THE ANOMURAN COLLECTIONS MADE BY THE FISH HAWK EXPEDITION TO PORTO RICO.

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In classification the Anomuran crabs occupy a shadowy place between the Brachyura and the Macrura. In some systematic works in recent years the Anomura have been divided between these subdivisions under the names *Brachyura anomalia* and *Macrura anomalia*. This does not, however, change the group from its intermediate position, nor, indeed, do more than indicate the value of its characters in the mind of an author.

The Anomura are found in all seas, though the distribution is by no means even, by far the larger number being found in the tropical and subtropical belts. The family *Lithodidæ* is most numerously represented in the North Pacific Ocean. The hermit crabs are the best-known members of the Anomuran group; common in all latitudes, usually from the shore line to considerable depths, they present the variations of form that a world-wide distribution naturally gives. The soft and unprotected abdomen compels them to find something with which to cover it, and we find them in shells and sponges or overgrown with polyzoa or anemones. The great majority live in the dead shells of mollusks, changing from one shell to another as they grow or when for any reason they have occasion to seek another house.

The necessity of changing shells as the crab grows is done away with in a curious manner in the case of some species. A hydroid envelops the shell and grows with the crab, or a sea anemone plants itself on the shell and covers it on all sides except the mouth, growing in the form which will furnish the best protection. In return for this kindly act the crab furnishes motive power for an otherwise stationary animal. One thing leads to another, and we often find the sea anemone and crab in close contact; the shell having, as it were, fitted the anemone to the crab, had lost its usefulness and been dissolved by one or the other of its captors. In the North Pacific the *Albatross* dredged many hermits living in sponges, the size of the sponge being disproportionately great to that of the crab. Here also the original home of the crab was in a shell, the shell in time being overgrown with a sponge.

When the hermits move about they protrude their chelipeds or hands and the first two pairs of ambulatory feet; the posterior two pairs are very much reduced in size; their function as ambulatory feet is a thing of the past. In the Anomura the fifth pair are always more or less modified; in some the fourth pair are equally so, as in the hermits. The Dromias have the fourth and fifth pairs reduced in size and furnished with a small hook-like nail. By means of these modifications they are able to hold sponges or shells over their backs. In the *Porcellanidæ* the fifth pair are small and elevated so that they rest on the carapace. In the *Lithodidæ*,

or Anomuran spider crabs, the fifth pair are very small and are folded under the carapace, so that this family presents to the eye but four pairs of legs, a character which easily distinguishes it from any other family of Decapods.

The Anomuran collection made by the Fish Commission expedition to Porto Rico in the winter of 1898–99, on the steamer *Fish Hawk*, contains 9 species believed to be new, a total of 53 species being described. The most interesting feature of the collection is the number of new species of hermit crabs of the genus *Paguristes* and that group of the genus to which *Paguristes depressus* belongs. Stimpson described this species in 1859, from specimens dredged by Dr. Gill at St. Thomas. A. Milne-Edwards and Bouvier described 6 species from the *Blake* dredgings, and here 5 additional species are now presented as new. Most of them live in shells with rather narrow openings and show the modifications described by Stimpson, which result from narrow quarters. It is true of these species, as well as of *P. depressus*, that they have "all of the generic peculiarities of *Paguristes*."

In this report it was thought best not to confine the descriptions to the species actually taken by the expedition, but to add descriptions of the more common species which are not in this or other Porto Rican collections, yet are likely to occur there.

Figures of many species of Anomura of the West Indian region are inaccessible or altogether lacking. While this lack has not been supplied, a beginning has been made, 26 species being here figured.

All of the figures were drawn by Miss Annie A. McKnew, except figs. 2 and 3, plate 5.

Genus DROMIA.

Dromia erythropus (G. Edwards).

Cancer marinus chelis rubris Catesby, Nat. Hist. Carolina, Florida, and the Bahama Islands, II, 37, pl. XXXVII, 1743.
Cancer erythropus Edwards, Catalogue of Animals in Catesby's Natural Hist. of Carolina, with the Linnæan names, 1771. (*Teste* M. J. Rathbun.)
Dromia lator H. M. Edwards, Hist. Nat. des Crust., II, 174, 1837.
Dromia erythropus M. J. Rathbun, Annals of the Institute of Jamaica, vol. I, No. 1, p. 39, 1897.

The front is tridentate, the inner angles of the orbits forming two and the rostral point the third, which is about as far below the line of the orbital angles as they are separated from each other. There are five teeth on the antero-lateral margin, including the one at the outer angle of the eye. The carapace is very convex in all directions, much broader than long; it is covered with a coat of short bristles, which altogether conceal the substance of the shell. The chelipeds are similarly covered, only the tips of the fingers being exposed. The chelipeds and the first and second pairs of ambulatory feet are stout and strong, folding in close to the body; the fourth pair are the shortest; the fifth pair rest on the posterior portion of the carapace. Both the fourth and fifth are much flattened and are subchelate.

This crab is found in shallow water throughout the West Indian region. The carapace of one at hand measures 67 mm. in length and 84 in breadth.

Genus DROMIDIA.

Dromidia antillensis Stimpson.

Dromidia antillensis Stimpson, Ann. Lyc. Nat. Hist. N. Y., VII, p. 71, March, 1859.

The front of this species is very much as in *Dromia erythropus*. The carapace is longer than wide; teeth of the antero-lateral margin are little more than enlarged granules, with the exception of the one behind the cervical suture. The outer angle of the eye is produced, but is not tooth-like. The fourth and fifth pairs of feet are subchelate. Carapace and feet are covered with a dense coat of short bristles, only the tips of the fingers showing. This crab carries over its carapace a growing sponge, with a cavity beneath into which the carapace fits. Under these conditions sponges are sometimes seen to move about, to the astonishment of those unacquainted with this bit of natural history.

Porto Rico. Collected by Mr. G. M. Gray. Mayaguez, station 6093.

Genus HYPOCONCHA.

Hypoconcha sabulosa (Herbst).

Cancer sabulosa Herbst, II, p. 57, pl. 48, figs. 2 and 3, 1799.
Hypoconcha sabulosa Guérin, Rev. et Mag. Zool. (2), VI, p. 333, pl. 5, 1854. Stimpson, Proc. Acad. Nat. Sci. Phila. 1858, p. 226; also Ann. Lyc. Nat. Hist. N. Y., VII, p. 72, March, 1859.

This and the following species are very much alike and have similar habits. The front and lateral margins are expanded, covering the eyes and all parts of the head except the flagella of the antennæ; the middle surface is very thin and membranous. There is but little hair on the surface of the specimens examined; the margin is heavily fringed with bristles and armed with a number of white spines. In outline this species is a little flattened in front and there is a large notch on the median line; there are no notches over the antennæ; the sides are a little flattened, but are not concave as in Herbst's figure. The fourth and fifth pairs of feet are prehensile without being subchelate as in *Dromia*. The shape of this crab has, like that of the hermit crabs, been modified to suit its dwelling or protective covering, for it holds over its carapace the valve of some lamellibranch, holding on by some of its posterior feet and perhaps, as Dr. Stimpson suggested, by the angular abdomen inserted under the hinge.

Herbst's specimens were from Africa, while the other writers have all had them from the West Indian region, and it is not unlikely that the African species may prove to be the true *sabulosa* and that the species in hand may differ more from that than from *H. arcuata*.

Length of an individual, 11.5 mm.

Hypoconcha arcuata Stimpson.

Hypoconcha arcuata Stimpson, Ann. Lyc. Nat. Hist. N. Y., VII, p. 72, March, 1859.

In comparison with *H. sabulosa* this species is more evenly rounded in front and on the sides; there is a deep fissure on the middle of the front rather than a notch; there are slight notches above the antennæ; the white spines that arm the border are smaller and more numerous.

Length, 115 mm.; width, 11.8 mm.

Genus PETROLISTHES.

Petrolisthes sexspinosus (Gibbes).

Porcellana sexspinosa Gibbes, Proc. Amer. Assoc. for Adv. of Science, III, 1850, p. 190.
Petrolisthes sexspinosus Stimpson, Proc. Acad. Nat. Sci. Phila. 1858, p. 227. Kingsley, Proc. Acad. Nat. Sci. Phila. 1879, p. 405.

The front is produced, triangular. The carapace is crossed by numerous rugose and ciliated lines; similar lines cross the chelipeds diagonally. Four large triangular, spine-pointed teeth arm the inner margin of the carpus.

Many specimens of this species were taken at Ensenada Honda, Culebra; some agree well with specimens from Florida, others have a row of four or five spines on the movable finger of the hand. At first the spiny-fingered variety seemed to be specifically distinct, as the color was different; afterwards the spines were found on specimens of all varieties of color. The larger and more numerous specimens are purple and white, the ridges taking the color while the intermediate spaces are occupied by the cilia, which under a lens become white plumes. In another variety the purple is changed to red, and in these there is likely to be a double cross on the carapace, caused by a line or light streak running from the rostrum to the posterior margin, and two transverse lines, one between the eyes and one near the center; specimens with this color are more likely to have the spiny fingers than the larger purple and white ones.

Common throughout the West Indies and southern coast of the United States; Porto Rico, at San Juan, Boqueron, Ensenada Honda (Culebra), Mayaguez Harbor, Caballo Blanco Reef, and other localities; stations 6075 and 6065. Length, 7.5 mm.; width, 6.5 mm.

Petrolisthes armatus (Gibbes).

Porcellana armata Gibbes, Proc. Amer. Assoc. for Advancement of Science, III, 1850, p. 190.
Porcellana gundlachii Guérin, in La Sagra's Hist. of Cuba, VIII (Atlas), 1855, Articulata, pl. II, fig. 6.
Petrolisthes armatus Stimpson, Proc. Acad. Nat. Sci. Phila. 1858, p. 227. Kingsley, Proc. Acad. Nat. Sci. Phila. 1879, p. 406.

The front is obtuse and but little produced. The carapace is crossed by numerous broken lines of minute ridges. The chelipeds are long; the carpus has three equidistant teeth on inner margin and four or five curved teeth on outer margin. The hand has a line of spinules on the lower margin; in some specimens the spinules are wanting; surface of hand roughened by short lines of granules.

San Juan and Boqueron Bay. Length, 9.5 mm.; width, 9 mm.

Petrolisthes tridentatus Stimpson. Plate 3, fig. 2.

Petrolisthes tridentatus Stimpson, Annals Lyc. Nat. Hist. New York, VII (March, 1859), p. 75, pl. 1, fig. 4.

The rostral lobe of the front is broad and triangular, the lateral lobes or teeth are well separated from the median lobe and markedly divergent. The chelipeds are large, glabrous to the eye, minutely rugose under a lens. There are no teeth or spines anywhere, with the exception of a rounded tooth on the inner distal angle of the merus and a small sharp, curved spine on distal angle of carpus. The inner margin of carpus is thin and slightly produced; outer margin marked with enlarged rugæ.

P. tridentatus has been taken at St. Thomas, Barbadoes (types), and Trinidad.

Petrolisthes marginatus Stimpson. Plate 3, fig. 1.

Petrolisthes marginatus Stimpson, Annals of the Lyceum of Nat. Hist. of New York, VII (1859), p. 74.

The outline of the front from the median lobe to the angle of the orbit is straight; the median lobe is rounded and deflexed. The carapace is pubescent. The chelipeds are not so slender as in *P. armatus;* there are four sharp teeth on the inner margin of the carpus; in the center is a row of small round tubercles; a row of more flattened tubercles arm the outer margin. A ridge runs from the gape of the fingers to the anterior angle of the carpus; the lower margin of the hand is armed with spinules. The color of the specimen when it first reached the Museum was pink. Stimpson gives the color as "a deep purplish crimson." The ambulatory feet were lost from the single specimen. Taken at Ponce.

Petrolisthes quadratus, new species. Plate 3, fig. 4.

The front is thin, produced to an angle in the middle. A deep depression reaches the apex from between the protuberances of the gastric region; the orbits are raised and a depression extends to the inner angle of the orbit from a point at the side of the gastric protuberances. There is a small protuberance on the gastric region behind the eye. There is only a slight emargination of the carapace where the cervical groove meets the side. The sides of the carapace are parallel; near the margin there are rugose lines, becoming coarser on the shoulder. The meral segments of the ambulatory feet are rugose; there are no spines anywhere except under the dactyl. The right cheliped is wanting; the left is large and strongly granulated. There are two slight longitudinal depressions and three resulting ridges on the carpus; the marginal granules are a little enlarged. There is a sulcus on the movable finger and a slight one near the crest of the palm. The fingers are pubescent on the inner surface near the prehensile edges. There are no spines or teeth on the chelipeds.

Reefs at Ponce. One specimen. Length of carapace, 5 m.; width, 5.5 mm.

Petrolisthes nodosus Streets.

Petrolisthes nodosus Streets, Proc. Acad. Nat. Sci. Phila., XXIV, p. 133, 1872.

The following is from the original description: "The carapace is broadly ovate, about as broad as long. The anterior portion is nodulated; the nodules are arranged in a semicircular manner transversely across the dorsum from one hepatic region to the other. The posterior portion of the carapace is distinctly imbricated. The front is prominent and deeply tridentate; the middle tooth is the largest and triangular in shape and very slightly more prominent than the lateral ones. The carpus is shorter than the hand. The anterior margin is armed with four large, serrated, and imbricated teeth; the two middle ones are the largest and are united at their bases; the external tooth is smallest."

Petrolisthes jugosus Streets.

Petrolisthes jugosus Streets, Proc. Acad. Nat. Sci. Phila. 1872, p. 134. Kingsley, Proc. Acad. Nat. Sci. Phila. 1879, p. 405.

The carapace is about as broad as long; the front is evenly convex from orbit to orbit when seen from above; in front it shows a V-shaped depression on the median line. The cervical groove is strongly marked; there is a paired tubercle on the side of the gastric region formed in part by a depression between this point and the raised margin of the orbit. The chelipeds are rather short for the genus; the carpus has a U-shaped sulcus on its upper surface; the opening of the U is on the proximal end; the ridge within the U and the ridges on each side are crossed diagonally by numerous raised lines; the anterior margin is armed with four teeth graded in size, the largest being on the proximal end. The hand is roughened with rather coarse granules; the lower margin is carinate.

The collection contains several specimens which I refer to this species; they are specifically identical with Mr. Kingsley's specimen from Key West, with which they have been compared. The Museum collection contains a number from St. Thomas. The Porto Rico expedition obtained several specimens at Caballo Blanco Reef and at Ponce.

Petrolisthes ? amœnus (Guérin). Plate 3, fig. 3.

Porcellana amœna Guérin, in La Sagra's History of Cuba, VIII, Atlas, pl. II, fig. 2, "1855."

The front is in the form of an obtuse angle; it has a deep depression from the apex along the median line to a line which curves from the slight protuberances of the gastric region to the shoulder where the cervical suture begins; the sides of the front are denticulated; there is a spine on the orbit and one at the shoulder. The carapace is without rugæ; a lens discloses a slight pubescence over the entire surface but becoming a little more marked near the front; it is longer than broad, measuring from the apex of the rostral projection; the areolations are very indistinct. The left cheliped is wanting, the right is smooth to the eye; the hand is granulose under a lens, the carpus is minutely rugose. The carpus is armed with four teeth on the inner margin very much like those of *P. sexspinosus*; it also has a row of four or five much smaller ones on the outer margin. The hand is marked by a row of spines on the lower margin of the palm, by a carina on its crest, and by a sulcus which runs the length of the finger. The dactyls of the ambulatory feet are spiny below and the merus has a line of four or five spines above. This species is readily distinguished from *P. sexspinosus* by the lack of coarse rugæ on the carapace and chelipeds.

A single specimen from the reefs at Ponce, Porto Rico. Its identification with La Sagra's specimens from Cuba is by no means complete, but the general characters are there. Guérin's figure would indicate that *P. amœnus* was much like *P. sexspinosus* in color.

Genus PISOSOMA.

Pisosoma glabra Kingsley. Plate 3, fig. 5.

Pisosoma glabra Kingsley, Proc. Acad. Nat. Sci. Phila., p. 406, pl. XIV, fig. 2, 1879.

The front is broad, slightly emarginate; the middle is a little in advance of the inner angles of the orbits. In general, the surface of the carapace is smooth, though slightly rugose near the posterior angles. The chelipeds are short and stout, subequal. When the hand is drawn back under the thin inner edge of the carpus, a large tooth-like projection nearly reaches the line of the inner base of the dactyl and the carpus. The margin is further divided up by three other toothlike lobes; a line drawn from the ends of the lobes at the extremes of the margin shows the middle lobes in advance; the outer margin is armed with a line of sharp granules; parallel to this is another line of like granules, but smaller in size and shorter in length of line. The hand is more triangular than in *P. angustifrons* or *P. serrata*.

There was but one specimen in the Porto Rico collection. This agrees well with the type from which the figure was made. The exact locality is not given on the label.

Pisosoma angustifrons, new species. Plate 3, fig. 6.

This species is much like *P. greeleyi* Rathbun.[1] It differs in having a rougher carapace; the sides are less arcuate. The right cheliped is stout and larger than the left. The carpus has numerous large and well separated granules evenly distributed on its upper surface; the granules on the carpus of *P. greeleyi* are crowded on the outer margin. The inner margins of the carpus in *P. angustifrons* is armed with four blunt teeth, one of which has a double point, otherwise the teeth are even in size and similar in shape. *P. greeleyi* has but three granulated teeth, uneven in size. The hand of the latter is granulated; the granules are not arranged in rows; in *P. angustifrons* there are two prominent rows of granules on the palm.

One specimen from Trinidad in the *Albatross* collection.

Pisosoma serrata, new species. Plate 3, fig. 7.

The front is a little advanced in the middle, otherwise it is rectangular in appearance. The orbits are deeper than in *P. angustifrons*. The carapace is convex in both directions and is rugose near the lateral and posterior margins. The branchial and other depressions are slight. The chelipeds are stout and unequal. The thin inner margin of the carpus is incised; three notches divide it into teeth, which are again divided into two or more points; the surface near the margin is set with large, rounded

[1] Proc. Wash. Acad. Sci., II, p. 147, pl. VIII, fig. 4, 1900.

granules, while the surface near the opposite margin is set with ridges and compressed granules, which appear like little disks on edge. The granules of the middle of the carpus are very much depressed. The surface of the palm is thickly set with coarse granules; near the crest the granules are smaller. The elevated portion of the crest is longer than in *P. glabra* and about the same as in *P. angustifrons*.

On corals at Mayaguez.

This species, like all others of the genus that I have seen, is small, the larger specimens not measuring more than 5 mm. in width.

Genus PACHYCHELES.

Pachycheles rugimanus A. Milne-Edwards. Plate 3, fig. 9.

Pachycheles rugimanus A. Milne-Edwards, Bull. Mus. Comp. Zool., VIII, p. 36, 1880–81.

The outline of the frontal margin as seen from above is nearly straight; from in front the margin dips down in a V at the median line. The orbits are raised, forming a depression behind the margin. The chelipeds are subequal; the inner margins of the carpal segments are armed with four teeth, graded in size, the proximal being the largest; the upper surfaces have four longitudinal ridges, with deep channels between; the channels are interrupted at the bottom by septæ, which form a row of oblong pits between the ridges. The hands have the same general character, except that there is less regularity in the arrangement. The dactyls of the ambulatory feet are short and are armed beneath with three or more small spines, too small to warrant the term multiungulate.

Dredged by the *Blake*.

Pachycheles ackleianus A. Milne-Edwards.

Pachycheles ackleianus A. Milne-Edwards, Bull. Mus. Comp. Zool., VIII, p. 36, 1880–81.

The front is nearly vertical and straight as seen from above; from before the median projection it is short and triangular. The carapace is longer than wide, with nearly parallel sides; a prominent suture crosses it from side to side, running behind the hepatic and gastric regions. The chelipeds are very unequal in size; the left is much the larger in one specimen, while the reverse is true in two others. The carpal segment of each is armed with three stout teeth on the inner margin. The surfaces are dotted with large flattened granules, without any regular arrangement; the granules on the hand are similar, except on the lower margin, where they are regularly elongated and are arranged in rows; a bunch of granules near the gape of the fingers forms a prominent tubercle. The dactyls are short, wide, and multiungulate, as in *Polyonyx* Stimpson, and like the type species of that genus it is commensal in its habits, having been found by Mr. J. E. Duerden "in massive black sponges." In appearance and in the character of the antennæ it is a *Pachycheles*.

U. S. Fish Commission steamer *Albatross*, station 2413.

Genus MEGALOBRACHIUM.

Megalobrachium poeyi (Guérin). Plate 3, fig. 8.

Porcellana poeyi Guérin, La Sagra's Hist. of Cuba, VIII (Atlas), Articulata, pl. II, fig. 4, "1855."

Megalobrachium granuliferum Stimpson, Proc. Acad. Nat. Sci. Phila., X, p. 228, 1858; also Annals Lyc. Nat. Hist. New York, VII, p. 76 (March, 1859).

The three lobes of the front extend but little beyond the eyes; the middle lobe is rounded, not noticeably larger and but a trifle in advance of the lateral lobes, which are more angular. The eyes are small. The carapace is rounded; there is a paired depression behind the eye on the gastric region. The areolations are distinct; the surface is pubescent, often covered with sordes; along the front, between and a little behind the eyes, and along the antero-lateral region the surface is sharply granular; a part of the border is marked by a row of granules. The chelipeds are characterized by depressions—two on the carpus and three on the palm. The entire surface is more or less hairy and is coarsely granulated. The hair on the lower portion of the palm and on the fingers is long and coarse and is often covered with dark slime.

Taken among the Bahama Islands at St. Thomas, the Barbados, and at Savanilla.

Genus PORCELLANA.

Porcellana sayana Leach. Plate 3, fig. 10.

Pisidia sayana Leach, Dict. Sci. Nat., XVIII, p. 54, 1820.
Porcellana ocellata Gibbes, Proc. Amer. Assoc. Adv. Sci., III, p. 190, 1850.
Porcellana sagrai Guérin, in La Sagra's Hist. of Cuba, VIII, pl. II, f. 5.
Porcellana sayana Kingsley, Proc. Acad. Nat. Sci. Phila., p. 407, 1879.

The front is triangular and emarginate on the sides; it is well separated from the lateral teeth at the angles of the orbits by wide and moderately deep incisions. The carapace is longer than wide. There is a shoulder where the cervical groove meets the side. The surface is minutely rugose. The chelipeds are short, curved, and bent; inner distal angle of merus and proximal inner angle of carpus produced, forming lobes. There is a fringe of long hair on the outer margin of the hands.

This species can readily be distinguished from any other porcellanid of the region by the numerous white spots on a red ground, both on the carapace and feet. A favorite place for this crab is in the spire of a large univalve containing a hermit crab.

Boqueron Bay, Arroyo, station 6086, $14\frac{3}{4}$ fathoms.

Porcellana stimpsoni A. Milne-Edwards.

Porcellana stimpsoni A. Milne-Edwards, Bull. Mus. Comp. Zool., VIII, p. 35, 1880-81.

Not examined "by the side of *P. sayana*. The carapace is wider. Its front is less advanced; the median point is rounded, lobiform, and it does not pass the inner angles of the eye. The anterior feet are smooth and are not fringed with hair as on *P. sayana*."

Dredged by the *Blake*.

Porcellana sigsbeiana A. Milne-Edwards.

Porcellana sigsbeiana A. Milne-Edwards, Bull. Mus. Comp. Zool., VIII, p. 53, 1880-81.

This species is much the largest of the porcellanids of the region and comes from deeper water, ranging from 25 to 175 fathoms. The front is deeply tridentate; the rostral projection extends beyond and is much larger than the lateral teeth. The lateral margin of the carapace is thin, produced, and is slightly turned upward. The chelipeds are long; to the eye they are smooth and glabrous; under a lens the surface is broken by minute rugæ composed of small granules. The color markings on the carapace, in the alcoholic specimens, consist of lines running longitudinally.

Dredged by the *Blake*.

Porcellana soriata Say.

Porcellana soriata Say, Jour. Acad. Nat. Sci. Phila., I, p. 456, 1818.
Pisidia socia Leach, Dic. Sci. Nat., XVIII, p. 54, 1820.
Porcellana sociata Gibbes, Proc. Am. Assoc. Adv. Sci., III, p. 190, 1850. Kingsley, Proc. Ac. Nat. Sci. Phila., XXXI, p. 407, 1879.

The front appears rounded when seen from above, tridentate from before; the rostral tooth is but little larger than the lateral teeth. The areolations of the carapace are well marked, some are inclined to be tubercular. The ambulatory legs are hairy; the chelipeds are very tuberculose; the tubercles are large and granulated; on the carpus they are placed without regularity, while on the hands they are in more or less well-defined rows; the lower margin of the hands are fringed with hair.

It seems necessary to restore Say's name *soriata*, which was dropped, perhaps, on account of its form or with the belief that the letter *c* was intended where *r* was used. Dr. Gill thinks that the name was suggested to Say by the fact that the aggregations of granules into tubercles on the chelipeds resemble the "sori" of ferns. The word *sorus* itself, he adds, is derived from the Greek σωρός, meaning, primitively, a "heap of corn." With this derivation the name will apply to the species much better than *sociata*, as the tubercles look like heaps of granules.

Southern coast of the United States.

Porcellana pilosa H. M. Edwards. Plate 3, fig. 11.

Porcellana pilosa H. M. Edwards, Hist. Nat. des Crust., II, p. 253; Kingsley, Proc. Acad. Nat. Sci. Phila., p. 406, 1879.

Readily distinguished from all other porcellanids of the West Indian region by the short, stout bristles on all of the feet in connection with the group of white tubercles on proximal portion of carpus. The median projection of the front is rounded and but little in advance of those at angles of the eyes.

Charleston, S. C., to the West Indian region in shallow water; Porto Rico, several localities.

Genus POLYONYX.

Polyonyx macrocheles Stimpson.

Porcellana macrocheles Gibbes, Proc. Amer. Assoc. Adv. of Sci., III, p. 191, 1850.
Polyonyx macrocheles Stimpson, Proc. Ac. Nat. Sci. Phila., X, p. 229, 1858. Kingsley, Proc. Ac. Nat. Sci. Phila., XXXI, p, 408, 1879.

The carapace is ovate and is much wider than long. The orbits are very shallow; the eyes are small; the front is so little produced that it does not interfere with the ovoid outline. The chelipeds are long and slender. The inner margin of the carpus is produced and entire. The hand has a fringe of long hair on its lower border. "The dactyls of the ambulatory feet are short, wide, and bi- or multi-ungulate."

This crab is found in the tubes of *Chætopterus*, on the southeastern coast of the United States and in the Gulf of Mexico, and may yet be taken in the West Indies.

Genus EUCERAMUS.

Euceramus prælongus Stimpson. Plate 3, fig. 12.

Euceramus prælongus Stimpson, American Jour. Sci. and Arts, II, XXIX, p. 445. Kingsley, Proc. Acad. Nat. Sci. Phila., p. 408, pl. XIV, fig. 4, 1879.

This is a small, elongated porcellanid, with a semicylindrical carapace. The front is tridentate; the teeth are sharp, the middle one twice as long as the lateral. The carapace is crossed by minute rugæ; its length is twice the width. The chelipeds are elongated; the palms of the hands are covered with bristles; the ambulatory feet are stout, the fourth pair is the longest.

The figure is from a Union College specimen identified by Mr. Kingsley.

Genus HIPPA.

Hippa cubensis (Saussure).

Hippa scutellata Fabr., Ent. Syst., II, p. 474, 1793.
Remipes cubensis Saussure, Rev. et Mag. Zool. (2), IX, 1857.
Remipes barbadensis Stimpson, Ann. Lyc. Nat. Hist. of N. Y., X, p. 120, 1871.
Remipes scutellatus of authors.
Hippa cubensis, M. J. Rathbun, Proc. U. S. Nat. Mus., XXII, p. 300.

Front trilobate. Antennulæ naked with the exception of a fringe of short cilia on the lower margin of the flagella, which is less than half the length of the carapace. The eye-stalks and antennæ are short. The carapace is depressed, broadest in the middle, tapering much more toward the head than posteriorly. It is bordered on the sides and front with short oblique lines of bristles, which rise from the bottom of grooves such as would be formed by overlapping scales. The bristles are directed forward. The border formed by these lines is broadest at about the posterior third carapace.

Length of specimen, 15 to 25 mm.

Porto Rico; at Ponce, Hueares, Mayaguez, Boqueron Bay. West India regions generally, and the west coast of Africa.

Genus EMERITA.

Emerita talpoida (Say).

Hippa talpoida Say, Journ. Acad. Nat. Sci. Phila., I, p. 160, 1817.
Hippa talpoida of American authors, *H. emerita* in part of others. For synonymy see Miers's Revision of the Hippidea, in the Journ. Linn. Soc. Lond., XIV, p. 323, 1879.

Miss Rathbun[1] has shown that *Remipes* is a synonym of *Hippa*, and that the type of *Hippa* is the *Hippa adactyla* Fabr.=*Remipes testudinarius* Latreille. This makes it necessary to survey other boundaries and to search for another name for the bereft little decapod so common in the shifting sands of our more southern shores. Gronovius in 1763 figured and described both the *Hippa emerita* and the *Remipes scutellatus* of authors under the generic name *Emerita*. After this Scopoli gave the same name to a chelate decapod and referred to figures of Swammerdamm which are intended to represent *Pagurus bernhardus*. If we ignore *Emerita* Gron.[2] for the "sand bugs," it would seem that we must recognize *Emerita* Scopoli for the "hermits" now in the genus *Pagurus*, and so add to the confusion. Although the names of Gronovius have not been universally used, I see no good reason why *Emerita* should not stand.

[1] Proc. U. S. Nat. Mus., XXII, p. 301, 1900.

[2] Scopoli, Intro. ad Hist. Nat., p, 405, 1777.

The *Hippidæ* of the West Indian region, represented by the genera *Hippa* and *Emerita*, are easily distinguished by the very long antennæ and the hemispherical cross section of the body of *Emerita* in contrast with the short antennæ and much less convex body of *Hippa*. The *Hippidæ* have nonchelate anterior legs; the outline of the carapace is ovate, fitting them for rapid movements in the loose sand along the surf-beaten shores. The young are often in great numbers in more sheltered places. Old and young are a favorite food for fish.

Mayaguez, San Juan. A specimen from Mayaguez is about 25 mm. long, 12 mm. wide.

Genus ALBUNEA.

Albunea gibbesii Stimpson.

Albunea symnista Gibbes, Proc. Amer. Assoc., III, p. 187, 1850.
Albunea gibbesii Stimpson, Ann. Lyc. Nat. Hist. N. Y., VII, p. 78, pl. I, fig. 6, Mar., 1859. Miers, Jour. Linn. Soc. Lond, XIV, p. 329.

The front behind the eyes is deeply sinuate. There is a spine on the median line. The margin between the eyes and antennæ is armed with about nine sharp spines. The eye-stalks are lamellate, elongated, triangular, with very small cornea at the apex of the angle. The flagellæ of the antennulæ are multiarticulate and more than twice as long as the carapace. The carapace is subquadrate, little convex on the median line and very convex from side to side. The sides are nearly straight, tapering a little behind. The first three pairs of ambulatory feet have falcate dactyls. The terminal segment in the male is elongated; in the female rounded.

The Albuneas have long antennules and subchelate anterior feet. The carapace is straight on the median line and convex transversely. The anterior outline is truncate.

The species are found from the shore line to the moderate depths. Specimens were dredged at station 6053, San Juan Harbor, in 4 to 7½ fathoms.

Albunea oxyophthalma Miers.

Albunea oxyophthalma Miers, Jour. Linn. Soc. Lond., XIV, p. 329, pl. V, figs. 14 and 15, 1879.

This species is distinguished from the preceding by the slightly more elongated eye-stalks and by the 11 or 12 spines on each side of the anterior margin. Length about 30 mm.

West Indian region.

Genus CENOBITA.

Cenobita diogenes (Latreille).

Pagurus diogenes Latreille, Ency., pl. 284, figs. 2 and 3. (From Catesby.)
Cenobita diogenes H. M. Edwards, Hist. Nat. des Crust., II, p. 240, pl. II, figs. 11–14, 1837.

This genus, as pointed out by H. M. Edwards, is intermediate between the noted cocoa-nut crab of the Pacific Islands and the *Paguridæ*. The West Indian species of the genus *C. diogenes* lives preferably in the heavy shells of *Livona pica* Gmelin, which it drags even up the hills; for this hermit lives on land much of the year, going back to water, some of the islanders say, to get new shells. In reality they visit the water in the breeding season. While *P. diogenes* climbs the hills, I have more frequently met with it in low marshy but shady places. It can readily be distinguished from any other hermit of the region by its earth-roaming habits, its large left cheliped of bluish purple, by its very stout ambulatory legs, its compressed eye-stalk, and by the propodus of the left third foot, which is very deep or compressed.

Boqueron Bay, Ensenada Honda (Culebra), Caballo Blanco Reef, Ponce.

Genus PAGURUS.

Pagurus marshi, new species.

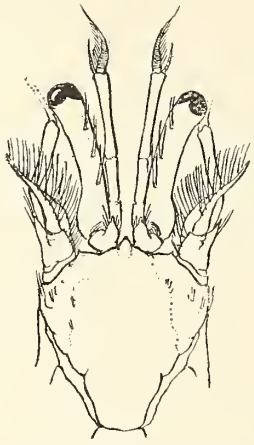
The projections of the front are pointed; the median or rostral point is in advance of the lateral points. Of the four divisions of the frontal line caused by the points, the two middle ones are transverse, forming a shallow sinus behind each eye. The two between the lateral points and the side of the carapace would, if prolonged, meet the median line a little beyond the eye scales. A large space in the middle of the anterior part of the carapace is smooth; near the sides the surface is rough.

The eye-stalks are as long as the entire front and are strongly bent inward from the base to the middle, outward from the middle to the cornea; the scales are broad and rapidly acuminate. The

peduncles of the antennulæ are but little longer than the eyes, while the peduncles of the antennæ are about equal in length; the acicles are curved in about the same lines as the eyes.

The right cheliped is moderately stout; the merus has a slender spine above on the anterior margin; there are two on each side of the lower margin. There is a row of six spines on the inner margin of the carpus, and seven or eight spines on the upper surface, not arranged in well-defined rows. The hand is oblong-ovate, with six well-defined rows of spines, two of which occupy the margins; a row runs parallel to the inner margin; this and the marginal row are continuous with two rows on the dactyl; the two median rows converge to a common terminal spine near the gape of the fingers; the sixth row runs in a curve to a point near the end of the immovable finger; the lower surface of the palm is smooth. The hand is hairy and in the shell, covered with mud which clings to the hair and the surface between the spines. The left hand is very much smaller than the right; is slender, the hand being but a trifle wider than the carpus. The carpus is compressed and is armed with a few spines on the upper margin. Those on the distal end are the largest. The hand is

a, Right hand.



Front and anterior appendages of *P. marshi*.

b, Left hand.

elliptical in shape with a hiatus between the fingers; a line of spines runs along the outer margin to the end of the immovable finger; another line begins at the inner angle of the articulation with the carpus and runs across the palm to the end of the immovable finger. A short line runs from the opposite angle to the gape of the fingers. This combination of lines incloses an elliptical space, which is smooth or with one or two spines. The ambulatory legs are hairy.

Obtained at Ponce, in shells of *Turbo castaneus* Lamarck.

Named for Mr. Millard C. Marsh, of the scientific staff of the *Fish Hawk*, on its expedition to Porto Rico.

Genus PETROCHIRUS

Petrochirus bahamensis (Herbst)

Cancer bahamensis Catesby, Carolina, p. 34, pl. XXXIV; Herbst, II, p. 30, 1792.
Pagurus granulatus H. Milne Edwards, Hist. Nat. des Crust., II, p. 225, 1837.
Petrochirus granulatus Stimpson, Proc. Acad. Nat. Sci. Phila. 1858, p. 223.

Two small specimens of this species were taken, one at Mayaguez, the other at Boqueron Bay. This is the common hermit inhabitant of the large conch *Strombus gigas*, so frequently met with in the shallow waters of Florida and the West Indies, and is perhaps the largest of the *Paguridæ*.

The front extends forward between the bases of the outer antennæ; the lateral projections are a little in advance of the middle or rostral projection; the outer antennæ are placed in an angle of the front. The anterior portion of the carapace is about as broad as long; is rough and uneven at the sides, with now and then a bunch of stiff bristles. The length of the eyes measured from the front to the extremity of the cornea equals that of the anterior portion of the carapace. A small cuneiform spot of red seems to be uniformly found on the peduncle just below the cornea on the inner

side. The eye scales are tapering, with a blunt apex armed with several spinules. The peduncles of the antennæ do not reach the cornea; the flagellum is about three times the length of the anterior carapace; it is strikingly colored with wide annulations of light and dark. The chelipeds are large and very rough; the right hand is the larger. The inner lower edge of the merus and the anterior margins are each armed with a row of spines. The carpus has a row of five spines with horny tips on the inner margin continuous with a similar row on the hand; the surface of the carpus is broken with swellings bearing small conical spines with horny tips; between the swellings are stiff bristles. Similar swellings on the hand are strongly tuberculous; some near the carpus are also spiny. The prehensile edges of the fingers of the right hand are blunt, without teeth or tubercles except near the tips, the fingers of the left hand are well provided with cutting teeth. The ambulatory feet are stout and about as long as the chelipeds; they are rough with spiny margins; the dactyls are stout, with dense rows of bristles above and below.

Small specimens from Mayaguez and Boqueron Bay.

PAGURIAS[1] new name.

Since publishing the statement[2] that "it seemed necessary to change the name of the group of which *bernhardus* is the type to *Pagurus*" I have not seen that the group long known as *Pagurus* has been yet supplied with a name. For this group I propose the name *Pagurias*.

Pagurias insignis (Saussure).

Pagurias insignis H. de Saussure, Mem. sur divers Crustaces nouv. du Mexique et des Antilles; p. 453 (37), Genève, 1858.

The middle front is occupied by a lobe much shorter than the lateral lobes, which are situated between the eyes and the antennæ. The latter project to a point on a line with the bases of the eye scales. The margin beyond the lateral lobes is straight and forms a right angle, with a rounded apex where it meets the side. The eye-stalks are stout, constricted in the middle, and in length, measured from the margin of the front, a little more than equal to three-quarters the width of the carapace. The eye scales are short and broad, with straight inner margins; the blunt tips carry several spines. The antennal peduncle equals the eye in length. The anterior part of the gastric area is inclosed by a rather deep semicircular sulcus and is divided on the median line by a short deep sulcus, which in some specimens is occupied by stiff bristles.

The left cheliped is much larger than the right. Behind the thumb are numerous oblong tubercles surmounted by a comb-like crest of little tubercles; between the large tubercles are fan-shaped fringes of plume-like bristles, which are parallel to the surface; higher up on the hand the form of the tubercles is a little modified. The propodus and dactyl of the second pair of ambulatory feet on the left side are wide; a prominent ridge runs the full length of both articles. Tubercles of the same nature as those on the chelipeds run transversely across the outer surface, interrupted in the middle by a sulcus, at the bottom of which is a row of single tubercles. The fan-like arrangement of bristles is repeated here, but does not occur on the right cheliped or on any other ambulatory leg.

This hermit is a most beautiful object. As preserved in alcohol, the ambulatory feet are banded with red on the merus and carpus; the comb-like tubercles are pink, the bristles of the left second foot and of the left cheliped are yellow, and the white tubercles of the fingers are marked out in the base with scarlet lines.

This is one of the larger hermit crabs of the West Indies. Several fine specimens were taken at Arroyo.

Genus CALCINUS.

Calcinus sulcatus (H. M. Edwards). Plate 5, figs. 3 and 3*a*.

Pagurus sulcatus H. M. Edwards, Hist. Nat. des Crust., II, p. 230.

Calcinus sulcatus Hilgendorf, Monatsber. d. k. Preuss. Akad. d. Wiss. Berlin, p. 823, 1878. Henderson, Challenger Report, XXVII, Aromura, p. 61.

The rostral point is very small and the lateral projections are even less conspicuous. The eyes are longer than the carapace is wide; the scales are slender and terminate in one or two slender spinules.

[1] The name is composed of the old term *Pagurus* and the suffix *ias*, indicating resemblance of some kind or other; it was in very common use among the ancient Greeks, as exemplified in *Xiphias*, *Anthias*, *Asterias*, and numerous other old names.

[2] Ann. and Mag. of Nat. Hist. (6) XVIII, p. 99, footnote.

The carapace is glabrous and punctate. The left cheliped is much the larger. The propodus of the second ambulatory leg of the left side is wider than those of the other legs and has the sulcus which suggested the name. This pretty little pagurid is the only representative of the genus accredited to the West Indian region. It prefers shells with the more circular apertures, as do many of the pagurids with hands so different in size. The color of the eye-stalks is an orange red, becoming white at the cornea; carapace a rich red, with white punctæ. The chelipeds are red, often tinged with purple.

Ensenada Honda, Culebra; Caballo Blanco Reef, Vieques; Arroyo; Ponce.

Genus CLIBANARIUS.

Clibanarius tricolor (Gibbes). Plate 6, fig. 2.

Pagurus tricolor Gibbes, Proc. American Assoc., 1850, III, p. 189.
Clibanarius tricolor Stimpson, Proc. Acad. Nat. Sci. Phila. 1858, p. 234.

This little *Clibanarius* is unique among the members of the genus inhabiting the region in having the legs conspicuously banded with color rather than longitudinally striped, a character that is so nearly generic. It is found in some localities in great numbers, living in the shells of *Cerithium* of various species and other small gastropods. The orange bands at the proximal ends of the articles of the ambulatory feet remain in the alcoholic specimens, but the "black spots" on the carapace are not present. Gibbes does not mention the single orange stripe on the eye-stalk.

From Ponce and San Juan.

Clibanarius antillensis Stimpson. Plate 6, fig. 1.

Clibanarius antillensis Stimpson, Ann. Lyc. Nat. Hist. of New York, VII, p. 85; part published March, 1859.

The frontal margin is nearly straight, broken only by a very small rostral point; from the angle behind the antenna to the side of the carapace the margin is straight. The length of the eyes is equal to the width of the carapace; the eye scales are short, broad, and truncate, and armed with three or four spinules on the terminal margin. The carapace is elongated, is widest at the anterior third, and is deeply punctate. The chelipeds are armed with numerous sharp conical spines. As occurs in some species of other genera, the propodus and dactyl of the exposed second left ambulatory leg are much wider than the corresponding parts of the right side. On the side of the merus are two white stripes; a single stripe of the same color runs from the merus to the tip of the dactyl; the chelipeds are reddish, with white spines. A small species, averaging but little larger than the preceding.

Mayaguez; Ponce; Boqueron Bay; Ensenada Honda, Culebra; Arroyo.

Clibanarius sclopetarius (Herbst).

Cancer sclopetarius Herbst, Krabben und Krebse, II, p. 23, pl. XXIII, fig. 3.
Pagurus tuberculosus H. M. Edwards, Ann. des Sci. Nat. (2), VI, p. 278, pl. XIII, fig. 1; also Hist. Nat. des Crust., II, p. 229.
Clibanarius sclopetarius Stimpson, Proc. Acad. Nat. Sci. Phila., p. 235, 1858; also in Ann. Nat. Hist. N. Y., VII, p. 85, part published 1859.
Pagurus cubensis Saussure, Crust. Nov. du Mexique et des Antilles, p. 39, 1858.
Clibanarius formosus J. E. Ives, Proc. Acad. Nat. Sci. Phila. 1891, p. 182, pl. V, figs. 1–2.

From Ensenada Honda, Culebra, there is a specimen of this species which comes under Herbst's description. The eye-stalks have faded to an olive green; the stripes on the legs are a brownish purple; the spiny tubercles of the chelipeds are yet greenish; the ground color is reddish. Three other specimens from Culebra are the same in form, but differ in color—the stripes are a bright crimson; in one specimen the eye-stalks are crimson; in another specimen one eye-stalk is crimson at the base and a very light flesh-color tinged with green near the cornea. From Jamaica a number of specimens come well under H. Milne Edwards's description of *C. tuberculosus*. The color is reddish, with yellow stripes on the legs.

The variation in color is wide; it may be possible, with an abundance of fresh material from many localities, to separate this species into subspecies. The variations in form are slight and do not hold uniformly in specimens from one locality and color. The variation in the length of the eye-stalk is as great as in any part. Among a number of specimens from Jamaica is one with eye-stalks very nearly equal to the length of the anterior portion of the carapace, measuring the eye-stalk from the front to the extremity of the cornea; in other specimens taken at the same time the eye-stalks are much shorter.

Ensenada Honda, Culebra; San Juan.

Genus XYLOPAGURUS.

Xylopagurus rectus A. Milne-Edwards.

Xylopagurus rectus A. Milne-Edwards, Bull. Mus. Comp. Zool., VIII, p. 37. A. Milne-Edwards & Bouvier, Mem. Mus. Comp. Zool., XIV, p. 108, pl. VIII, figs. 1–13. A. Agassiz, Bull. Mus. Comp. Zool., XV, p. 40, 1888.

The front advances gradually from the angle behind the eyes, forming a short rostral point; the eye-stalks are stout and a little elongated; clavate; the cornea is large and swollen. The antennæ are small, the antennulæ large; the eye scales are comb-like; the carapace is elongated, smooth, and semi-cylindrical. The abdomen is obliquely cut, subquadrate, and divided into four or five plates. Two specimens were taken at station 6033 in vegetable tubes. The carapace and feet are red, of several shades; the ambulatory feet are lighter at the joints; the right hand is light beneath. The chelipeds and ambulatory feet are elongated; the right cheliped is very much larger than the left; the upper margin of the palm extends over the movable finger in the form of a large tubercle. All of the legs are free from spines.

Obtained at station 6063.

Genus PAGURISTES.

The Paguristes of the West India region, of which *Paguristes depressus* Stimpson is the type, are numerous and difficult to determine without figures; consequently the 10 species in the U. S. Fish Commission collection and the National Museum collections have been figured for this report.

Key to the group of the genus Paguristes of the West Indian region.

a. Peduncle of the antennules much longer than the eye-stalks.
b. Rostral projection short and blunt.
c. Peduncles of antenna longer than eye-stalks ..... *sayi*
cc. Peduncles of antenna shorter than eye-stalks ..... *lymani*
bb. Rostral projection long and slender ..... *triangulatus*
aa. Peduncles of antennules not longer than eye-stalks.
d. Eye-stalks measured from extremity of rostral point to end of cornea longer than distance between antero-lateral angles.
e. Rostral point acute.
f. Carapace very convex ..... *spinipes*
ff. Carapace very much flattened.
g. Rostrum broad at base, triangular ..... *sericeus*
gg. Rostrum long and slender ..... *depressus*
ee. Rostral point obtuse ..... *tæniatus*
dd. Eye-stalks shorter than the front.
h. Base of the rostrum anterior to the line of the antero-lateral angles.
i. Outline of the front almost straight.
k. Rostrum slender from base to tip ..... *tenuirostris*
kk. Rostral projection short, rounded ..... *planatus*
ii. Outline of the front much curved at the sides.
l. Rostrum not spiny ..... *puncticeps*
ll. Rostrum usually with one or more spines on each side ..... *grayi*
hh. Base of the rostrum posterior to line of antero-lateral angles ..... *rectifrons*

Paguristes tenuirostris, new species. Plate 4, fig. 1.

The rostrum in this species is more slender than in any species yet examined by me; its sides are parallel from the base to near the acute tip. The general outline of the front is much like that of *P. rectifrons*, but the sinus behind the eyes is in advance of the line of the antero-lateral angles. The straight appearance of the front is heightened by the fact that the rostrum and the tips of the projections between the eyes and antenna are colored to correspond with the peduncles of the eyes and antenna, which are red, spotted with white, as in *P. puncticeps*, except that the color fades out rapidly from the middle of the eyes. The terminal segment of the antennal peduncle is armed with two spines. The carapace is white and very flat, and even in strong contrast with that of *rectifrons*.

One male, from *Grampus* station 5077, in 68.5 fathoms, Gulf of Mexico, off west coast of Florida.

Paguristes sayi A. Milne-Edwards & Bouvier. Plate 4, fig. 2.

Paguristes sayi A. Milne-Edwards & Bouvier, Mem. Mus. Comp. Zool., XIV, No. 3, p. 55, pl. v, figs. 1–7, 1893.

The rostral and lateral projections of the front in this species are about equally advanced; the rostrum is a rounded lobe. The eye-stalks are short, equaling in length about five-eighths of the width of the carapace. The terminal segment of the peduncle of the antennula extends beyond the cornea nearly the entire length, that of the antenna one-third of its length. The carpus, propodus, and dactyl of the first pair of ambulatory legs are spiny along the upper margin; the carpus has four large spines on its inner border, also four on the crest of the palm; in addition to more or less scattering large, spiny granules, there is a prominent row extending from the wrist to the gape of the fingers.

In general this specimen agrees with that figured by Milne-Edwards & Bouvier, but the rostrum of their specimen is pointed and the eyes are figured as more slender. This is so close to *sayi* that I am unwilling to call it new. One male was dredged by the *Albatross* at station 2655, in 338 fathoms.

Paguristes moorei, new species. Plate 4, fig. 3.

The rostrum is short, rounded, not quite reaching the line of the tips of the projections of the front between the eye-stalks and the insertions of the antenna. From these points the front retreats rapidly to the well-rounded antero-lateral angles. The eye-stalks are about one-fifth longer than the entire front. The peduncles of the antenna extend a little beyond the middle of the eye-stalk; the terminal segment is unarmed. The peduncles of the antennula do not extend quite to the extremity of the cornea. The chelipeds are rather narrow, the outline of the hand is slightly elongated, with a straight margin where the two hands come together in close contact; the lower or outer margins are concave. The outer surface is well covered with small tubercles surmounted by spinules with small horny tips; the crest of each hand is armed with five small, stout spines; the hands are hairy. The first pair of ambulatory feet are spiny along the outer margin of the carpus and propodus. The color of the eye-stalks in the single specimen from Porto Rico is a deep crimson, with a single stripe of white along the upper surface.

Named for Dr. H. F. Moore, the naturalist of the *Albatross* and a member of the scientific staff of the *Fish Hawk* on its expedition to Porto Rico.

Paguristes puncticeps, new species. Plate 4, fig. 4.

The rostrum in this species is elongated, broad at the base and acuminate. The margin of the carapace behind the antenna falls away to the rounded antero-lateral angles. The eye-stalks are about one-sixth shorter than the front, measured between the angles. The peduncles of the antenna extend a little beyond the middle of eye-stalks; the terminal segment is normally armed with three spines, though many individuals have but two. The peduncles of the antennules do not reach the cornea. The chelipeds differ from those of *P. sericeus* in having a straighter outline of the movable finger and crest of the palm, which brings the margins of the hands in contact as they withdraw into the shell. The outer surface is paved with small tubercles which are surmounted with small horn-tipped spines. The surface is obscured with long hair. The carpus and propodus of the first pair of ambulatory legs are spiny, in the second pair the segments are almost smooth. In alcoholic specimens the color of the eye-stalks and peduncles of the first and second antennæ is pink spotted with white.

Several specimens of this species were collected at Kingston, Jamaica, in shallow water, March 1884, by the U. S. Fish Commission.

Paguristes depressus Stimpson. Plate 4, fig. 5.

Paguristes depressus Stimpson, Annals Lyc. Nat. Hist. New York, VII, p. 87, March, 1859.

"Carapax flattened, naked; posterior portion much expanded; sides of the anterior portion short, the transverse suture reaching far forward laterally; surface rugulose; lateral sinuses spinulose. Anterior cardiac lobe narrow halberd-shaped, somewhat widening toward its blunt posterior extremity. Rostrum elongated, reaching nearly to the middle of the opthalmic scales, with its lip embedded in the rounded tubercle of the opthalmic ring, which is exposed in this species. Eyes very large, much overreaching the tip of the peduncle of the very slender antennulæ. Opthalmic scales with bidentate

tip—margins of apex entire. Antennæ short; terminal joint of peduncle and flagellum very slender, almost naked; acicle slender, spinous, and hairy. Chelipeds equal, broad and depressed, almost naked; merus scabrous above; carpus minutely spinulose and armed with four spines on the inner edge; hand uniformly minutely granulated with five tubercles on the inner edge of the palm; fingers with sharp cutting inner edges; tips not spiniform; immovable finger concave below; dactyls nearly three times as long as the inner edge of the palm. Ambulatory feet above scabrous, spinulose, and setose; dactyli, with a dense series of longer setæ along the superior and inferior edges. The inner side of the penult and terminal joints in the left second foot is concave.

The following are the measurements of a female specimen: total length, 3 inches; length of carapace, 0.77; breadth of front, 0.40; length of eye, 0.41; length of chelipeds, 1.05 inches."

A male and a female of this species were taken by the *Fish Hawk* at Mayaguez, Porto Rico. The eye-stalks and chelipeds are a rich orange red. The species is readily distinguished from all others of the genus yet found in the West Indian region by the broad, spineless, evenly granulated hands; its nearest relative is the *Paguristes digueti*, of Bouvier, found on the west coast of Mexico.

Paguristes spinipes A. Milne-Edwards. Plate 4, fig. 6.

Paguristes spinipes A. Milne-Edwards, Bull. Mus. Comp. Zool., VIII, p. 44, 1880.
Paguristes visor J. R. Henderson, Challenger Report, XXVII, Anomura, p. 78, pl. VIII, fig. 3, 1888.
Paguristes spinipes A. Milne-Edwards & Bouvier, Mem. Mus. Comp. Zool., XIV, No. 3, p. 33, pl. III, figs. 1–13, 1893.

The rostrum is broad at the base, the sides are straight, meeting at the sharp apex; from the lateral projections the front retreats rapidly and rounds into the sides without forming an appreciable angle, as in *P. lymani* and *P. sagi*. The eye-stalks are very much longer than the greatest width of carapace. The carapace is more convex than in any other species of the *depressus* section of the genus. The peduncles of the antennula reach the cornea; those of the antenna are about half the length of the eyes, the terminal segments are unarmed, acicles elongated, slender, with tips 2 or 3 spined.

Taken by the *Albatross*, at station 2354, in 130 fathoms, one female.

Paguristes rectifrons, new species. Plate 4, fig. 7.

The rostrum is triangular and is inserted posterior to the general line of the front. The front is remarkable for its linear appearance from angle to angle; the projections between the eyes and antenna are low; between the bases of these projections and the antero-lateral angles the margin is straight. The eye-stalks are but little shorter than the width of the front. The peduncles of the antennula reach the cornea, those of the antenna but little more than one-half of the eye-stalk; the terminal segments of the antenna are armed with two spines; the acicle is forked and has a prominent spine on the side. The carapace is flattened and has several spines on the side. The chelipeds are short and rather stout, the carpus is broad, with two large spines on the inner margin and several smaller ones on the surface near by; the hand is broad and is shaped very much as the hand of *P. sericeus*, as shown in fig. 17, pl. III, Blake Paguridæ, Edwards & Bouvier. The crest is armed with five spines; spines of smaller size fringe the lower margin and the margin of the dactyl.

Paguristes rectifrons is separated from *P. sericeus* by the much shorter eye-stalks, by the front, which in *sericeus* is not so straight, and by the different armature of the hand and carpus.

Dredged by the *Fish Hawk*, at station 6085, in 14 fathoms, one male in the shell of *Strombus pugilis*.

Paguristes lymani A. Milne-Edwards & Bouvier. Plate 4, fig. 8.

Paguristes lymani A. Milne-Edwards & Bouvier, Mem. Mus. Comp. Zool., XIV, No. 3, p. 49, pl. IV, figs. 13–22, 1893.

The rostrum is a rounded lobe in the sinus behind the eyes; from the projections which limit this sinus the front rounds gradually into the lateral margin. The eye-stalks are short; when laid off on the front they reach from the middle of the insertion of one antenna to the middle of the other. The peduncles of the antenna reach the base of the cornea and those of the antennula extend beyond for three-fourths of the length of the last segment. The terminal segment of the peduncle of the antenna is unarmed. The sides of the carapace are roughened by spiny granules. The chelipeds are small, the hand is narrow with a few rather large tubercular granules on the surface and four spines on the crest of the palm; the lower margin of the palm is concave at the base of the immovable finger; the closed fingers show a small hiatus. The upper surface of the carpus has three rows of spines,

four large ones on the high inner margin and six on the surface a little nearer the inner margin than the outer, which is armed with six spines graded in size, the distal one being the largest.

One specimen of this species was dredged by the *Albatross* at station 2659, in 509 fathoms.

Paguristes triangulatus A. Milne-Edwards & Bouvier. Plate 4, fig. 9.

Paguristes triangulatus A. Milne-Edwards & Bouvier, Mem. Mus. Comp. Zool., XIV, No. 3, p. 40, pl. IV, figs. 6–12, 1893.

The rostrum is slightly elongated, acuminate, the lateral projections are rendered prominent by the margin behind the antenna, which retreats in a straight line to the antero-lateral angle. The peduncle of the antenna is four-fifths as long as the eye; the peduncles of the antennula are much longer. This species can be distinguished from all of the others by the triangular cross section of the dactyls of the second pair of ambulatory feet. Color of eye-stalks light rose pink.

A number of specimens were taken by the *Albatross* at station 2121, in 31 fathoms, off Trinidad.

Paguristes grayi, new species. Plate 5, figs. 1 and 1*a*.

The outline of the front is closely like that of *P. puncticeps;* it is, however, well separated from that species by the character of the rostrum and also of the eye scales. A comparison of all parts, while showing the close relationship, shows a marked difference in detail. The rostrum in two of the three specimens is armed with lateral spines and a spine at the tip; this latter armature is also found on the rostrum of *puncticeps.* The largest specimen is a female; in this case the rostrum has two spines on each side; in a smaller specimen, a male, there is but a single spine on each side; the other small specimen has a spine at the apex, but none on the side.

The peduncles of the eyes are elongate but shorter than the front, the scales are rather broad at the end, armed with a spine at the outer angle; the inner angle is produced slightly, making a notch between it and the spine. The peduncles of the antennæ are but little more than one-half the length of the eye-stalk; there are three spines on the terminal segment; the spines of the acicle are large.

The chelipeds are stout with a broad hand, as in *puncticeps;* the spines are larger and more numerous; the horny tips of the spines are much more prominent. The inner surface of the palm is much more spiny than in *puncticeps;* the spines, as in other places, are large and black-pointed.

The first pair of ambulatory feet are spinose; the spines have the same characters as those of the chelipeds; the crests of the propodus and dactyl are thin and overhanging, forming a deep sulcus on the anterior surface; the spines of the posterior pair of legs are very much less in numbers and size.

San Antonio Bridge, San Juan, Porto Rico.

This species is named for the collector, Mr. G. M. Gray, of the Marine Biological Laboratory at Woods Hole, Mass.

Genus MUNIDA.

The following is the key to the section of the genus *Munida*, of which *M. stimpsoni* is the type:

a. Without middle gastric spines ..... *stimpsoni*
aa. With middle gastric spines.
  b. Supraocular spines shorter than the eyes; not divergent ..... *flinti*
  bb. Supraocular spines longer than the eyes; divergent.
    c. Posterior margin of the carapace with more than one pair of spines ..... *evermanni*
    cc. Posterior margin of the carapace with one pair of spines ..... *affinis*

Munida evermanni, new species. Plate 5, fig. 4.

The rostrum and supraocular spines, as seen from above, are about as long as in *affinis*, but differ in being a little more divergent, not so rough, and the supraoculars are broader. The spines of the gastric region are as in *affinis*, as are also the other spines of the carapace, with the exception of those of the posterior border, which is armed with six or eight spines in place of the two common to the other three species of the group. The lines of the carapace differ very much from those of the other species. They are well separated and ciliated, but the cilia are not numerous enough to obscure the carapace; the lines are made prominent by the very large and separated granules. In comparison with those of the other species perhaps tubercles would be a more suitable name. The armature of the abdomen is about like that of *affinis*, except that the spines are proportionately larger. The chelipeds

are elongated, slender, and have more spines than the other species of the group. The spines are themselves characteristic, being thin and broad. The crest of the palm bears about ten of these spines.

Station 6070, in 220 fathoms.

This species is named for Dr. Barton Warren Evermann, the chief naturalist of the *Fish Hawk* expedition to Porto Rico.

Munida affinis A. Milne-Edwards.

Munida affinis A. Milne-Edwards, Bull. Mus. Comp. Zool., VIII, p. 48, 1880.
Munida affinis A. Milne-Edwards & E. L. Bouvier, Ann. Sci. Nat. Zool. (7) XV, XVI, p. 2573, 1894.

The rostrum extends beyond the eyes about one-half of its length. The supraocular spines are a little divergent and extend beyond the eyes but little. Both the rostrum and these spines are roughened by sharp granules. The gastric region has normally seven spines, the large gastric pair, and a secondary pair of much smaller ones directly behind the first pair and the spine on the median line, and a paired spine near the hepatic region; sometimes the middle spine has one or more spines in line with and close to it. There is a paired spine on the branchial region behind the fork of the cervical suture, and a spine on the median line on the anterior margin of the cardiac region. The posterior margin of the carapace is armed with one pair of spines.

The transverse lines of the carapace are crowded and broken; the granules with which these lines are set are very small and sharp; the cilia of the lines reach from line to line.

All specimens examined (about twenty) have a patch of long, silky, iridescent hair on the side of the branchial region, where it is covered by the knee of the fifth pair of legs. This hair is, as far as I have been able to observe, altogether lacking in the related species. The prominent armature of the abdomen is the middle pair of spines on the second, third, and fourth segments, in connection with the spine on the median line near the posterior border of the fourth segment. Smaller spines occur on the sides of the armed segments.

Munida stimpsoni A. Milne-Edwards.

Munida stimpsoni A. Milne-Edwards, Bull. Mus. Comp. Zool., VIII, p. 47, 1880. Henderson, Anomura of the Challenger, Zool., XXVII, p. 126, pl. XIV, fig. 1, 1888. A. Milne-Edwards and E. L. Bouvier, Mem. Mus. Comp. Zool., XIX, No. 2, p. 48, pl. IV, figs. 1–13, 1897.

The rostrum is longer and much more slender than that of *M. affinis*. The supraocular spines are a little divergent, without granulations, and extend a little beyond the cornea. The gastric region has six spines placed as in *flinti*—two pairs in line directly behind the supraoculars and a paired spine near the hepatic area. The transverse lines of the carapace are well separated and bear rows of cilia, which occupy about one-half of the space between the ridges. The posterior margin of the carapace has two spines. Three segments of the abdomen are armed; the fourth segment, in all specimens from off Habana, lacks the median spine. A specimen from the west end of Cuba, which I can not separate from *S. stimpsoni* by the lines of the carapace, has both a spine on the middle gastric region and a median spine on the fourth abdominal segment; the rostrum is not as long as in the more typical specimens and is rougher. A number of specimens from that locality may show the specimen to belong to a distinct species. The chelipeds of the typical specimens are long, the hands broaden slightly from the wrist to the base of the fingers; under a lens twelve or more spines can be made out on crest of palm. The outer surface of the palm is set with sharp granules and is hairy.

Albatross stations 2166 in 196 fathoms, 2321 in 230 fathoms, and 2341 in 143 fathoms.

Munida longipes A. Milne-Edwards.

Munida longipes A. Milne-Edwards, Bull. Mus. Comp. Zool., VIII, p. 50, 1880–81. A. Milne-Edwards & Bouvier, Mem. Mus. Comp. Zool., XIX, No. 2, p. 44, pl. III, figs. 9–13, 1897.

The rostral spine is a little shorter than the lateral spines of the front; the eye-stalk is short and very much constricted, while the cornea is spreading. The gastric region has a pair of slender spines, as is usual in the genus. There are three spines just behind the cervical suture—one on the median line and one, a paired spine, near the middle of the side. There are three or four spines on the margin behind the suture and two on the posterior border. The second and third abdominal segments have each seven spines, and the fourth has two. The chelipeds and ambulatory legs are more than three times as long as the carapace from the posterior margin to the tip of the rostral spine. Legs spiny.

From station 6070, in 220 fathoms.

Genus UROPTYCHUS.

Uroptychus uncifer (A. Milne-Edwards).

Diptychus uncifer A. Milne-Edwards, Bull. Mus. Comp. Zool., VIII, p. 63, 1880. A. Milne-Edwards & E. L. Bouvier, Ann. Sci. Nat. Zool. (7) XVI, p. 306, 1894; also Mem. Mus. Comp. Zool., XIX, p. 140, part 2, pl. XI, figs. 1 and 2, pl. XII, figs. 17–29, 1897.

The rostrum extends but a trifle beyond the eyes. Two spines on the antero-lateral angles are all that arise from the carapace, which is markedly smooth. The carapace is broadest about one-fourth of its length from the posterior margin; the sides are but little arcuate. The chelipeds are elongated; the margins of both the carpus and palm are parallel except near the articulations; fingers of hand hairy, as are also the dactyls of ambulatory legs; hairs on other parts few and inconspicuous.

Station 6065, in Mayaguez Harbor, 4 to 6 fathoms, and station 6070, in 220 fathoms.

Genus MUNIDOPSIS.

Subgenus OROPHORHYNCHUS.

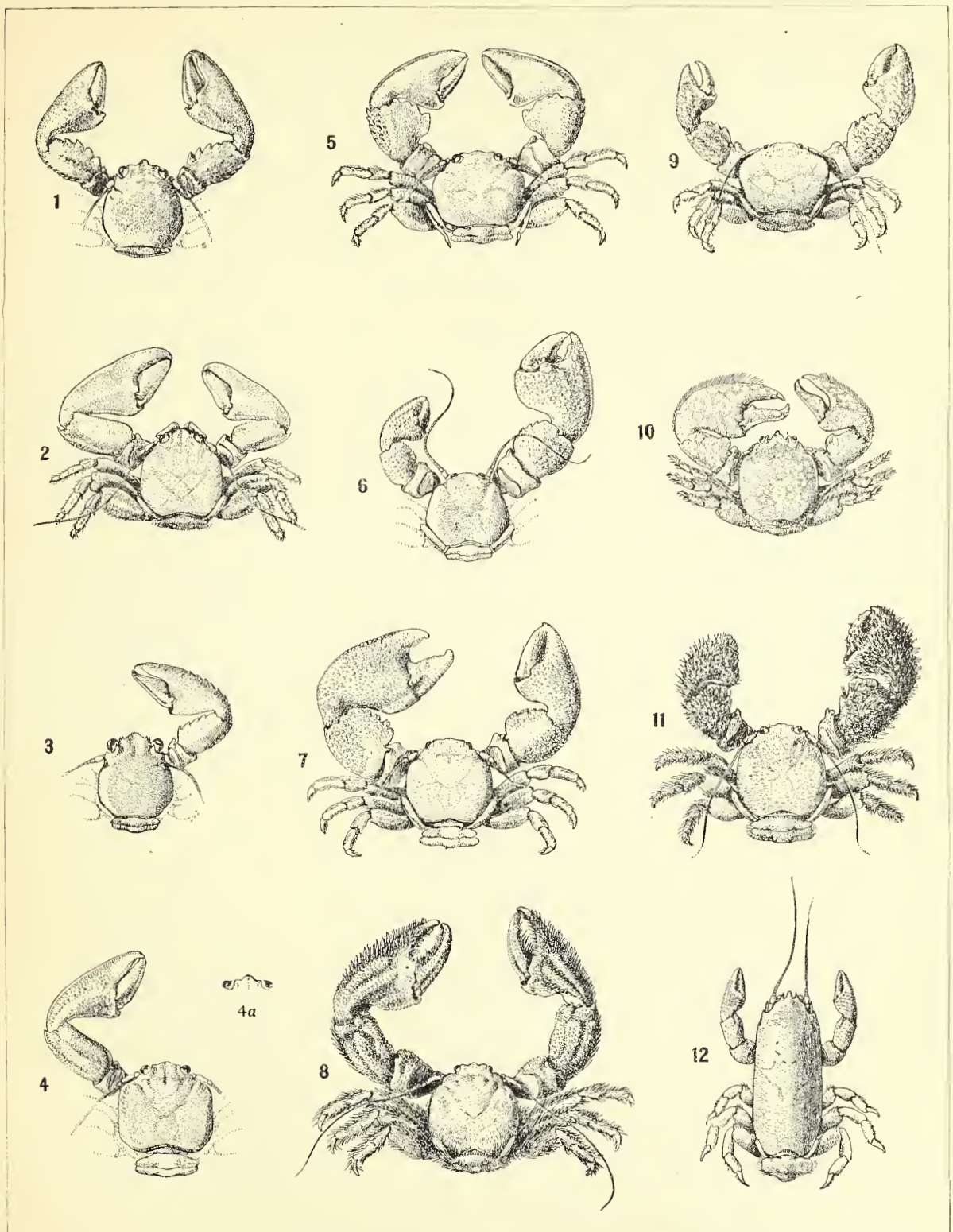
Orophorhynchus platirostris A. Milne-Edwards & Bouvier.

Orophorhynchus platirostris A. Milne-Edwards & Bouvier, Ann. Sci. Nat. Zool. (7) XVI, p. 287, 1894; also Mem. Mus. Comp. Zool., XIX, No. 2, p. 114, pl. IX, figs. 12–15; pl. X, fig. 3, 1897.

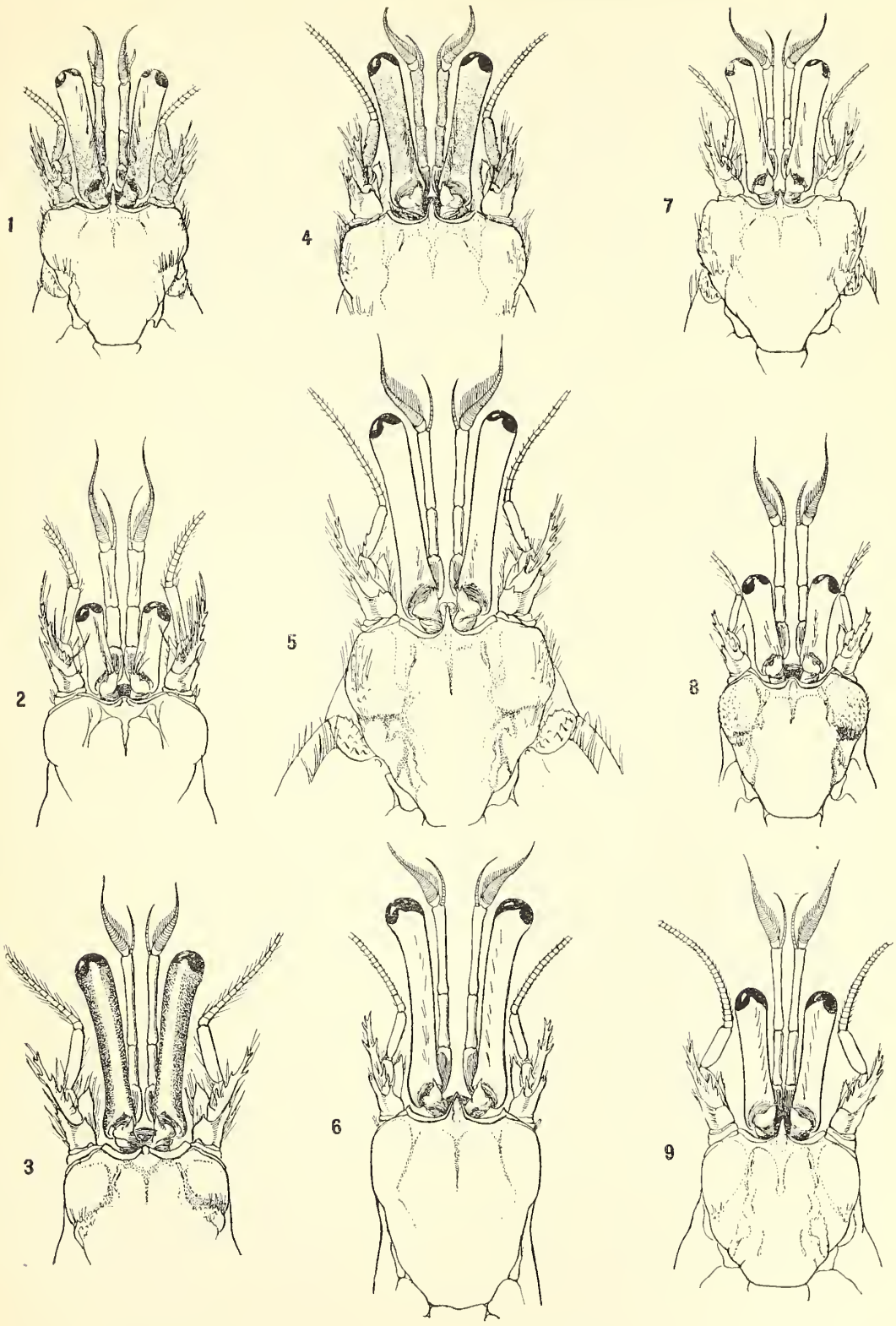
The rostrum is broad at the base; beyond the eye-stalks it forms a nearly equilateral triangle; its sides posterior to the ends of the eye-stalks are parallel. Behind the rostrum on the gastric region are two tubercles. The sides of the carapace are arcuate and are divided by two small notches into three parts; the posterior part is emarginate and twice as long as the lobe-like second part, which is in turn more than twice as long as the third division, which includes the antero-lateral angle. The carpus and propodus of the ambulatory legs are carinate. The chelipeds are moderately long and stout, the hands are oblong-ovate.

Orophorhynchus is a subgenus of *Munidopsis* far removed from the typical forms of the genus.

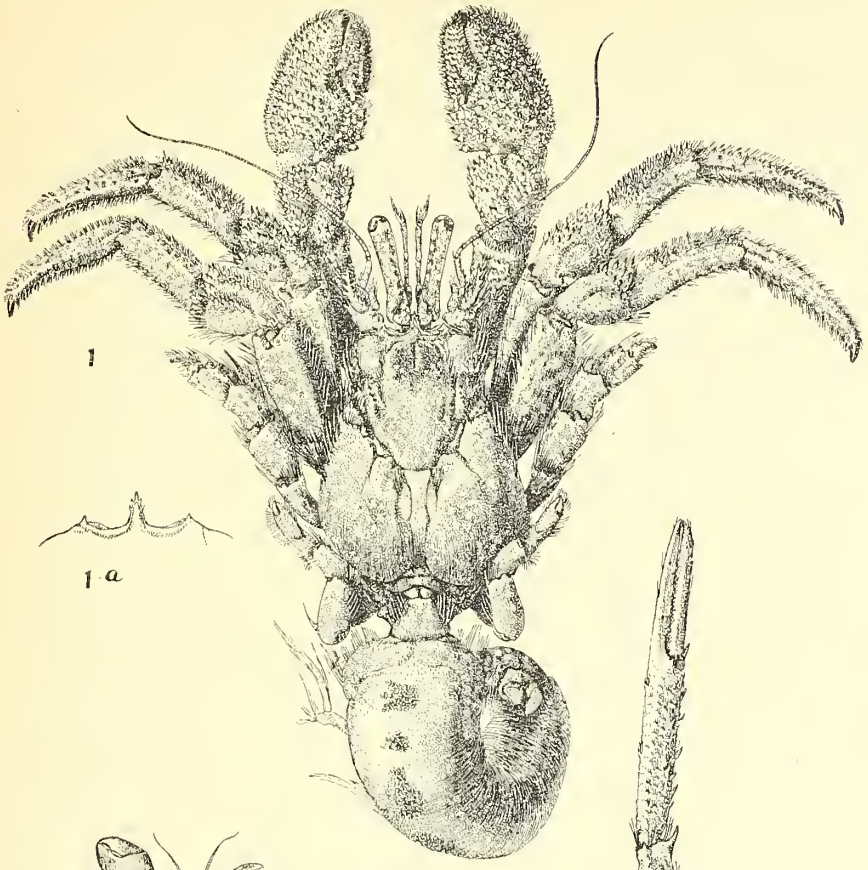
Station 6070, in 220 fathoms.

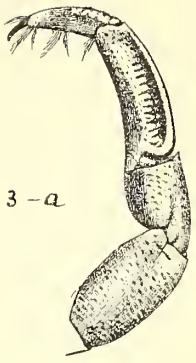


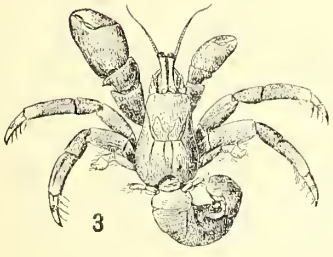
1. *Petrolisthes marginatus* Stimpson, × 3½.
2. *Petrolisthes tridentatus* Stimpson, × 1¾.
3. *Petrolisthes amœnus* (Guérin), × 3.
4. *Petrolisthes quadratus*, n. sp., × 3.
5. *Pisosoma glabra* Kingsley, × 3.
6. *Pisosoma angustifrons*, n. sp., × 3.
7. *Pisosoma serrata*, n. sp., × 3.
8. *Megalobrachium poeyi* (Guérin), × 1½.
9. *Pachycheles rugimanus* A. Milne-Edwards, × 3.
10. *Porcellana sayana* (Leach), × 1½.
11. *Porcellana pilosa* Edwards, × 1½.
12. *Eucremus prælongus* Stimpson, × 2¼.

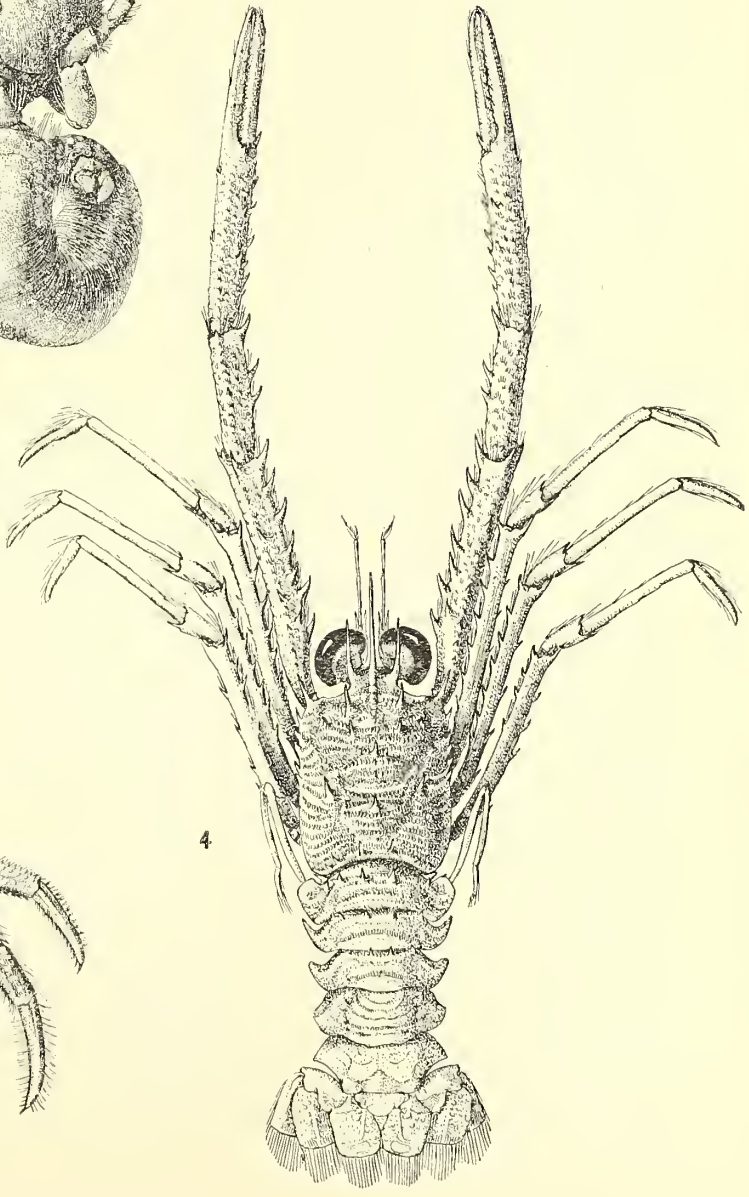


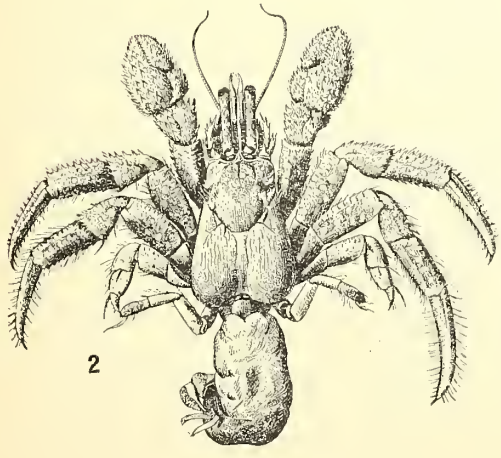
1. *Paguristes tenuirostris*, n. sp., × 3.
2. *Paguristes sayi* E. & B., × 3.
3. *Paguristes moorei*, n. sp., × 3.
4. *Paguristes punticeps*, n. sp., × 3.
5. *Paguristes depressus* Stimpson, × 3.
6. *Paguristes spinipes*, A. Milne-Edwards, × 3.
7. *Paguristes rectifrons*, n. sp., × 3.
8. *Paguristes lymani* E. & B., × 3.
9. *Paguristes triangulatus* E. & B., × 3.



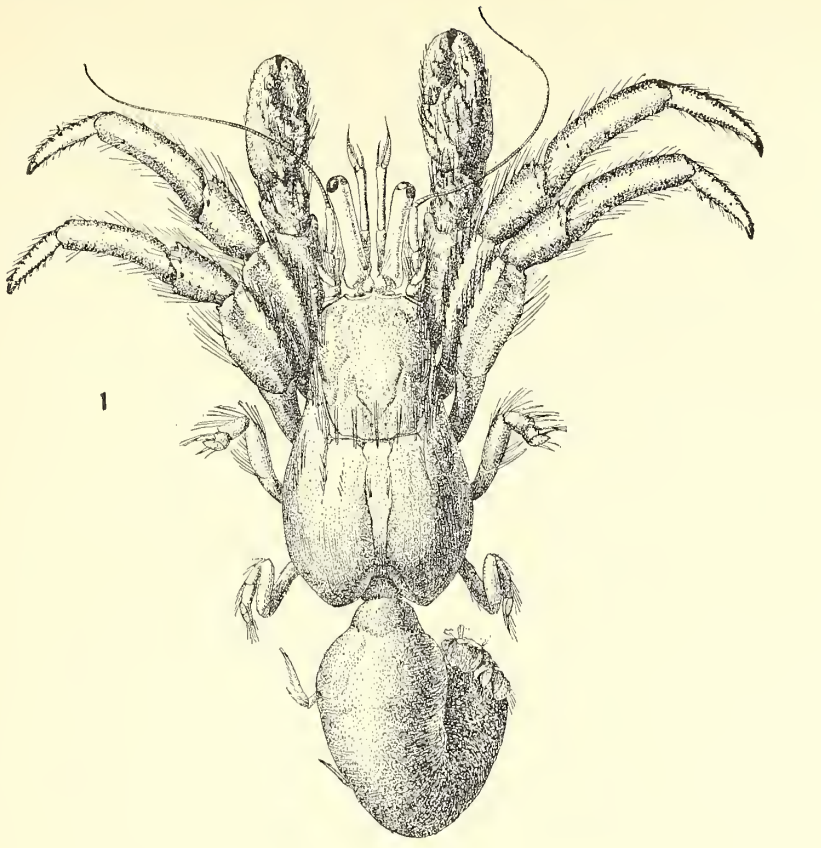








1. *Paguristes grayi*, n. sp., × 1½.
2. *Paguristes puncticeps*, n. sp., natural size.
3. *Calcinus sulcatus* (Milne-Edwards), slightly enlarged.
4. *Munida evermanni*, n. sp., × 2.



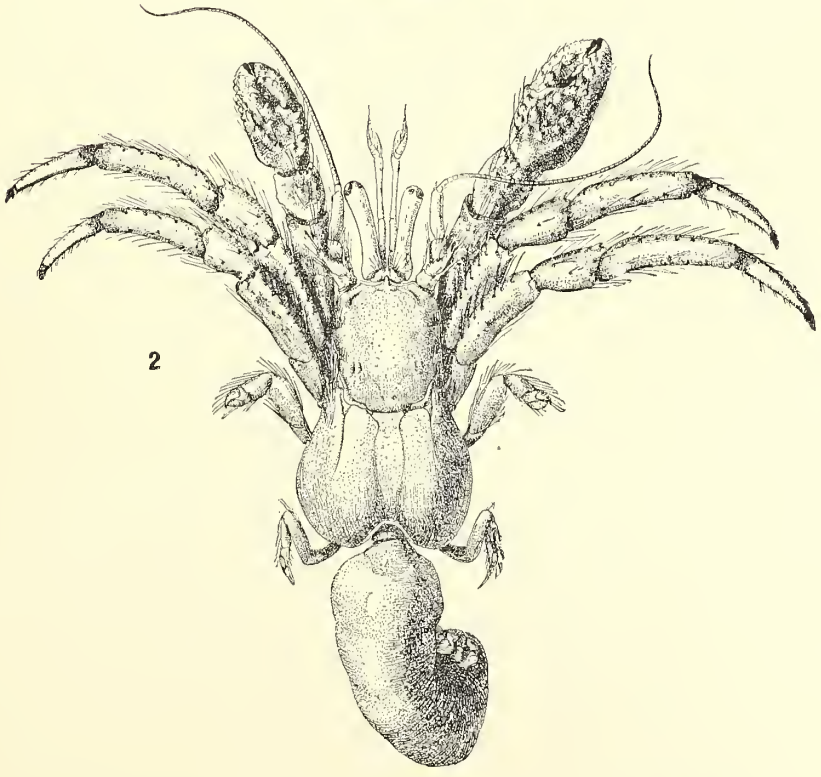


Fig. 1. *Clibanarius antillensis* Stimpson, × 6.

Fig. 2. *Clibanarius tricolor* (Gibbes), × 8.