THE STOMATOPODA OF PORTO RICO.

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The report herewith presented relates to the Crustacea of the order Stomatopoda collected by the *Fish Hawk* in the waters of Porto Rico during the investigations of the U. S. Fish Commission in the winter of 1898–99. Collections were made at 19 dredging stations in the harbors and off the coast of Porto Rico, and many specimens were picked up by collecting parties in shallow water upon the coral reefs and shoals. The collection consists chiefly of two common species, *Gonodactylus œrstedii* Hansen and *Pseudosquilla ciliata* Miers. The three other species represented are *Squilla intermedia* Bigelow and two new species, *Lysiosquilla plumata* and *L. maiaquesensis*.

The Stomatopoda may be distinguished from the other malacostracous crustacea by the fact that the stalked eyes and first pair of antennæ are borne upon distinct movable segments. The carapace is small, leaving four thoracic segments exposed behind it, and the rostrum is separated from it by a mobile joint. The second pair of thoracic limbs are very characteristic of the group, being developed into the large raptorial claws, in which the terminal segment (dactylus) closes upon the penultimate one (manus) like the blade of a penknife. The next three pairs of limbs, although smaller, are of the same pattern, and it is only the last three pairs of thoracic limbs that are used for walking. The abdominal appendages bear tufted gills, except the last pair (uropods), which are armed with a strong prolongation of the basal segment ending in one or two spines, and act with the telson as a powerful tail fin.

For definitions of the technical terms used and for synopses of genera and species not represented in the present collection the reader is referred to the report on the *Albatross* collections (Bigelow '94) and to the more recent memoirs listed on p. 160.

I wish to take this opportunity to express my obligations to Prof. H. C. Bumpus for his kindness in granting me every facility for the study of this collection at the marine laboratory of the United States Fish Commission at Woods Hole.

Figs. 2, 3, 4 were drawn by Miss McKnew; the other figures by the author.

Genus GONODACTYLUS Latreille.

Diagnosis.—Species of this genus are distinguished by the possession of a flexible joint between the sixth abdominal segment and the telson; a strongly built and highly convex hind-body; the dactylus of the raptorial claw being dilated at the base, without lateral teeth, and with a sharp inner edge that fits into a groove on the manus.

Larval form.—A *Gonerichthus* Brooks, recognizable by the following characters: Eyes stalked; appendages I–VII and XIV–XVII present in the earliest stages; telson usually quadrate or hexagonal in general outline, slightly wider than long, longer than outer spine of uropod and notched on the median line, and with never more than four intermediate denticles; body elongated, carapace narrow, shallow, not infolded, without prominent ventro-lateral angles, posterior lateral spines close to dorsal median line and at least half as long as carapace; never any trace of lateral teeth upon the raptorial dactylus.

Gonodactylus œrstedii Hansen. (Figs. 1 and 2.)

Gonodactylus chiragra, Smith, S. I., Brazilian Crustacea, Trans. Conn. Acad., II, p. 41, 1869. Milne-Edwards, A., Nouv. Arch. Mus. Hist. Nat., vol. IV, p. 65, 1868. Martens, E. v., Cubanische Crust. Arch. f. Naturg. Jahrg. 33, Bd. II, p. 147, 1872. Brooks, Voyage of H. M. S. *Challenger*, XVI, II, p. 56, 1886. Brooks, Mem. Nat. Acad. Sci. V, p. 353, pls. I and III, 1892. Bigelow, Stomatopoda collected by the steamer *Albatross*, Proc. U. S. Nat. Mus., vol. XVII, p. 495, 1894.

Gonodactylus œrstedii, Hansen, H. J., Isopoden, Cumaceen, und Stomatopoden, Ergebnisse der Plankton-Expedition der Humboldt-Stiftung, Bd. II, G. c., footnote p. 65, 1895. Rankin, Crustacea from the Bahamas, Ann. N. Y. Acad. Sci., XI, p. 253, 1898. Borradaile, Crustaceans from the South Pacific, Proc. Zool. Soc. Lond., 1898, p. 35, pl. V, fig. 3.

Diagnosis.—A *Gonodactylus* having cylindrical eyes; the rostrum transverse, with an acute median spine as long as half the width of the rostrum and elevated somewhat above the rounded lateral angles; a smooth carapace, nearly oblong, the posterior margin being very slightly concave and the rounded anterior lateral angles projecting forward; hind-body strongly convex; the lateral margins of the first exposed thoracic segment not produced, the margins of the next three segments rounded; the first five abdominal segments smooth above, with marginal carinæ and rounded posterior lateral angles; sixth abdominal segment with 6 longitudinal dorsal carinæ, the submedian and intermediate pair being well rounded prominences more or less elliptical in outline and often possessing a minute posterior spine, which may, however, be obsolete or absent, the lateral pair narrow, ending in the

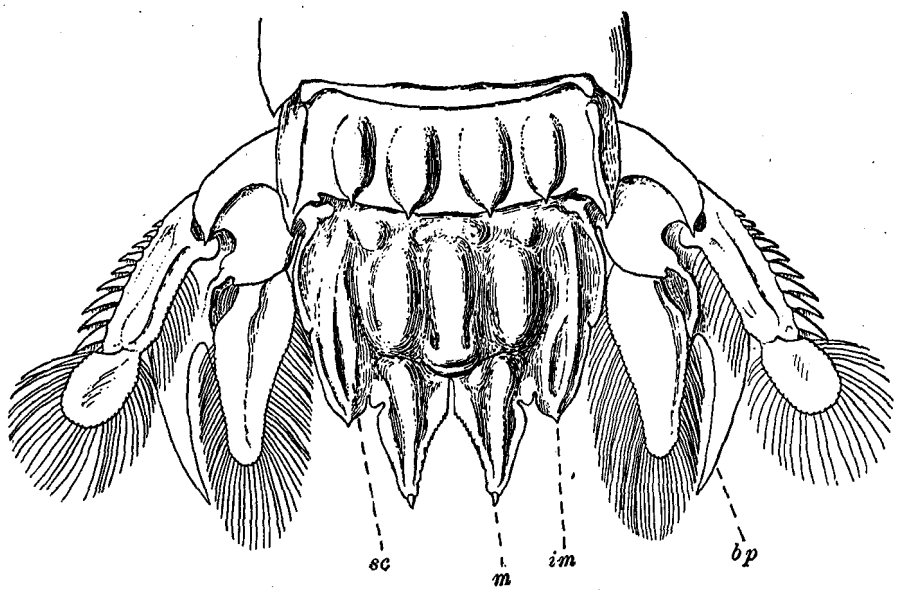


FIG. 1. Telson and adjacent parts of *Gonodactylus œrstedii*. Female, × 5; *sc*, supplementary carina; *im*, intermediate spine; *m*, mobile tip of submedian spine; *bp*, basal prolongation of europod.

strong posterior lateral angles, and with a transverse carina extending between the ends of the lateral carinæ and, when the abdomen is fully extended, hidden under the posterior margin of the fifth segment; 3 high rounded longitudinal dorsal prominences on the telson, submedian spines large, with minute mobile tips and finely serrated on the inner edge, intermediate spines prominent, and lateral pair obsolete; 6 marginal carinæ, each intermediate one having on its inner side a shorter *supplementary carina;* the surface of these sculpturings being smooth and polished, except that the supplementary carinæ are sometimes slightly serrated and the intermediate central prominences sometimes show faint indications of a posterior spine; and the basal prolongations of the uropod ending in 2 flattened curved spines, of which the outer one is the longer.

General description.—This form is so very similar to *G. chiragra* Fabr. that most authors have identified it with that species. S. I. Smith ('69) stated that he found a slight difference between the American species and the true *G. chiragra*, but Hansen ('95) is the first to describe this as a distinct species and to point out the character by which it can be recognized. This distinguishing characteristic is the small supplementary carina (*sc*, fig. 1) on the inner side of each intermediate marginal

carina on the telson. This is so small a character by which to separate two species, otherwise apparently identical, that one would be inclined to suspect that this might be a case of individual variation. But through the courtesy of Dr. Walter Faxon I have been able to examine the material in the Museum of Comparative Zoology at Harvard College and to compare specimens of *G. œrstedii* identified by Dr. Hansen with specimens from 18 localities on the Atlantic, besides those of the present collection, and with specimens of *G. chiragra* from 16 localities in the Pacific and Indian oceans. I found that the difference pointed out by Hansen is perfectly constant. In every specimen of *G. chiragra* from the Indo-Pacific region the valley between the intermediate marginal carina and the central prominences

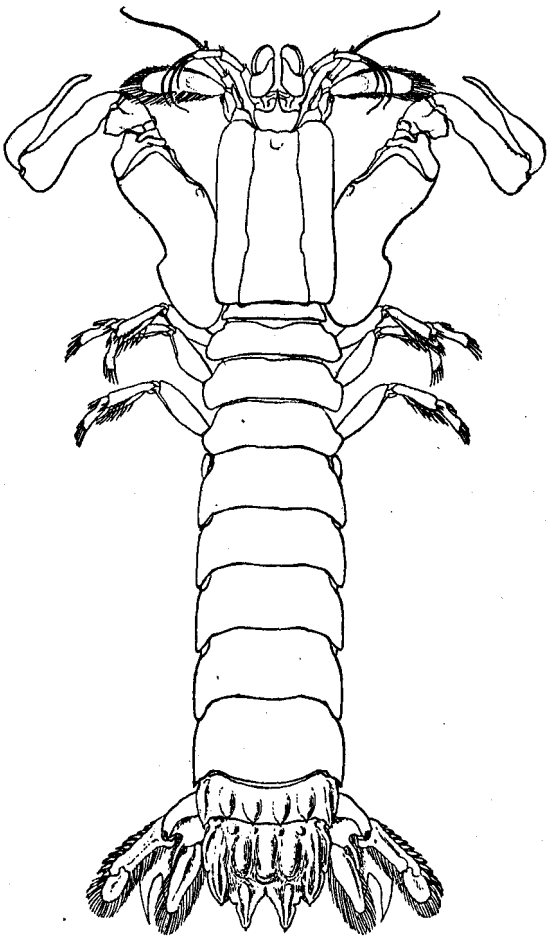


FIG. 2. *Gonodactylus œrstedii*, Hansen, × 2; not accurately to scale.

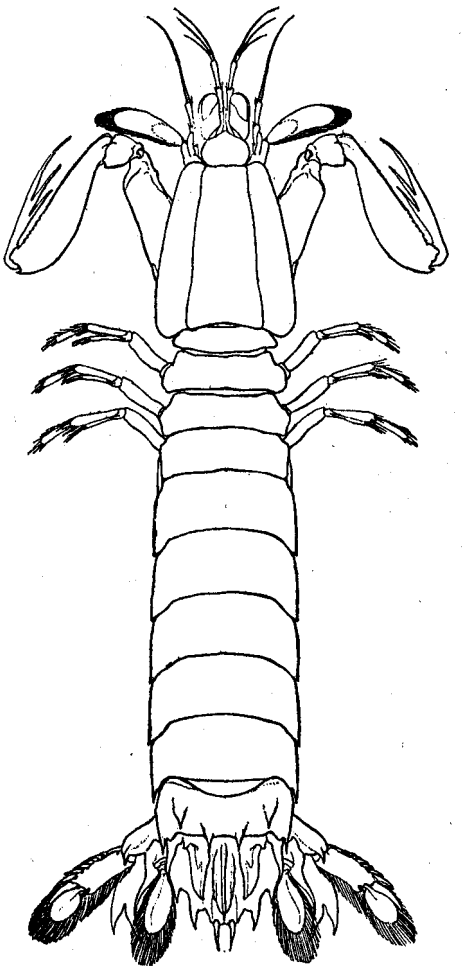


FIG. 3. *Pseudosquilla ciliata*, Miers, male, × 2; not accurately to scale.

of the telson presented a smooth, even slope, without trace of additional carina. On the other hand, every specimen from the Atlantic region possessed the supplementary carina, somewhat variable in length and elevation, but always distinctly present. It may be well to note here that in order to see this feature, as well as the other sculpturings of the telson, distinctly, the surface must be dry. In a specimen freshly lifted from a bottle of alcohol and covered with the liquid it is not easily visible.

G. œrstedii is readily distinguished from *G. spinosus* Bigelow and *G. spinosissimus* Pfeffer by the absence of prickles on the dorsal surface; and it is separated from *G. glabrous* Brooks and *G. graphurus* Miers by the possession of only three central longitudinal carinæ on the telson. There are small

additional elevations on the telson at the bases of the intermediate denticles, in front and a little on one side of the submedian central prominences, behind the median prominence, and along the margins of the submedian and intermediate spines, fig. 1. In front of the median prominence are two small pits on very slight elevations of the surface and there are two grooves on the sides of the central prominence near its posterior end. The first antennæ are fairly long, the second joints extending beyond the eyes. The second pair extend nearly as far forward as first. The antennary scale slightly exceeds half the length of the carapace; the carapace is about one-fourth the length of the body. The appendages to the walking legs are linear. The basal prolongation of the uropod is broad and flat, and the two spines are curved inward. There is no tooth on the margin of either spine. The distal segment of the exopodite is about half the length of the proximal one, which bears 11 movable spines besides a small immovable terminal one.

Color.—The coloring is very variable, both in shade and pattern, and is distinctly protective; varying from a mottled green and white to a nearly pure olive green.

Size.—Length of full-grown specimens, about 5 cm.

Geographical distribution.—This species is common in the tropical Atlantic from the West Indies to Brazil, and is the only form of *Gonodactylus* reported from this region. In the waters of Porto Rico the *Fish Hawk* collected a large number of specimens from various stations on the eastern, southern, and western coasts in depths varying from 21 fathoms, at station 6089, west of the island of Vieques, to a few feet of water on coral reefs. The most numerous collections were made with tangle at station 6092, north of Vieques, depth 16 fathoms, coral bottom, and by shore collecting in Ensenada Honda, island of Culebra.

Life history.—The early larval stages of this species have been fully described and illustrated by Brooks ('92). The eggs are deposited in burrows excavated by the females in pieces of coral rock lying upon the sand flats. The larva hatches in an *Erichthus* form with very short eye-stalks and the sutures between the fifth and sixth and between the sixth and seventh abdominal somites undeveloped. The abdomen bears five pairs of appendages. The first molt occurs about sixty hours after hatching, and the second about a week later, when the larva passes into the typical form of the *Gonerichthus*. Before the second molt Brooks's larvæ remained near the bottom of the aquarium and fed upon the eggs of an unknown species of Nudibranch; but after the second molt they refused this food and swam at the surface. Suitable food for this stage not having been discovered, it was impossible to rear the larvæ further. Later stages were obtained, however, by collecting with the skimming net, and they are described in the memoir.

Genus PSEUDOSQUILLA (Guérin) Dana.

Diagnosis.—Stomatopoda with the sixth abdominal segment not fused to the telson; the hind body smooth, very convex, and narrow; the dactylus of the raptorial claw not dilated at the base and provided with not more than three lateral teeth; the submedian spines of the telson long and with movable tips; and not more than four intermediate denticles, usually one.

Larval form.—We are indebted to Claus for the determination of the larval form of this genus, to which Brooks ('86) has given the name *Pseuderichthus*. It may be recognized by the following characters: Eyes stalked, appendages I–VII and XIV–XVII present in the earliest stages, hind body very long; telson longer than wide, sometimes ovate in general outline; carapace narrow, at least twice as long as wide, short, without prominent ventro-lateral angles, short rostrum, and posterior lateral spines short, usually only one-fourth or one-third as long as the carapace, and placed near the dorsal median line.

Pseudosquilla ciliata Miers. (Figs. 3 and 4.)

? *Squilla ciliata*, Fabricius, Ent. Syst., II, p. 512, 1793.

Squilla stylifera, Lamarck, Hist. Anim. sans Vert., V, p. 189, 1818. Latreille, Encyl. Meth., X, p. 472, 1825.

Pseudosquilla stylifera, Dana, U. S. Expl. Exp., XIII, Crustacea, I, p. 622, 1852. ? Von Martens, Arch. f. Naturg., XXXVIII, p. 146, 1872.

Pseudosquilla ciliata, Miers, Squillidæ, Ann. and Mag. Nat. Hist., (5), V, p. 108, 1880. Brooks, Voyage of *Challenger*, XVI, p. 53, 1886. Bigelow, Stomatopoda collected by the steamer *Albatross*, Proc. U. S. Nat. Mus., XVII, p. 499, 1894. Hansen, Isopoden, Cumaceen, und Stomatopoden, Engeb. Plank. Exp., II, G. c., p. 86, 1895. Rankin, Crustacea from the Bahamas, Ann. N. Y. Acad. Sci., XII, p. 253, 1898.

Diagnosis.—A *Pseudosquilla* with cylindrical eyes; the dactylus of the raptorial claw slender with three teeth, including the terminal one; a smooth rostrum without spines or acute angles, wider than long; lateral margins of the exposed thoracic segments slightly produced, the first acute, the others more or less rounded, the second obliquely truncated, and the fourth notched; the first five abdominal

segments smooth and without carinæ or spines, except posterior-lateral spines on the fourth and fifth segments; sixth segment with 6 strong spines, the intermediate pair arising farther forward than the others, about half way between the anterior and posterior margins; a high, narrow crest ending in a spine and 6 other carinæ on the telson, one pair on the lateral margins, and two pairs grouped near the crest, the pair nearest the crest being the smaller; 6 marginal spines, the submedian pair long and mobile; 2 simple spines on the basal prolongation of the uropod, of which the inner one is the longer; 8 to 10 mobile spines on the exopodite.

General description.—The specimens in the collection from Porto Rico differ from Miers's description in that the posterior margin of the carapace is not straight, but distinctly concave, and in having minute posterior lateral spines on the fourth as well as the fifth abdominal somite. In his figure the basal prolongation of the uropod is represented as extending as far as the tip of the exopodite, and the endopodite appears to equal the proximal segment of the exopodite in length. In our specimens the basal prolongation extends only so far as the tip of the endopodite, which, however, is considerably longer than the proximal segment of the exopodite. (In fig. 4 the basal prolongation is represented as a little too long, and the spines should be more slender and less sinuous on their inner margins.) The distal segment of the exopodite is less than two-thirds the length of the proximal one. Brooks found these segments to be equal in specimens from the Pacific, but the distal one shorter in specimens from St. Thomas. He found also that the posterior lateral angles of the fourth abdominal segment were rounded and without spines in specimens from the Pacific. His

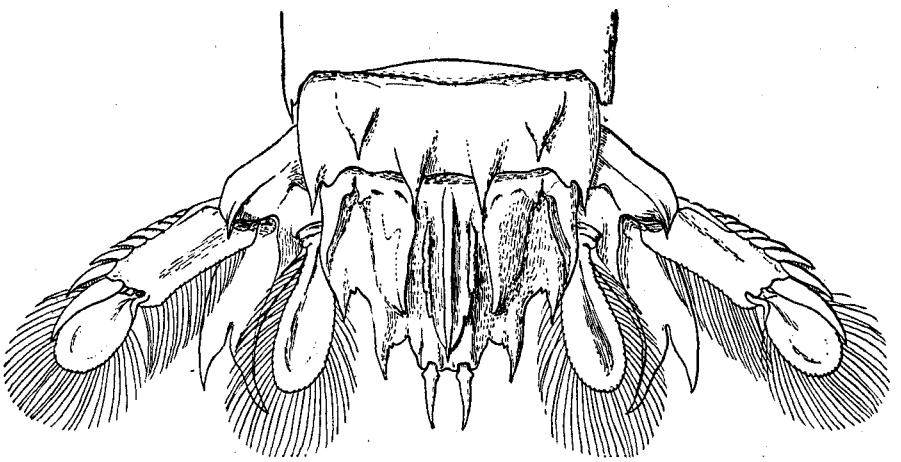


FIG. 4. Telson and adjacent parts of *Pseudosquilla ciliata*. Same specimen as Fig. 3, ×4.

specimens from St. Thomas differed from those from Honolulu in having the spines of the basal prolongation of the uropod equal in length. But our specimens from Porto Rico agree with those from the Pacific in having the inner spine the longer. As Brooks has pointed out, this species probably varies to a considerable extent, and the slight differences observed do not furnish sufficient ground for dividing it. *P. ciliata* is distinguished from *P. ornata* Miers by its cylindrical eyes, the eyes of *P. ornata* being flattened and club-shaped. It is separated by the number of carinæ on the telson from all other species having a similar basal prolongation to the uropod.

Color.—Living specimens observed at Bimini (Bigelow, '94) showed great variation in coloring, which closely resembled that of *Gonodactylus ærstedii*.

Size.—The largest specimen in the present collection measures 8 cm. in length.

Geographical distribution.—This is perhaps the most widely distributed of all the Stomatopods. It is common in the West Indies, living on shoals of coral sand associated with *Gonodactylus ærstedii*, and is found also at the Cape Verde Islands. In the Indo-Pacific region it has been taken from the Red Sea, Mauritius, Ceylon, Japan, and from various localities in the Malay Archipelago, South Sea Islands, and Hawaii. On the Porto Rico expedition the *Fish Hawk* obtained specimens in San Juan Harbor, Ensenada Honda in Culebra, Mayaguez Harbor, Boqueron Bay, Fajardo, Playa de Ponce, and

at several stations in the shallow sound between St. Thomas, Culebra, and Porto Rico by dragging the tangle over the coral bottom. The greatest depth was 20 to 23 fathoms, at station 6079, off St. Thomas.

Life history.—Hansen ('95) identifies the larval form of this species under the name *Pseuderichthus communis*. In the earlier stages it can not be distinguished from the very similar larva of *Pseudosquilla oculata* Brulle (*Pseuderichthus distinguendus* Hansen). But when fully developed it may be recognized by its smaller size, 21 to 24 mm., and the possession of 8 distinct spines on the uropod (Hansen, l. c., pl. VIII, fig. 5). *P. distinguendus* of this size does not have the upper spines of the uropod distinct. When fully developed this species is longer than *P. communis*—over 24 mm.—and has 10 to 11 of these spines.

Between this stage and the adult form there is an intermediate stage (Claus, '71, figs. 26 and 27*c*). We might call it the *monodactyla* stage, for, according to Hansen, *Pseudosquilla monodactyla* of Milne-Edwards is this stage of *P. oculata*. The carapace has lost the larval spines and the whole appearance of the animal is very much like the adult *Pseudosquilla;* but on the dactylus of the raptorial claw only the rudiments of the two lateral teeth may be seen beneath the integument, and the telson has only the median carina, the others not being developed. In our specimens, however, there are slight elevations on the telson representing the lateral marginal and external pair of central carinæ. Hansen has two specimens of this stage of *P. ciliata* that measure from the tip of the rostrum 17.5 and 21.3 mm. In the present collection there are five specimens in this stage from three localities. They were taken in Ensenada Honda in Culebra, San Juan Harbor a quarter of a mile from Morro Castle with the dredge at a depth of 4 to 7½ fathoms, and at station 6092 between Culebra and Vieques with the tangle at a depth of 16 fathoms. These specimens have the following lengths, 16, 17.5, 17.5, 19, 19 mm. Three of them have 9 mobile spines on the uropod and two have 8.

It is probable that at the next molt these would pass into the adult form, and that the growth at that time results in a thickening of the body rather than in increase in length. In fact, there seems to be a slight shortening of the body, for in the collection there are five small specimens of the adult form measuring 16, 17, 17, 17.5, and 17.5 mm., respectively, but their bodies are much thicker and more strongly built than the larvæ in the *monodactyla* stage. One of these has 8 mobile spines on the uropod; the others have 9.

Genus LYSIOSQUILLA Dana.

Diagnosis.—"Stomatopoda having the sixth abdominal segment separated from the telson by a mobile joint; the hind-body depressed, loosely articulated, and wide; the dactylus of the raptorial claw without a basal enlargement and with not less than five marginal teeth; no more than 4 denticles, often only 1, between the intermediate and submedian marginal spines of the telson, which is usually wider than long."

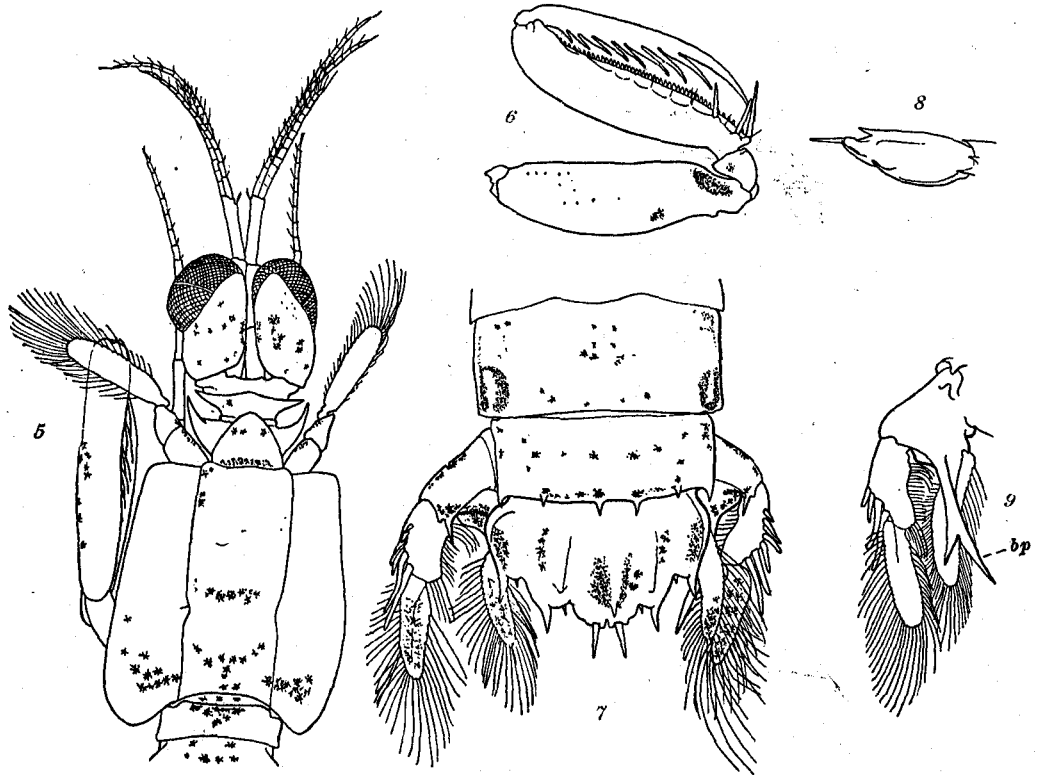
Larval form.—A *Lysioerichthus*, Brooks, having stalked eyes, appendages I–VII and XIV–XVII present in earliest stages; telson wider than long, with never more than four intermediate denticles; body short; carapace large and wide, infolded on the ventral side, with prominent ventral angles, and posterior lateral angles widely separated from the median line; hind-body wide and flat.

Lysiosquilla plumata, sp. nov. (Figs. 5 to 9.)

Provisional diagnosis.—A *Lysiosquilla* having the corneal portion of the eye nearly globular and set obliquely upon the strong, nearly cylindrical eye-stalk; the dactyli of the raptorial claws with nine marginal teeth, including the terminal one; antennary scale small, less than half the length of the carapace; appendages to the walking legs linear; the rostrum shorter than wide, triangular, with rounded apex, hardly overlapping the ophthalmic segment; the carapace smooth, nearly quadrate, without acute angles, posterior lateral lobes slightly produced backward; the hind-body smooth; 6 marginal spines on the sixth abdominal segment, the intermediate pair arising slightly in front of the margin; the telson wider than long, convex above with 3 dorsal carinæ, of which only the middle one ends in a posterior spine, narrow lateral marginal carinæ, 6 marginal spines, submedian pair long and mobile, the other pairs shorter and curved slightly upward, no submedian denticles, 1 intermediate and 1 lateral one on each side, arising from the ventral surface of the telson and partially covered above by a broad lobe of the margin; uropods with a very narrow basal prolongation, angled on the ventral side, without serrations, and terminating in 2 stout spines, of which the inner one is the longer; and 7 mobile spines on the uropod, the distal one not much more than half the length of the paddle.

Remarks.—It is not possible to give more than a provisional description of this species at present, because the only material available is one very small male specimen. It is very probable that full-grown individuals will be found to differ from this specimen in important details. This is especially probable in regard to the female, for sexual dimorphism is not uncommon in other species of the genus. Nevertheless, the form here described differs so clearly from any previously described species of *Lysiosquilla* that it seems worth while to place it upon record. The most nearly related species are *Lysiosquilla spinosa* Wood-Mason and *L. maiaguesensis* n. sp. It differs from the former in the absence of spines on the submedian dorsal carinæ of the telson, in having the mobile spines of the telson longer than the others, and in having no submedian and only one intermediate denticle. (Fig. 7.) The differences from the latter will be discussed when we come to that species.

L. plumata is not identical with *L. tricarinata* (Gray), White ('47), for according to Miers ('80) that species has about a dozen minute intermediate denticles.



FIGS. 5-9, *Lysiosquilla plumata*. Male, camera drawings, ×11¶ Fig. 5, head and carapace. Fig. 6, right raptorial claw. Fig. 7, last three abdominal segments. Fig. 8, side view of telson. Fig. 9, right uropod viewed from ventral side; *bp*, basal prolongation.

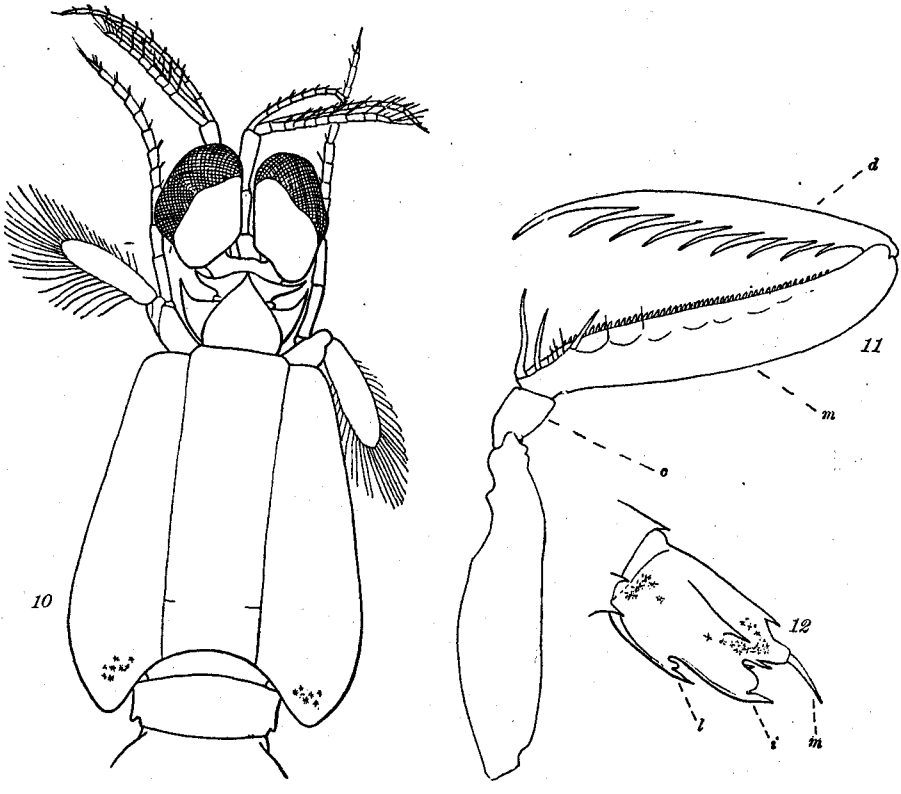
Color.—The color pattern is indicated in the alcoholic specimen by the presence of dark branching pigment cells. There is an eye-spot at each posterior lateral angle of the fifth thoracic segment, a dark spot on the two sides of the central carina of the telson, and accumulations of pigment on the sides of the telson, the terminal segments of the uropod, the posterior lobes of the carapace, and at the base of the rostrum. More scattered pigment cells indicate a symmetrically mottled pattern covering the whole dorsal surface. (Figs. 5 and 7.)

Size.—The specimen in hand has the following dimensions: Total length, 15.0 mm.; length of carapace on mid-line, 2.8 mm.; width of carapace, 2.6 mm.; width of fifth abdominal segment, 3.0 mm.; length of telson, 1.4 mm.; length of antennary scale, 1.2 mm.

Locality.—One male specimen was taken by the *Fish Hawk* at station 6062 in Mayaguez Harbor, Porto Rico, using the dredge on a bottom of sand, mud, and shells, at a depth of 25 to 30 fathoms.

Lysiosquilla maiaguesensis, sp. nov. (Figs. 10 to 13.)

Provisional diagnosis.—A *Lysiosquilla* having triangular eyes, the corneal axis oblique and shorter than the peduncular one; raptorial claws with a slender dactylus bearing 8 to 10, usually 9, marginal teeth; small antennary scales, less than half the length of the carapace; appendages to the walking legs linear; the apex of the broadly ovate rostrum acute; a smooth carapace slightly narrowed in front, with rounded angles, the posterior lateral angles being produced backward as broad lobes; the hind-body depressed and smooth, except for very narrow lateral marginal carinæ on the first five abdominal segments, and six spines on the posterior margin of the sixth abdominal segment, the intermediate pair being continuous with low carinæ; the telson wider than long, convex, with 3 dorsal carinæ ending posteriorly in spines, narrow lateral marginal carinæ, 6 marginal spines, of which the submedian pair are long and mobile, the intermediate ones large, extended downward below the ventral surface



FIGS. 10–12, *Lysiosquilla maiaguesensis.* Male, camera drawings, ×11. Fig. 10, head and carapace. Fig. 11, left raptorial claw; *c*, carpus; *d*, dactylus; *m*, manus. Fig. 12, side view of the telson, ×11; *m*, submedian spine; *i*, intermediate spine; *l*, lateral spine.

of the telson, and with a large rounded lobe on the dorsal side, lateral pair smaller, similarly curved and lobed; no submedian denticles, 2 intermediate and 1 lateral one on each side arising from the margin; about 12 fine sharp serrations on the inner margin of the broad basal prolongation of the uropod, of which the inner tooth is much the longer; and 6 mobile spines on the exopodite, the distal one extending to or beyond the tip of the paddle.

Remarks.—Unfortunately, the material is too scanty to allow more than a provisional description of this species, 2 small males being all that is afforded by the collection. It is closely related to the preceding, but differs from it in a number of striking peculiarities. The first pair of antennæ are shorter, the eyes are larger, the rostrum is as long as it is broad, and acute. (Compare figs. 5 and 10.) But the most remarkable differences are to be found in the telson and the uropods. (Compare figs. 12 and 13 with figs. 7, 8, and 9.) The telson differs not only in being longer and having three dorsal spines, but to a greater degree in the form of the marginal spines and the mode of origin of denticles.

In the uropods the basal prolongation has an entirely different form, and the segments of the limb show marked dissimilarities of shape and proportion. It will be noted that in the form of the telson this species closely approaches the genus *Pseudosquilla*.

Color.—In the alcoholic specimens there is a well-marked band of pigment on each side extending the whole length of the hind-body. These bands are connected by fine transverse lines at the posterior margin of each segment. The lobes of the carapace and the posterior part and sides of the telson are also pigmented.

Size.—The two male specimens have the following dimensions in millimeters:

	No. 1.	No. 2.
Total length	18.5	22.5
Length of carapace on mid-line	3.5	4.0
Length of telson	2.0	2.1
Width of carapace	3.4	4.2
Width of fifth abdominal segment	3.5	4.5

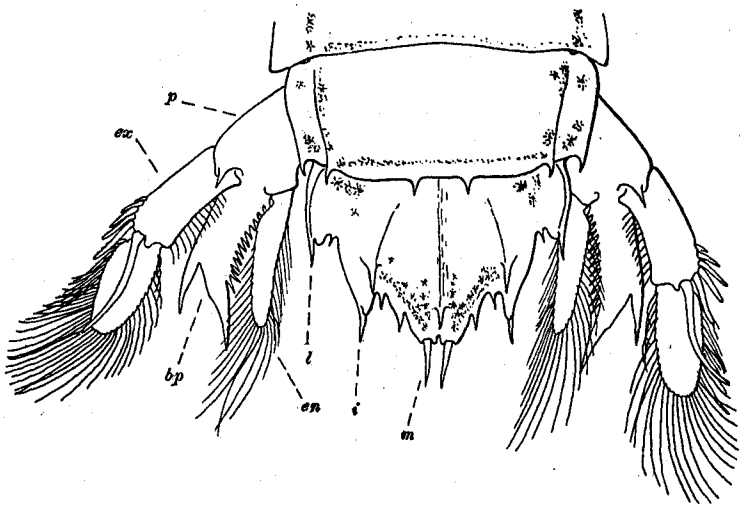


FIG. 13. Telson and adjacent structures of *Lysiosquilla maiaguesensis*. Male, camera drawing, × 11; *bp*, basal prolongation of the uropod; *en*, endopodite; *ex*, exopodite; *p*, protopodite; *m*, submedian spine of the telson; *i*, intermediate spine; *l*, lateral spine.

Locality.—The *Fish Hawk* took three small specimens (one mutilated) at station 6066 in Mayaguez Harbor, with the beam trawl, on a sand and mud bottom, at a depth of 161 to 172 fathoms.

Life history.—Unknown.

Genus SQUILLA Fabricius.

Diagnosis.—"Stomatopoda having the telson attached to the sixth abdominal segment by a mobile joint; the hind-body depressed and wide; the dactylus of the raptorial claw with usually not more than 6 teeth; as a rule more than 4 intermediate denticles on the telson, which is usually longer than wide; and the inner basal spine of the uropod the longer of the two."

Larval form.—An *Alima*, Leach, having stalked eyes; appendages I to VII and XIV to XVII present in earliest stages; a telson generally octagonal in general outline with numerous intermediate denticles; the inner basal spine of the uropod longer than the outer; the body greatly elongated; carapace flattened, elongated, and narrow (width usually about one-fourth the length); usually several thoracic segments exposed.

Squilla intermedia Bigelow.

Squilla intermedia Bigelow, Johns Hopkins Univ. Circ. 88, 1891; Proc. U. S. Nat. Mus., XVII, p. 530, fig. 19.

Diagnosis.—A *Squilla* having very large, nearly T-shaped eyes; very large and strong raptorial claws, with 6 teeth upon the dactylus; the rostrum narrowed in front and provided with well-marked median and lateral carinæ; 5 strong carinæ on the carapace, the median one bifurcated in front and

behind, and the lateral one ending in spines at the anterior lateral angles; posterior lateral margin angled; the lateral margin of the fifth thoracic segment produced into a strongly sickle-shaped acute spine; of the sixth and seventh obliquely truncated and very acute; 8 prominent carinæ on the abdominal segments, all ending in spines except the submedian of the first 4 segments; a low crest on the telson, ending in a small spine, a post-anal keel without a spine, the dorsal and ventral surfaces of the telson marked by numerous curved lines of very fine pits, 6 marginal spines, and 4 to 6 submedian denticles, 10 to 13 intermediate, and 1 lateral one; the crest and dorsal margin of the telson very much thickened in the male; the marginal thickening being continuous between the intermediate spines.

Remarks.—This species stands in an intermediate position between two Pacific forms, *S. panamensis* Bigelow and *S. biformis* Bigelow, from both of which it may be distinguished most easily by the character of the thickening of the telson in the males. This feature, as well as the number of denticles, serves also to distinguish full-grown specimens from the nearest Atlantic form, *S. empusa* Say. The latter has 3 to 5 submedian denticles, 6 to 10 intermediate, and 1 lateral one; and never has any thickening of the carinæ on the abdomen or of the margin of the telson, either in males or females.

In the Porto Rico collection there are 4 young males, the largest 5.55 cm. and the shortest 2.25 cm. in length, which seem to be *S. intermedia*, although they differ from the type specimens in some particulars. The antennary scales are only one-half instead of three-quarters the length of the carapace; the margins of the sixth and seventh thoracic segments (the second and third exposed ones) are not acute, but rounded at the apex, and bear an anterior lobe well marked in the sixth and minute in the seventh; in 3 of the specimens the marginal carinæ of the first and second abdominal segments are the only ones on those segments that bear spines; the denticles on the telson are 3–4, 8–9, 1; and the expodite of the uropod bears 9 mobile spines. In the largest one of these specimens there are, however, thickenings of the margin of the telson that suggest the beginnings of the structure characteristic of the type. When we remember that this species was described from only two specimens, a male and a female, and that the specimens under consideration are evidently immature, it would seem better to regard them as all of one species, pending further study of the fully adult form and the younger stages.

Size.—The largest of the type specimens was 10.5 cm. in length.

Locality.—Gulf of Mexiço and tropical Atlantic. The specimens collected by the *Fish Hawk* were all taken in Mayaguez Harbor with the beam trawl, at 7¼ to 18 fathoms, on a mud bottom.

Life history.—Unknown.

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