Munida irrasa* A. Milne-Edwards, Bull. Mus. Comp. Zool., VIII (1880), p. 49.—Benedict, Proc. U. S. Nat. Mus., VIII (1902), pp. 251, 310.

*Munida caribæa* A. Milne-Edwards, Bull. Mus. Comp. Zool., XIX, no. 2 (1897), p. 25, pl. 1, figs. 16-20; pl. 2, fig. 1.

D.S. 3; two specimens. D.S. 7, Barbados, May 16; one specimen. D.S. 18; one specimen. Sta. 7, Barbados; four specimens. Sta. 49; two specimens. Sta. 51; two specimens. Sta. 59; two specimens. Barbados; two specimens.

Mostly small young specimens.

#### ? *Munida iris* Milne-Edwards

*Munida iris* A. Milne-Edwards, Bull. Mus. Comp. Zool., VIII (1880), p. 49.

Milne-Edwards and Bouvier, Mem. Mus. Comp. Zool., XIX, no. 2 (1897), p. 21, pl. 2, figs. 2-7.—Benedict, Proc. U. S. Nat. Mus., XXVI (1902), pp. 251, 310.

D.S. 1, May 13; one specimen. Sta. 42; one specimen (fragment). Sta. 78; one specimen (dried).

These are all small, probably juvenile specimens without the



chelipeds, which because of the armature of the first abdominal somite are placed here.

### Family Porcellanidæ

#### *Petrolisthes galathinus* (Bosc)

*Porcellana galathina* Bosc, Hist. Nat. Crust., I 1802, p. 233, pl. 6, fig. 2.

*Petrolisthes sexspinosus* Rathbun, Ann. Inst. Jamaica, I, no. 1 (1897), p. 40.—Proc. Wash. Acad. Sci., II (1900), p. 145.—Benedict, Bull. U. S. Fish Comm., XX, pt. 2, 1900 (1901), p. 133.

*Petrolisthes galathinus* Rathbun, Rapport van de Visscherij en de Industrie van Zeeproducten in de Kolonie Curaçao, uitgebracht door Prof. Dr. J. Boeke, pt. 2 (1920), p. 327 [11].—Milne-Edwards and Bouvier, Mem. Mus. Comp. Zool., XLVII, no. 4 (1923), p. 289, pl. 1, figs. 1, 2.

D.S. 20; 1 ♀ ovig. Okra Reef, May 13; 6 (2 ovig.). Barbados, May 15; one specimen. Barbados, May 22; one specimen. Old coral, May 31; 2 (1 ovig.).

Off the Castle, E. side Barbados; one specimen.

#### *Petrolisthes tridentatus* Stimpson

*Petrolisthes tridentatus* Stimpson, Ann. Lyc. Nat. Hist. N. Y., VII, 1859 (1860), p. 75 [29], pl. 1, fig. 4.—Benedict, Bull. U. S. Fish Comm., XX, pt. 2, 1900 (1901), p. 134, pl. 3, fig. 2.—Milne-Edwards and Bouvier, Mem. Mus. Comp. Zool., XLVII, no. 4 (1923), p. 291.

Needham's Point, Barbados; two specimens. English Harbor; 4 (3 ovig.). Pillars of Hercules, English Harbor; 3 (1 ovig.).

#### *Petrolisthes marginatus* Stimpson

*Petrolisthes marginatus* Stimpson, Ann. Lyc. Nat. Hist. N. Y., VII, 1859 (1860), p. 74 [28].—Benedict, Bull. U. S. Fish Comm., XX, pt. 2, 1900 (1901), p. 134, pl. 3, fig. 1.

Okra Reef, Barbados, May 13; 4 (2 ovig.). Barbados, May 15; 8 (3 ovig.). Barbados, old coral, May 31; 3 (2 ovig.). Barbados, from coral heads, June 4; two specimens.

In alcohol, salmon color marked with reddish flecks usually along margins and on tubercles of chelipeds. Legs more or less banded with red, one on propodus, two on carpus, with red fleck, rather spot, on upper anterior margin of merus.

#### *Petrolisthes jugosus* Streets

*Petrolisthes jugosus* Streets, Proc. Acad. Nat. Sci. Phila., XXIV (1872), p. 134.—Benedict, Bull. U. S. Fish Comm., XX, pt. 2, 1900 (1901), p. 134.

D.S. 1, May 13; 2 (1 ovig.). Okra reef, Barbados, May 13; 1 ♀ ovig. Barbados, May 15; 19 (13 ovig.). Old Coral, Bar-



bados, May 31; 6 (3 ovig.). From coral heads, June 4; 11 (7 ovig.).

In coloration this species resembles *P. riisei* (below), has carapace lighter, finely speckled with white, meral joints of legs speckled, and others banded about midway. Abdomen speckled with white, like carapace, but median, intestinal line white.

*Petrolisthes amoenus* (Guérin)

*Porcellana amoena* Guérin, in La Sagra's Hist. Cuba, pt. 2, VIII, atlas (1857), pl. 2, fig. 2.

*Petrolisthes* ? *amoenus* Benedict, Bull. U. S. Fish Comm., XX, pt. 2, 1900 (1901), p. 135, pl. 3, fig. 3.

D.S. 20; 2 ovig.

Engineers Pier, Barbados, 15-20 feet, from gorgonians; two specimens. Needham's Point, Barbados, May 18; 10 (3 ovig.). Off Needham's Point, from sponges, May 18, 20-25 feet; 6 (1 ovig.). Barbados, May 22; 3 (1 ovig.).

*Petrolisthes magnifica* (Gibbes)

*Porcellana magnificus* Gibbes, Proc. Amer. Assoc. Adv. Sci., III (1850), p. 191 [27].

*Petrolisthes magnifica* Benedict, Proc. U. S. Nat. Mus., XVI (1893), p. 539.—Rathbun, Rapport van de Visscherij en de Industrie van Zeeproducten in de Kolonie Curaçao, uitgebracht door Prof. Dr. J. Boeke, pt. 2 (1920), p. 327 [11].

*Porcellana polita?* Milne-Edwards and Bouvier, Mem. Mus. Comp. Zool., XLVII, no. 4, p. 293, pl. 1, fig. 7.

English Harbor; two specimens. Needham's Point, Barbados; one specimen. Pelican Island, tide-pool, May 11; 1 ♂. Pillars of Hercules, Antigua; 9 (4 ovig.).

*Pisosoma riisei* Stimpson

*Pisosoma riisei* Stimpson, Ann. Lyc. Nat. Hist. N. Y., VII, 1859 (1860), p. 75 [29].

*Pisosoma glabra* Kingsley, Proc. Acad. Nat. Sci. Phila., XXI, 1879 (1880), p. 406, pl. 14, fig. 2.—Benedict, Bull. U. S. Fish Comm., XX, pt. 2, 1900 (1901), p. 135, pl. 3, fig. 5.

D.S. 20; one specimen. Okra Reef, Barbados, May 13; twenty specimens. Barbados, May 15; 7 (2 ovig.). Needham's Point, May 18; three specimens. Needham's Point, diver; one specimen. Old coral, May 31; 8 (4 ovig.). From coral heads, Barbados, June 4; 6 (3 ovig.).

In alcohol deep red, with postorbital, anterior shoulder of branchial regions and proximal half of leg joints white splotched, except in case of legs, in which the entire dactyl is



whitish or pinkish), tips of fingers white. Abdomen white or reddish.

*Megalobrachium poeyi* (Guérin)

*Porcellana poeyi* Guérin, in La Sagra's Hist. Cuba, pt. 2, VIII, atlas (1857), pl. 2, fig. 4.

*Megalobrachium poeyi* Benedict, Bull. U. S. Fish Comm., XX, pt. 2, 1900 (1901), p. 136, pl. 3, fig. 8.—Milne-Edwards and Bouvier, Mem. Mus. Comp. Zool., XLVII, no. 4 (1923), p. 297.

Pelican Island, tide pool; 11 (2 ovig.). Pelican Island, shallow, May 13; two specimens.

*Porcellana sayana* (Leach)

*Pisidia sayana* Leach, Dict. Sci. Nat., XVIII (1820), p. 54.

*Porcellana sayana* Benedict, Bull. U. S. Fish Comm., XX, pt. 2, 1900 (1901), p. 137, pl. 3, fig. 10, and synonymy.—Andrews, Zool. Anz., XXXVII (1911), p. 401, 2 text figs.—Milne-Edwards and Bouvier, Mem. Mus. Comp. Zool., XLVII, no. 4 (1923), p. 291, pl. 1, fig. 3.

Barbados in *Strombus* shell, May 29; 5 (1 ovig.). English Harbor; 1 specimen.

*Porcellana soriata* Say

*Porcellana soriata* Say, Jour. Acad. Nat. Sci. Phila., I (1818), p. 456.—Benedict, Bull. U. S. Fish Comm., XX, pt. 2, 1900 (1901), p. 137.—Milne-Edwards and Bouvier, Mem. Mus. Comp. Zool., XLVII, no. 4 (1923), p. 294, pl. 4, fig. 1.

Needham's Point, Barbados, May 18; one specimen.

*Pachycheles ackleianus* A. Milne-Edwards

*Pachycheles ackleianus* A. Milne-Edwards, Bull. Mus. Comp. Zool., VIII (1880-81), p. 36.—Benedict, Bull. U. S. Fish Comm., XX, pt. 2, 1900 (1901), p. 136.

Barbados; 2 ♀ ovig. Barbados, from coral heads, May 27; one specimen.

*Pachycheles pilosus* (Milne-Edwards)

*Porcellana pilosa* H. Milne-Edwards, Hist. Nat. Crust., II (1837), p. 255.—Benedict, Bull. U. S. Fish Comm., XX, pt. 2, 1900 (1901), p. 137, pl. 3, fig. 11.—Milne-Edwards and Bouvier, Mem. Mus. Comp. Zool., XLVII, no. 4 (1923), p. 294.

specimen. From coral heads, Barbados, June 4; 6 (4 ovig.). Off the Castle, E. side Barbados; two specimens.

Barbados, May 15; 5 (3 ovig.). Old coral, May 31; one

Family **Callianassidæ**

*Upogebia affinis* (Say)

*Gebia affinis*, Say, Jour. Acad. Nat. Sci. Phila., I (1817), p. 241.

*Upogebia affinis*, Hay and Shore, Bull. U. S. Bur. Fisheries, XXXV, 1915-16 (1918), p. 408, pl. 29, fig. 9.

Pelican Island, Barbados, shallow, May 14; 2 (1 ovig.).



*Upogebia (Gebiopsis) operculata*, new species

Okra Reef, May 13; 1 ♂ holotype. Okra Reef, 16, May 13;  
1 ♀.

A new species which in the structure of its tail fan and the last two abdominal somites undoubtedly represents the Atlantic analog of "*Gebia*" [*Upogebia (Gebiopsis)*] *rugosa* Lockington.<sup>18</sup>

Rostrum in front of the line connecting the anterior spines of the lateral ridges of the gastric region, short, thick, rounded triangular, depressed, armed on each lateral border with two strong spines, the anterior pair situated at about or a little before the middle of the length of this frontal portion, the posterior pair situated within and anterior to the spines terminating the lateral gastric ridges, separated from them by the furrow lying just within either ridge, which at this point turns out to meet the frontal margin, behind these grooves, or furrows reach the cervical groove; between the two posterior spines of the front are two smaller spines, making a row of four across its base. In the holotype the lateral gastric ridges are armed with nine blunt, spiniform tubercles arranged in an anterior group of four larger spines and a posterior group of five smaller more separated tubercles; in the only other known specimen of this species there are from eleven to twelve tubercles on the lateral ridges. On the dorsum of the anterior portion of the carapace are four rather irregular rows of at times twined, paired, blunt spines, anteriorly these rows, the two either side of the mid-dorsal line, converge and apex, in the corresponding spine of the median pair of the basal line of the front, the mid-dorsal line of the anterior portion of carapace is somewhat grooved in its anterior half, posteriorly the rows become more irregular and harder to trace, the tubercles constituting them becoming smaller, less distinct and finally, virtually disappearing in the posterior third or fourth of the anterior portion of the carapace just before the cervical groove, where there are but one or two little granules to be found, the rostral, frontal, region of the carapace is thickly hirsute, while proximally before the cervical groove the anterior portion of the carapace is virtually without hairs. The antero-lateral portions of branchial regions are armed with a group of three or four or more small, spiniform granules.

The antennal peduncles exceed the rostrum by the length of the terminal joint and about the distal third or a little more of the penultimate joint taken together; antennular peduncle surpasses the proximal margin of the terminal joint of the antennal peduncle, and is slender and rather feeble as compared to the latter, in the paratype reaching one-third the length of the end joint of the antennal peduncle; flagella of antennules about equal in length, about as long as their peduncle, upper or outer flagellum the stouter composed of nineteen segments, thinner of fourteen.

There is but one cheliped to the two specimens, this was found in the

<sup>18</sup> Ann. Mag. Nat. Hist., (5), II (1878), p. 300.



vial containing the specimen selected, for this reason, as the holotype. Hand thick and stout, compressed but rounded above and below; both fingers short and stout; immovable finger the longer, and at first glance appearing to be furnished with a tooth at or just before the middle of its length, on closer inspection it is seen to be but indicated by a discolored or corneous area or interspace between the tip of the finger and the apparent tooth; the smooth palm has on its inner face a thin line of hair tufts on a level with the middle of the base of the movable finger extending back about to its posterior margin, and on the outer face with another more thickly set row of hairs extending obliquely from about the same level proximally, nearly to the base of the sinus between the fingers, where it curves abruptly downward to meet the lower margin of the palm, lower margin of hand with fringe of long hair for the greater part of its length; upper and lower margins of carpus unarmed, there is however a single, blunt tooth on its inner face near but below the upper distal angle, in line with the line of hair on the inner face of the palm; merus proximally broken off, below with fringe of long hair just within or on the medial side of the row of tiny, inconspicuous denticulations marking the inferior margin of the joint. The only legs attached to the body are those of the fifth pair of which the left leg is small and evidently regenerated; the right leg is imperfectly subchelate, propodus thick, hirsute, little shorter than carpus, about equal to the merus in length, dactyl, long, curved, tapering to a nearly acute tip, about twice as long as produced infero-distal angle of propodus constituting the fixed finger, and extending for half its length beyond it when folded against the distal margin of the propodus. Of the legs loose in the vial with the type specimen, one which may be taken as the second left leg has the merus subequal to or slightly shorter than the ischium, about one-third longer than the carpus and about as long as the propodus; propodus compressed with fringe of long hair on upper and lower margin, the stout three angled dactyl is about one-third as long as propodus.

The terminal portion of the abdomen of *U. rugosa* as described by Lockington applies equally well to the species before us. As he has it (*op. cit.*, p. 301), "Posterior margin of fourth abdominal segment beset with short stiff hairs; the three posterior segments [inclusive of telson] and the lateral caudal appendages complexly wrinkled above, the rugae smooth. Terminal segment [telson] broader than long, distal margin longer than proximal; caudal processes large, filling up the space between the terminal and fifth segments." In our species the first three abdominal segments are dorsally smooth, as is likewise the fourth which carries a line of hair across its anterior third and a thick fringe, or brush of hair along its entire posterior margin sharply setting it off from the fifth somite; fifth and sixth somites "complexly" but symmetrically "wrinkled" telson and uropods with smooth rugae some of which bifurcate or are incomplete; proximal half of fifth somite and distal moiety of telson and of uropods longitudinally concave or transversely troughed for their entire, respective widths; tail fan when fully expanded form-



ing with the fifth and sixth somites a striking and unique, operculiform disk, troughed within its distal half around the circumference and margined with a continuous thick fringe of hair; apparently to lock the elements of the disk together; the proximal half of the outer margin of the sixth somite carries two blunt prominences between and below which is a third more tooth or spine-like projection for the purpose of engaging the outer margin of the outer branch of the uropods.

From Lockington's *U. rugosa*, our species differs in the armature of the rostrum, and the extent of the tuberculation of the anterior portion of the carapace; *U. rugosa* has the "upper surface of rostrum and carapax, to about half way to the dorsal suture, beset with small tubercles and hirsute; and what is probably more significant, the dactylus seems to have been longer than the "pollex" in Lockington's species though his description is not wholly clear on this point: "dactylus less than half the length of the palmar portion of the hand which is thickly hirsute, curved, regularly downwards, its tip passing beyond that of the dactylus [pollex?]." It is apparently on the basis of this character that Borradaile<sup>19</sup> placed this species in the subgenus *Upogebia*. Surely it is a

<sup>19</sup> Ann. Mag. Nat. Hist., (7), XII (1903), p. 543.  
*Gebiopsis*. Lockington does not mention a small tooth on the fore edge of the carapace over the antennae in describing his species, though he was well aware of its occurrence in the genus (*cf.* his remarks *op. cit.*, p. 300, on *Gebia (Upogebia) longipollex* Streets.) The relative length of the fingers of the *Upogebias* is so variable that it can scarcely be considered of having much weight even as a subgeneric character.

It would be interesting to know the application of the "operculum" in our species and Lockington's, the former are, as noted above, from Okra reef, Barbados, the latter from "under stones and coral at low tide Port Escondido, Gulf of California, August, 1876."

The carapace of the male holotype including the rostrum is 8 mm. long, anterior portion before the cervical groove and also including rostrum 4.5 mm.; abdomen and telson 14.5, telson 3.5 mm. long.

#### *Glypturus branneri* Rathbun

*Glypturus branneri* Rathbun, Proc. Wash. Acad. Sci., II (1900), p. 150, pl. 8, figs. 5-8.—Bull. U. S. Fish Comm., XX, pt. 2, 1900 (1901), p. 93.—Rapport van de Visscherij en de Industrie van Zeeproducten in de Kolonie Curaçao, uitgebracht door Prof. Dr. J. Boeke, pt. 2, (1920), p. 328 [12], text fig. 3.

Pelican Island, Barbados, shallow, May 14; one specimen.

#### ? *Glypturus acanthochirus* Stimpson

*Glypturus acanthochirus* Stimpson, Proc. Acad. Sci., Chicago, I (1866), p. 46.

Barbados, from coral head, June 4; one small specimen about 19.5 mm. long.

The one hand remaining, apparently the larger is not spined



on the inner surface near the upper margin, and the median point of the front, is more the narrow triangularly produced anterior margin of the carapace forming a flattened rostral point, than a more or less distinct spine as seems to be usual with larger specimens of this species; the smallest specimen available for comparison is not less than 43 mm. long from tip of rostral projection to end of telson. Our specimen may represent the juvenile or non-mature form of *G. acanthochirus*.

*Callianidea laevicauda* Gill

*Callianidea laevicauda* Gill, Proc. Acad. Nat. Sci. Phila., XI (1859), p. 167.—Rathbun, Bull. U. S. Fish Comm., XX, pt. 2, 1900, (1901), p. 94.

Needham's Point, Barbados; 3 (2 ovig.). Pelican Island, shallow, May 14; anterior portion of one specimen.

Family **Paguridæ**

*Paguristes grayi* Benedict

*Paguristes grayi* Benedict, Bull. U. S. Fish. Comm., XX, pt. 2, 1900 (1901), p. 146, pl. 5, figs. 1, 1a.

Antigua, 9, Jan. 7; 1 ♂.

*Clibanarius tricolor* (Gibbes)

*Pagurus tricolor* Gibbes, Proc. Amer. Assoc. Adv. Sci., III (1850), p. 189 [25].

*Clibanarius tricolor* Stimpson, Proc. Acad. Nat. Sci. Phila., X (1858), p. 234.—Benedict, Bull. U. S. Fish Comm., XX, pt. 2, 1900 (1901), p. 142, pl. 6, fig. 2.

Pelican Island; 50 (4 ovig.). Pelican Island, shallow; two specimens.

The larger lot of specimens is unmistakably this species, as the color is still well marked.

*Calcinus tibicen* (Herbst)

*Cancer tibicen* Herbst, Naturg. d. Krabben u. Krebse, II (1791), p. 25, pl. 23, fig. 7.

*Calcinus sulcatus* Benedict, Proc. U. S. Nat. Mus., XVI (1893), p. 539.—Bull. U. S. Fish Comm., XX, pt. 2, 1900 (1901), p. 141, pl. 5, figs. 3, 3a.—Verrill, Trans. Conn. Acad. Sci., XIII (1908), p. 439, text figs. 56, 57, pl. 28, fig. 7.—Rathbun, Proc. Wash. Acad. Sci., II (1900), p. 144.

*Calcinus tibicen* Rathbun, Rapport van de Visscherij en de Industrie van Zeeproducten in de Kolonie Curaçao, uitgebracht door Prof. Dr. J. Boeke, pt. 2, (1920), p. 329 [13].

No label, three specimens.



*Petrochirus bahamensis* (Herbst)

*Cancer bahamensis* Herbst, Naturg. d. Krabben u. Krebse, II (1791), p. 30.

*Petrochirus bahamensis* Rathbun, Ann. Inst. Jamaica, I, no. 1 (1897), p. 42.—Benedict, Bull. U. S. Fish Comm., XX, pt. 2 1900 (1901), p. 140.

Pelican Island, from *Strombus* shell; one large male, carapace 64 mm. long, abdomen and telson together about 155 mm.

*Dardanus venosus* (Milne-Edwards)

*Pagurus venosus* Milne-Edwards, Ann. Sci. Nat., Zool., Paris, (3), X (1848), p. 61.

*Pagurias insignis* Benedict, Bull. U. S. Fish Comm., XX, pt. 2, 1900 (1901), p. 141.

Barbados, 1 ♂.

? *Catapagurus*, species

D.S. 1, May 13; four specimens.

These specimens are all small, and somewhat broken, at least two of them may be near *Catapagurus gracilis* (Smith). The material is such that I hesitate to determine it more definitely.

A further tiny specimen without legs, from Sta. 51, Barbados, seems to be a *Pagurus*.

Family **Cænobitidæ***Cænobita clypeatus* (Herbst)

*Cancer clypeatus* Herbst, Naturg. d. Krabben u. Krebse, II (1791), p. 22, pl. 23, fig. 2A and B.

*Cænobita diogenes* Rathbun, Ann. Inst. Jamaica, I, no. 1 (1897), p. 42.—Benedict (spelled *Cenobita*), Bull. U. S. Fish Comm., XX, pt. 2, 1900 (1901), p. 139.

*Cænobita clypeatus* Rathbun, Rapport van de Visscherij en de Industrie van Zeeproducten in de Kolonie Curaçao, uitgebracht door Prof. Dr. J. Boeke, pt. 2, (1920), p. 329, [13].

Pelican Island, May 14; 12 ♂ 5 ♀. English Harbor; 1 ♂. Antigua, May 27; 9 ♂ 10 ♀.

Family **Hippidæ***Hippa cubensis* (Saussure)

*Remipes cubensis* Sussure, Rev. et. Mag. Zool. (2), IX (1857), p. 503.

*Hippa cubensis* Benedict, Bull. U. S. Fish Comm., XX, pt. 2, 1900 (1901), p. 139.—Verrill, Trans. Conn. Acad. Sci., XIII (1908), p. 436, text figs. 53, 54.—Rathbun, Rapport van de Visscherij en de Industrie van Zeeproducten in de Kolonie Curaçao, uitgebracht door Prof. Dr. J. Boeke, pt. 2, (1920), p. 330 [14].

Beach near Pelican Island, May 27; 5 ♂ 5 ♀ ovig. Beach near Pelican Island, 3; 1 ♀ ovig. Bridgetown Beach, Bar-



bados; 5 ♀ ovig. Bathsheba, Barbados; 1 ♀ ovig. Barbados; 1 ♀ ovig.

? *Lepidopa scutellata* Stimpson

*Lepidopa scutellata* Stimpson, Proc. Acad. Nat. Sci. Phila., X (1859), p. 230 [68].—Ann. Lye. Nat. Hist., N. Y., VII (1859), p. 79 [33].—Benedict, Proc. U. S. Nat. Mus., XXVI (1903), p. 894, text fig. 6. Sta. 42, Barbados; one larva; probably this species.

Order STOMATOPODA

*Gonodactylus oerstedii* Hansen

*Gonodactylus oerstedii* Hansen, Isopoden, Cumaceen und Stomatopoden, Ergeb. d. Plankton Exped. II (1895), p. 65, footnote.—Bigelow, Bull. U. S. Fish Comm., XX, pt. 2, 1900 (1901), p. 152, text figs. 1, 2.—Rathbun, Rapport van de Visscherij en de Industrie van Zeeproducten in de Kolonie Curaçao, uitgebracht door, Prof. Dr. J. Boeke, pt. 2, (1920), p. 348 [32].

D.S. 1, May 13; 1 ♂. D.S. 11; 1 ♂. Needham's Point, Barbados; 1 ♀. Bathsheba, Barbados; 1 ♂. Pelican Island, tide pool, May 11; 2 ♂. Pelican Island, tide pool; 3 ♀. Barbados, May 15; 1 ♂. Barbados, June 4; 1 ♀. Barbados; 2 ♀. English Harbor, 6; 1 ♂. English Harbor, Pillars of Hercules; 1 ♀. English Harbor; 1 ♀. Pillars of Hercules; 1 ♀. Pillars of Hercules, 5; 1 ♂.

*Gonodactylus oerstedii* var. *curacaoensis* Schmitt

*Gonodactylus oerstedii* var. *curacaoensis* Schmitt, Macruran, Anomuran, and Stomatopod Crustacea collected at Curaçao by Dr. C. J. van der Horst, in 1920. Bijdragen tot de Dierkunde, Amsterdam, (XXIII) (1924), p. 80.

D.S. 20; 1 juvenile. Okra Reef, Barbados, May 15; 1 ♀.

The specimen from Okra Reef carries a tiny spinule either side and a little behind the spiny-pointed distal end of the median carina of the telson.

*Gonodactylus oerstedii* var. *spinulosus*, new variety

Off the Castle, E. side Barbados, 1-4 fathoms; 1 ♂ 1 ♀. Okra Reef, Barbados, May 13; 1 ♀. Barbados, from coral heads, June 4; 1 ♀. English Harbor, shore; 1 ♀.

Just as *Gonodactylus chiragra* Fabricius<sup>20</sup>, of the Pacific, forms a number of recognized varieties<sup>21</sup>, it is reasonable to suppose that varieties would likewise be developed by its Atlantic analog as more material be-

<sup>20</sup> Ent. Syst., III, pt. 1 (1793), p. 513.

<sup>21</sup> Vide Borradaile, Trans. Linn. Soc. London, (2), Zool., XII, pt. 2, (1907), p. 211.



came available for examination. It seems that this will be the case, for here we have a very distinct variety of what is specifically, unmistakable *Gonodactylus oerstedii*.

As in variety H, *affinis* de Man<sup>22</sup> *segregatus* Lanchester<sup>23</sup>) of *G. chiragra*, at the hinder end of the median keel of the telson of *G. oerstedii* var. *spinulosus*, there is present on either side, a smaller ridge almost or quite independent of the middle keel, and armed, each with two little tuberculiform spinules; one such spinule terminates the median carina posteriorly. Half way between the apex of the V of the median notch of the telson and the end of the swelling carrying the median carina, there is a small semicircular swelling, with convexity directed backward, which is often armed with four likewise tuberculiform spinules, one either side of the mid-point, and usually a second external to each of these. The bases, or anterior ends of the carinae which terminate in the sub-median points of the telson, are broadened out proximally or swollen, in order to carry two small accessory or minor ridges, one either side of the carina proper, and armed each with a single spine at the middle, or as is sometimes the case, at the proximal end; the median of these three carinae, or the carina proper, is armed in that portion between the minor ridges of the base with three or four spinules in a longitudinal row. Furthermore, the little lobe situated at the apex of the notch between the submedian, and the intermediate or first lateral teeth or points of the telson of the typical species, in this variety is spiniform, and moreover on the little ridge or keel with which it is provided, carries a second little spinule just above the terminal one; often too, the posterior margin of the telson carries a second spinule just external to the one just mentioned, about in line with the two or three teeth usually carried by the supplementary carina, which distinguishes the species from its Pacific relative—*G. chiragra*—in effect making the supplementary carina appear to be armed with an extra, third or fourth tooth. The submedian, or intermediate carinae, either side of the median keel—not the accessory or minor ridges mentioned above—end in a sharp spine, as in the variety *ouracaoensis*, and often as in the type behind and below this on the swelling which carries the carina, there is a second spine or spiniform tubercle in line with the first.

On the middle back of the first and fourth abdominal somites of most of the specimens are paired black markings, squarish designs looking much like some of the Chinese ideographs; in one of the two specimens in which they are not discernible they have partly faded; in none of the typical *oerstedii* did I find such markings.

This variety though it keys out as *G. festæ* Nobili<sup>24</sup> in Kemp's "Crus-

<sup>22</sup> Abh. Senck. Ges. Frankfurt, XXV (1902), p. 912; see also Borradaile *loc. cit.*

<sup>23</sup> Fauna Maldive and Laccadive Arch., I, pt. 4 (1903), p. 448, pl. 23, fig. 7.

<sup>24</sup> Boll. Mus. Torino, XVI, no. 415, 1901, p. 53.



tacea Stomatopoda of the Indo-Pacific Region''<sup>25</sup> seems to be distinct. From Nobili's brief description it would appear that the telson has much in common with our variety, but the shape of the rostral plate at once differentiates the two; as Nobili has it, "in the *G. oerstedii* the external angles [of the rostral plate] are muticous, and almost flat; in *G. festæ* these angles are acute, slender, and produced forward," apparently, from his further remarks, much resembling *G. acutirostris* (de Man).<sup>26</sup>

<sup>25</sup> Mem. Indian Mus., IV, no. 1 (1913) pp. 148, 153, 204.

<sup>26</sup> *G. chiragra* var. *acutirostris* de Man, Zool. Jahrb., Syst., X (1898), p. 695, pl. 38, fig. 77b, c. *G. acutirostris* Kemp, *op. cit.*, p. 163.

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These works by no means constitute a complete bibliography of the works cited in the text, but they do contain either in themselves, or in contained references, a comprehensive survey of the carcinological fauna of the region.



PLATES



## PLATE I

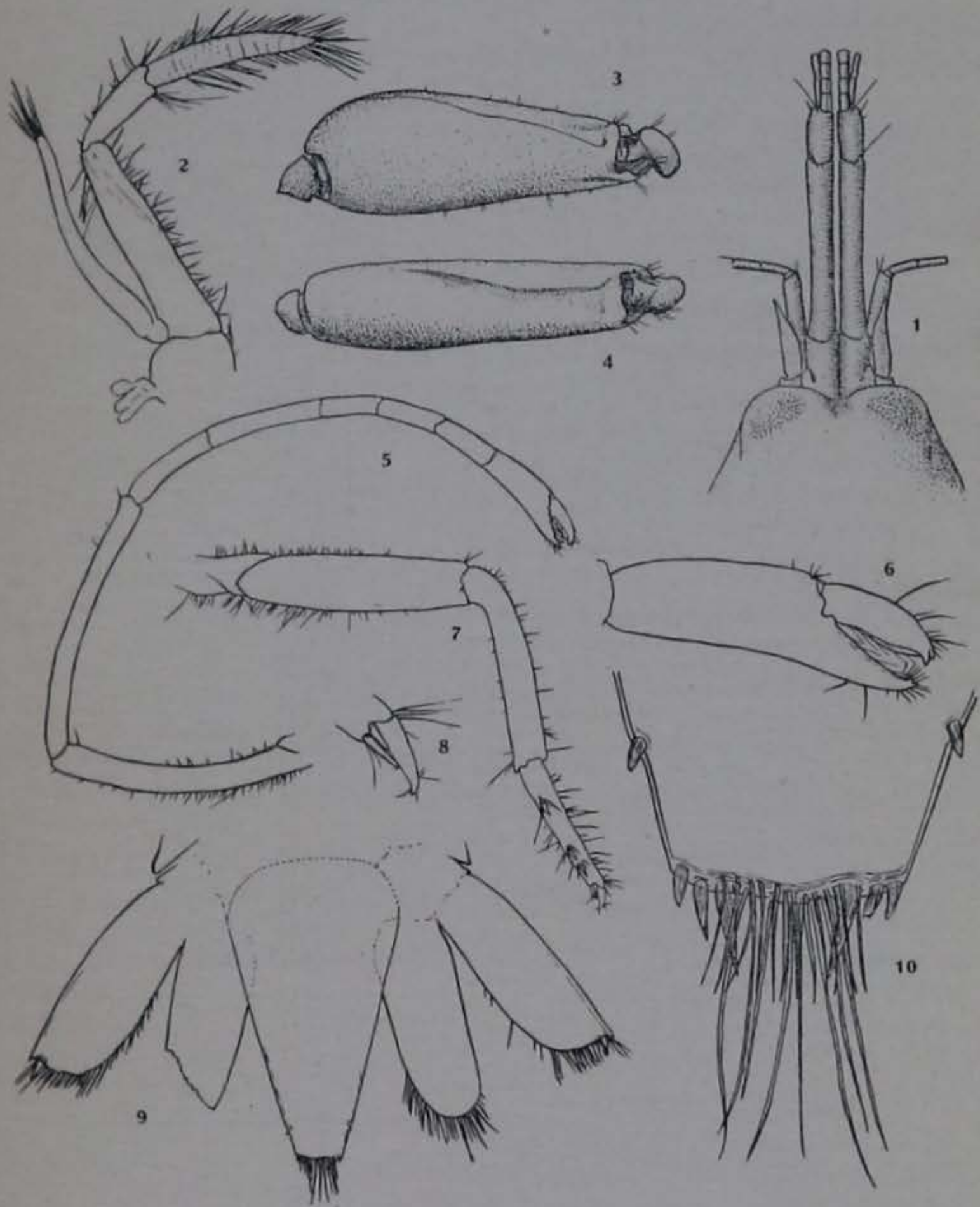
Magnifications are approximate

*Crangon rathbunæ*, female from Okra Reef, Barbados

- Fig. 1. Dorsal view of anterior portion, x about 7.5.
- Fig. 2. Right, third maxilliped, x 7.
- Fig. 3. Larger right chela, outer face, x about 6.5.
- Fig. 4. Same, view from above, x about 6.5.
- Fig. 5. Right, second leg, x 7.
- Fig. 6. Same, chela, x 19.
- Fig. 7. Right, third leg, x 7.
- Fig. 8. Same, dactyl, x 19.
- Fig. 9. Tail fan, x 12.
- Fig. 10. Extremity of telson, x 62.



PLATE I





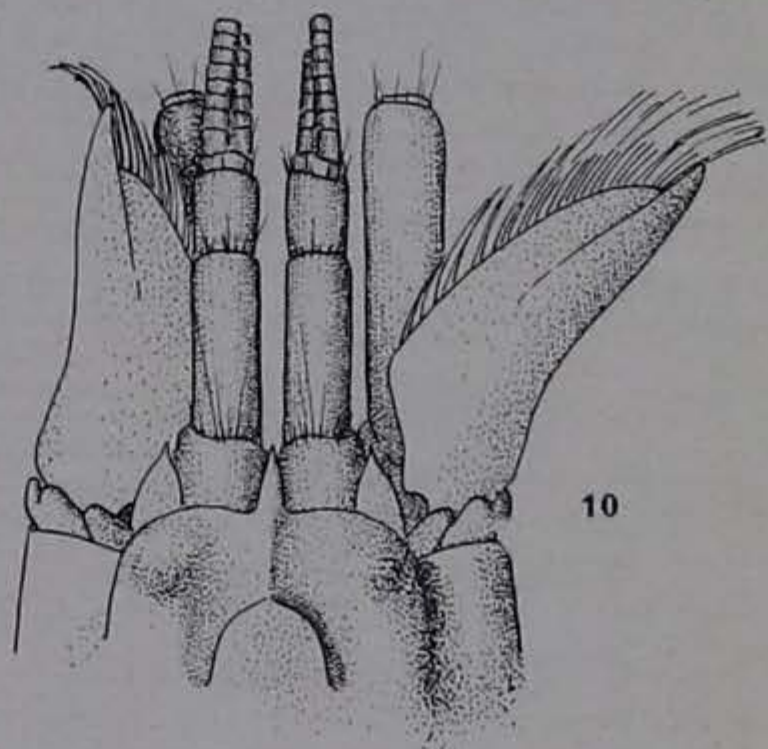
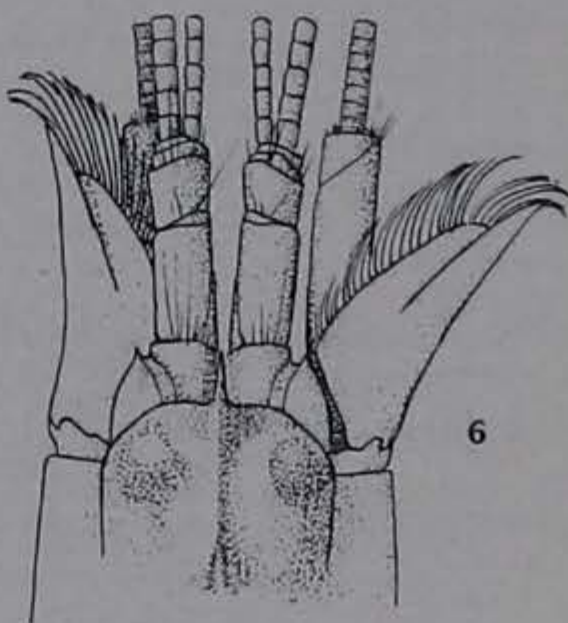
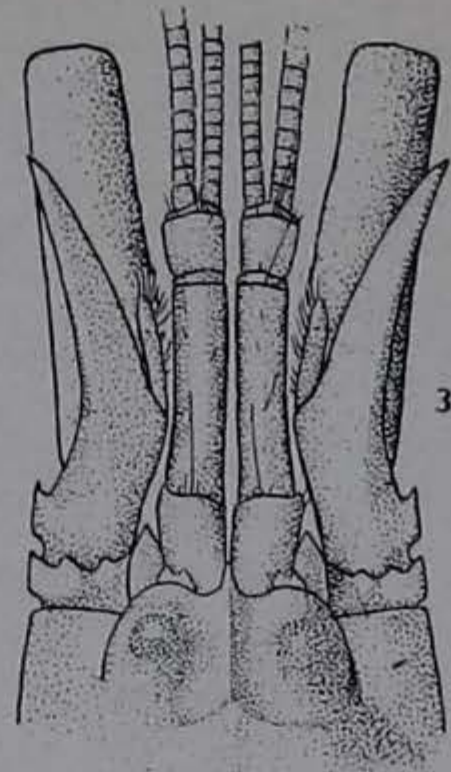
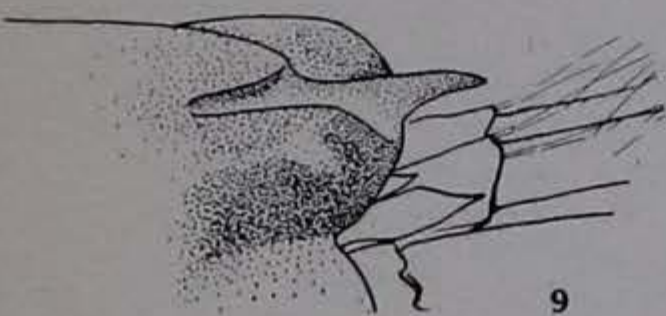
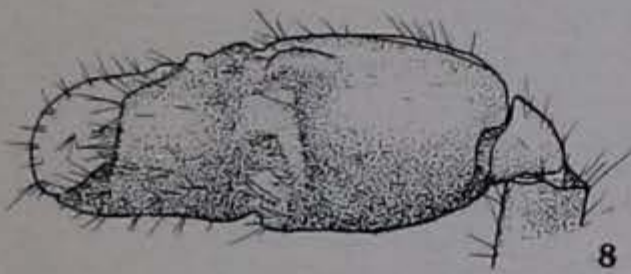
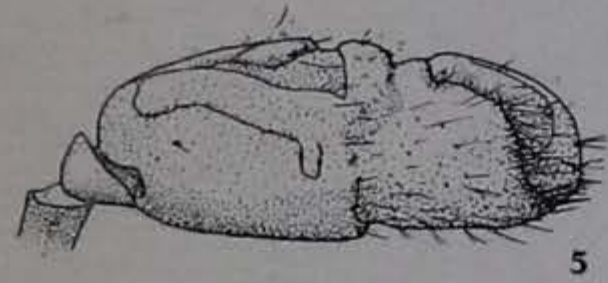
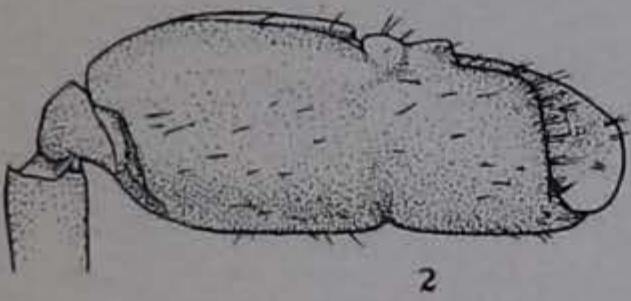
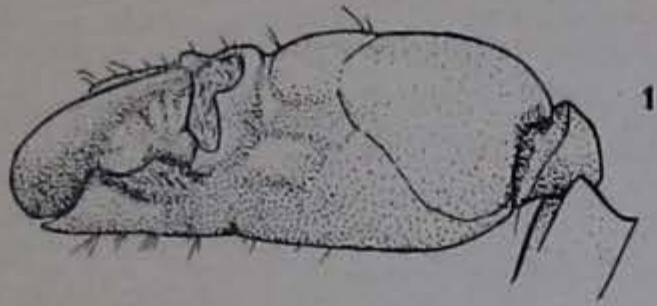
## PLATE II

Magnifications are approximate

- Fig. 1. *Crangon barbadensis*, male holotype, from off the Castle, E. side Barbados, 1-4 fathoms; larger, left, chela, outer face, x 2.
- Fig. 2. Same, inner face of larger chela, x 2.
- Fig. 3. Same, dorsal view of anterior portion, x about 5.
- Fig. 4. *Crangon nuttingi*, male holotype, from Pelican Island, shallows; larger, left, chela, outer face, x 2.
- Fig. 5. Same, inner face of larger chela, x 2.
- Fig. 6. Same, dorsal view of anterior portion, x about 5.
- Fig. 7. *Crangon verrilli*, female holotype, in dead *Strombus* shell from Barbados, larger, right, chela, outer face, x 2.
- Fig. 8. Same, larger chela inner face, x 2.
- Fig. 9. Same, profile of anterior portion, x 5+.
- Fig. 10. Same, dorsal view of anterior portion, x about 5.



PLATE II





### PLATE III

Magnifications are approximate

*Periclimenes barbadensis*, male holotype, from English Harbor, Antigua,  
electric light.

Fig. 1. Lateral view of carapace and rostrum, x 7.

Fig. 2. Same, dorsal view, x 7.

Fig. 3. Right antennule from above, x 10.

Fig. 4. Right antenna, x 10.

Fig. 5. Left, first leg, x 10.

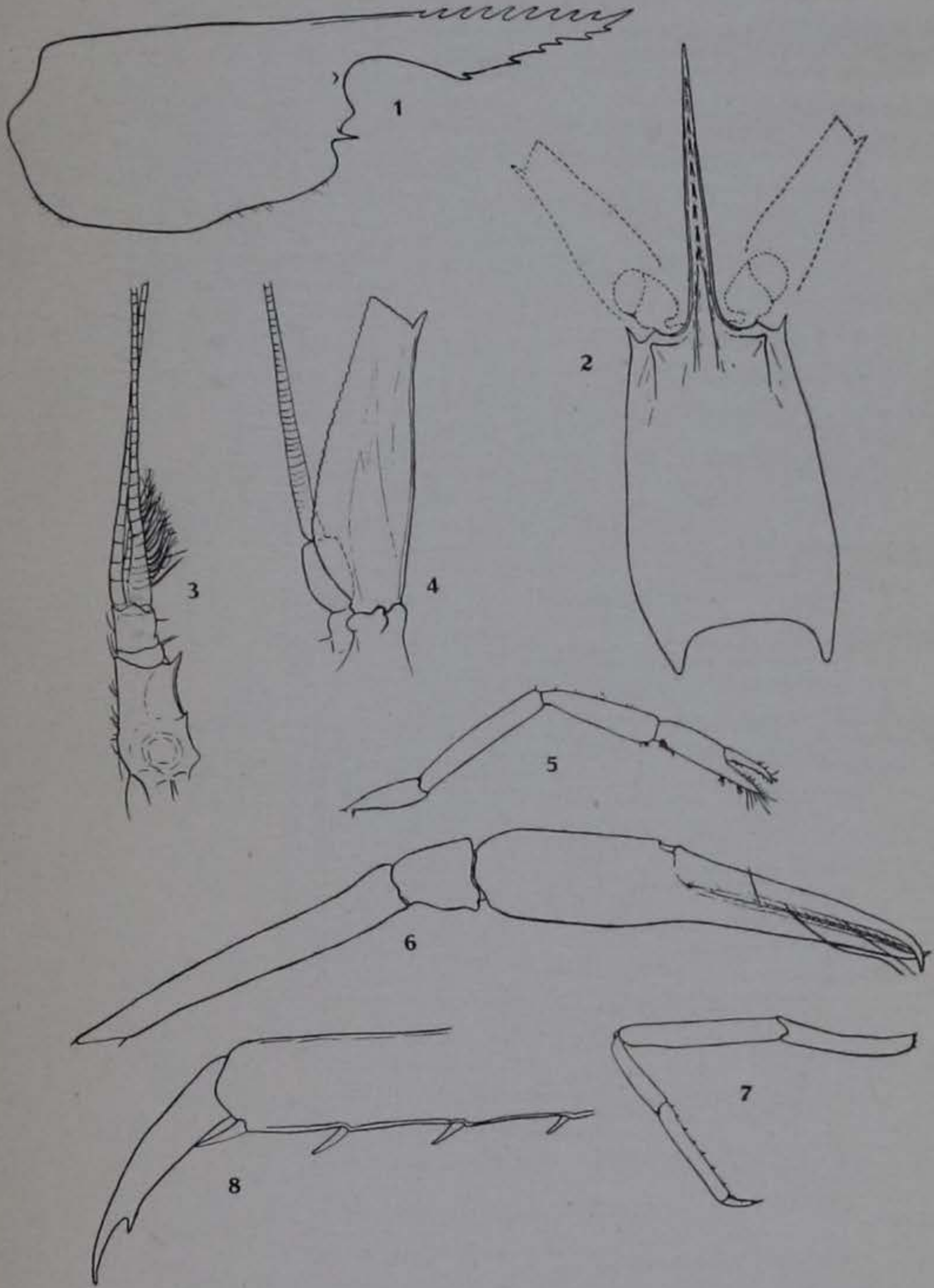
Fig. 6. Left, second leg, x 10.

Fig. 7. Left, third leg, x 10.

Fig. 8. Same, dactyl, x 65.



PLATE III





## PLATE IV

Magnifications are approximate

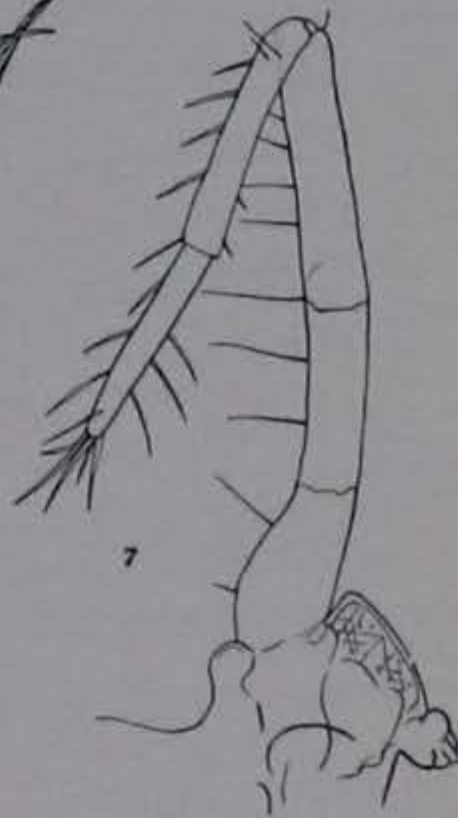
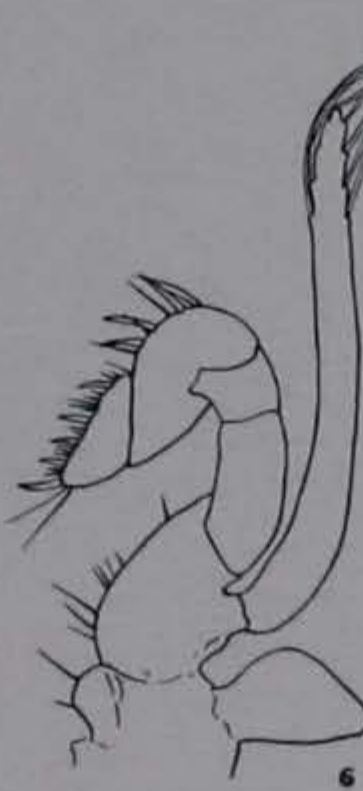
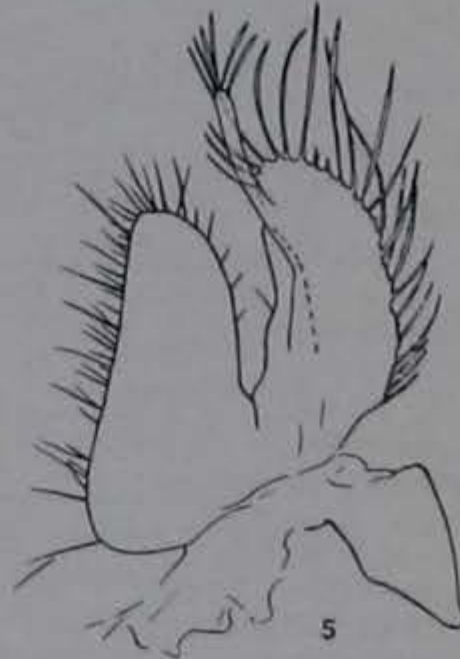
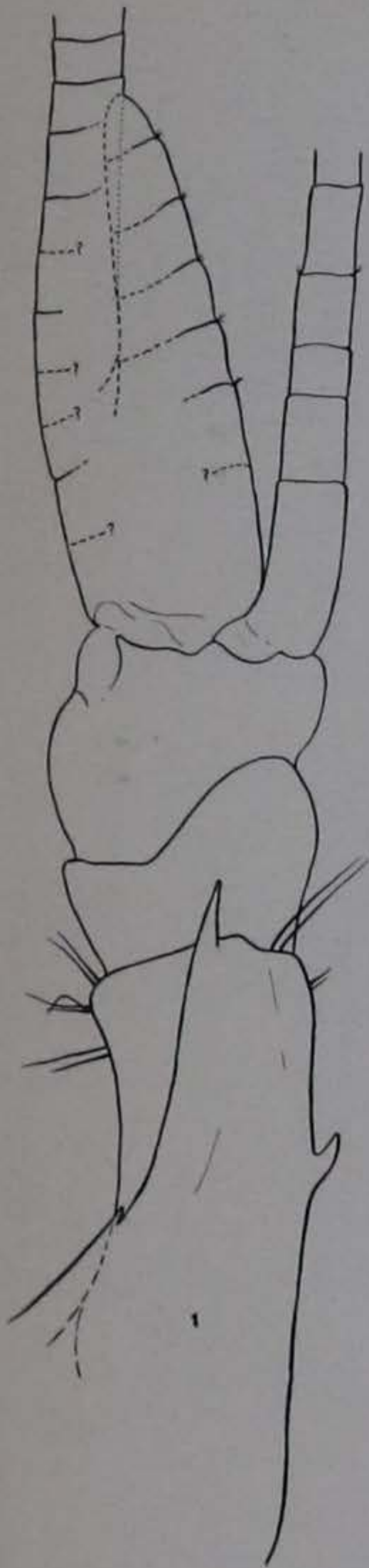
*Periclimenes barbadensis*, male holotype, from English Harbor, Antigua,  
electric light.

Fig. 1. Right antennule, lateral aspect x 65.

Figs. 2-7. Mouth parts of left side, except fig. 4, which is right, x 34,  
respectively, mandible, first maxilla, second maxilla, and first,  
second and third maxillipeds.



PLATE IV





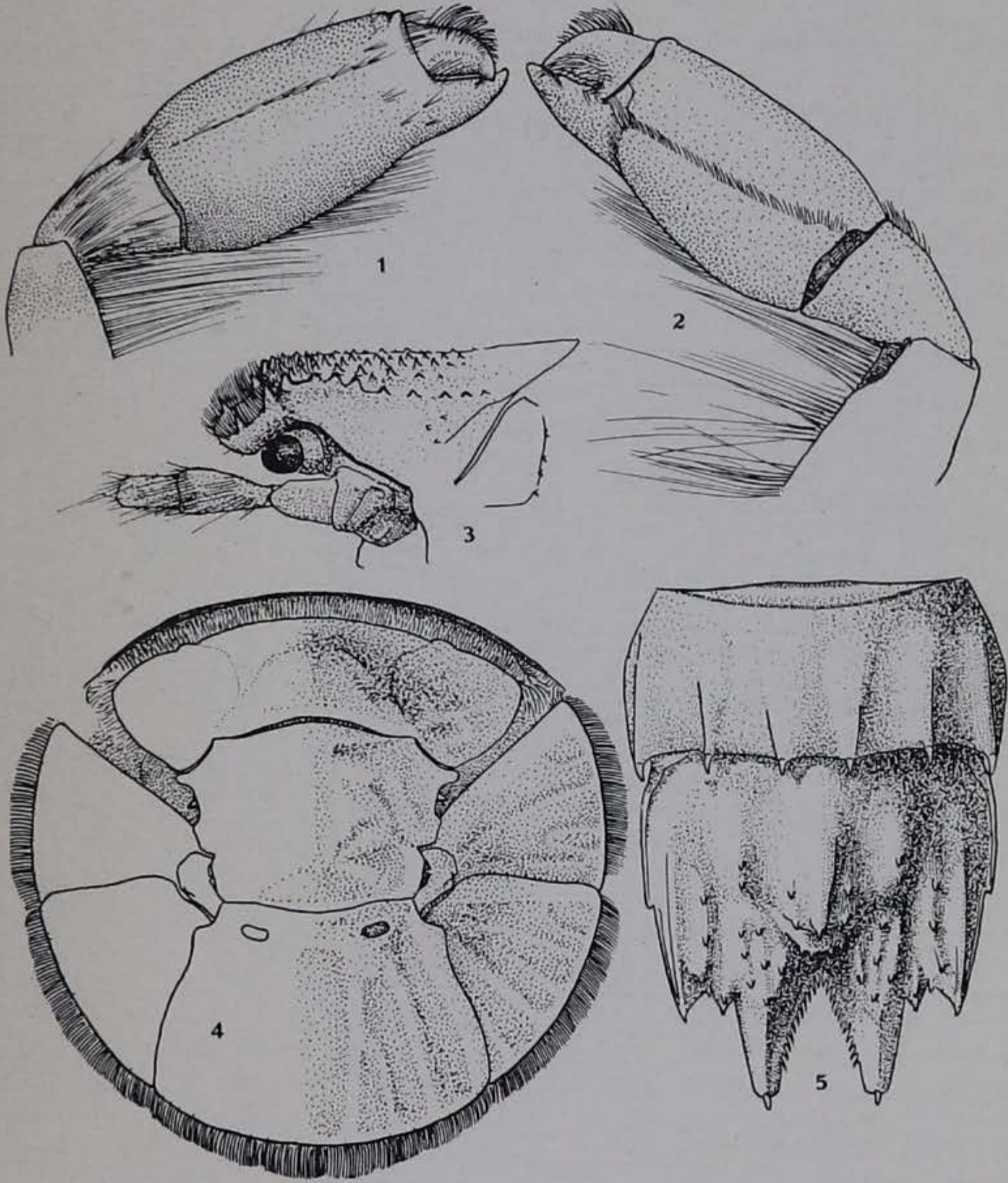
## PLATE V

Magnifications are approximate

- Figs. 1, 2. *Upogebia (Gebiopsis) operculata*, male holotype, from Okra Reef, Barbados. Inner and outer faces of larger, left chela, x about 7.5.
- Fig. 3. Same, lateral view of anterior portion, x about 7.5.
- Fig. 4. Same, fifth and sixth abdominal somites, telson and uropods, dorsal aspect, x about 7.3.
- Fig. 5. *Gonodactylus oerstedii* var. *spinulosus*, female holotype, from off the Castle, East side Barbados, 1-4 fathoms, dorsal view of telson and sixth abdominal somite, x 7.5.



PLATE V





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