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PARASITIC CRUSTACEANS FROM ALLIGATOR HARBOR, FLORIDA

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From April 16 to June 16, 1952 the writer worked at the Oceanographic Institute of the Florida State University at Alligator Harbor. The Director, Dr. Harold J. Humm, did everything he could to further my search for parasitic crustaceans. The caretaker at the Institute, Richard Durant, also helped materially in the collection of hosts. Professor Franklin Olson, William Hargis, Charles Yentsch, Edward Joseph, and others helped in the collection and identification of hosts. Dr. Fenner Chace of the United States National Museum gave free access to E. B. Wilson's collection of copepods and their literature. Grateful acknowledgment is made to these persons. An account of the commensals and parasites observed follows.

Order COPEPODA

Suborder ARGULOIDA

Family ARGULIDAE

Argulus americanus Wilson

A single female was taken from the outside of the head of a bony gar, *Lepisosteus osseus* (L.).

Argulus laticauda Smith

Ten females were taken from the skin and mouths of nine stingarees, *Dasyatis sabina* (Le Sueur).

Argulus megalops Smith

A single female was collected from the gills of six toadfishes, *Opsanus tau* (L.).

Argulus varians Bere

Two females were taken from the skin of a bat-fish, *Ogcocephalus nasutus* Ginsberg, and from a spiny boxfish, *Chilomycterus schoepfi* (Walbaum).

Suborder NOTODELPHYOIDA

Family MYICOLIDAE

Pseudomyicola glabra Pearse

Fourteen females were collected from ten oysters, *Ostrea virginica* Gmelin.

Family DOROPYGIDAE

Doropygus molgulensis n. sp.

Figure 1

Host.—Several females were taken from the branchial cavity of ascidians, *Molgula occidentalis* Traustedt, trawled in Alligator Harbor on June 3.

Female.—Head elongated and turned down very little. First thoracic segment shorter than those that follow. Incubatory pouch inflated and rounded dorsally; eggs large, 4-6 in number, urosome 4-segmented, fourth segment shortest; genital segment longer than any in the abdomen. Caudal rami slender, with two terminal setae, more than twice as long as last abdominal segment.

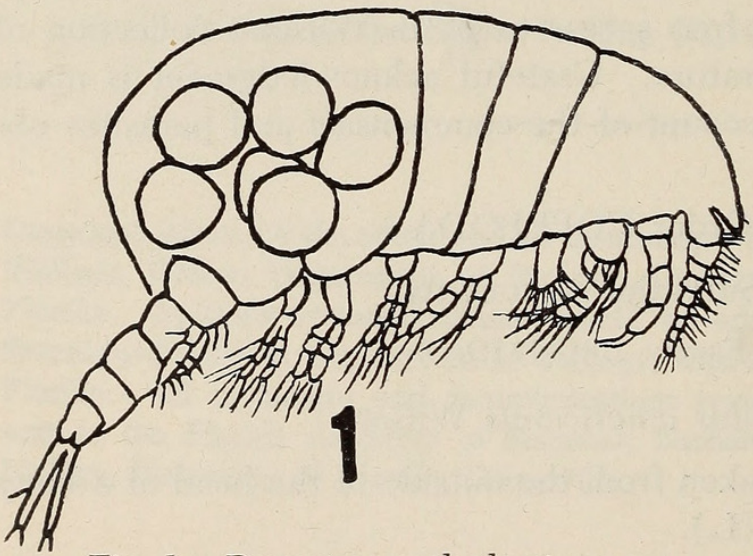


Fig. 1. *Doropygus molgulensis* n. sp.

First antennae 9-segmented; basal segment longer than wide, the base wider than distal end; second segment wider than long, as are the third, fourth and fifth; sixth segment as wide as long; seventh and eighth wider than long; ninth longer than wide; the basal segment has a stout anterior seta; segments 2-8 are setose on

the anterior margins, 9 is also setose at tip. Second antennae slender, 4-segmented; all segments longer than wide and about equal in length; stout setae near the distal end of the second and fourth segments; a curved terminal hook at the distal end of the fourth.

The legs are all biramous and have 3-segmented rami, except the first in which the endopod is 2-segmented, the terminal segment strongly tapering. Fifth leg 2-segmented, the terminal segment three times as long as the basal and with five equally spaced short setae on the distal two-thirds of the anterior border and a longer and a shorter terminal seta; also a short seta on the posterior border of the basal segment.

Length.—1.3 mm.

Type.—U. S. Nat. Mus. No. 93714.

Male.—Unknown.

This species is somewhat like Wilson's (1932) *D. laticornis*, but is smaller in size, has longer caudal rami, different segmentation of the endopods of the first and second legs.

Doropygus robustus n. sp.

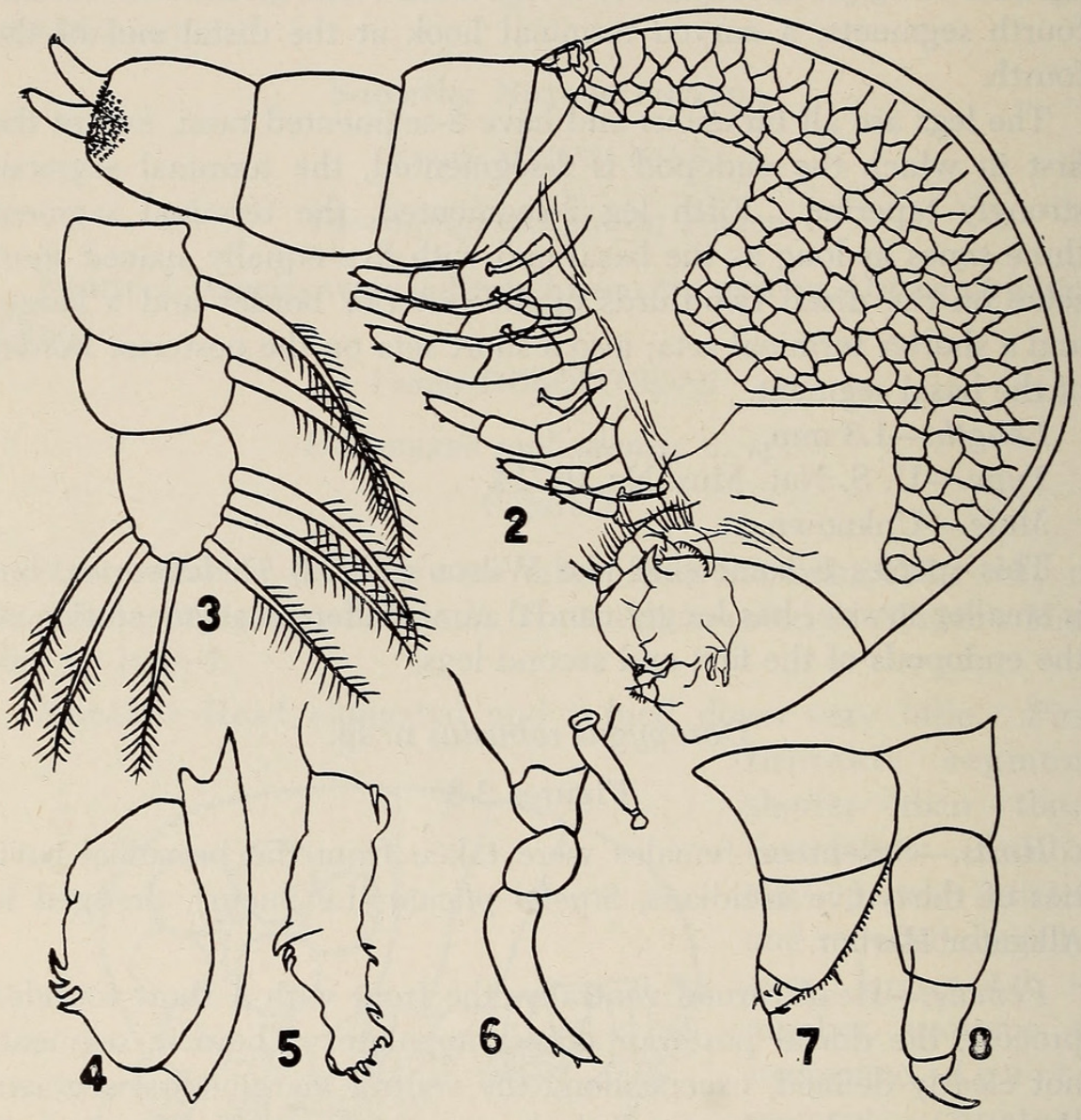
Figures 2-8

Hosts.—Seventeen females were taken from the branchial cavities of thirty-five ascidians, *Styelia plicata* (Le Sueur), dredged in Alligator Harbor.

Female.—Head turned ventrally; the front with a short rounded process, the dorsal posterior corner angulate. Thoracic segments not clearly defined, except along the ventral margin; first segment shortest, second segment a little longer, third and fourth segments a trifle longer and about equal in length. Incubatory pouch much inflated dorsally and containing more than 700 eggs. Genital segment mostly covered by the brood pouch. Abdomen 3-segmented, the segments increase in length slightly from front to rear and decrease slightly in width; last segment indented to anus and minutely spinulose at tip. Caudal rami slender, tapering, two-thirds as long as anal segment, with three short setae at tip.

First antennae 3-segmented; basal segment wider than long, tapered; second about the same length as the basal, but tapered, armed with a small curved spine at tip; two terminal segments minutely spinulose; segments poorly defined. Second antenna 3-

segmented, the second segment longest; terminal curved hook with an expanded base.



Figs. 2-8. *Doropygus robustus* n. sp. 2, side view of female; 3, exopod of first leg; 4, fifth leg; 5, endopod of second leg; 6, third leg; 7, first antenna; 8, second antenna.

First legs biramous, rami 3-segmented; with long plumose setae:—exopod (Fig. 3): 1, 1, 6, and a spinulose tip; endopod: 1, 1, 7. Legs 2-4 are biramous; exopods all 3-segmented, segments increasing somewhat from proximal to distal, minutely setose and with about three small spines at and near tip; endopods (Fig. 6) slightly more than a third the length of the exopods, unsegmented, with spines at tip and on margins. Fifth legs short, wide, uniramous, 2-segmented, with three curved spines at tip.

Length of body, 5.7 mm.

Type.—U. S. Nat. Mus. No. 93715.

Male.—Unknown.

This species differs from other notodelphids in the great extent of the brood pouch, the rudimentary character of the endopods of legs 2-4, the lack of setae on the caudal rami, and the large number of eggs in the brood pouch.

Suborder Cyclopoida

Family ERGASILIDAE

Ergasilus lizae Kryer

Fourteen large females were taken from the gills of the striped mullet, *Mugil cephalus* L., and thirteen from those of the white mullet, *Mugil curema* Curier & Valiencennes.

Ergasilus mugilis Vogt

Fifty-nine were taken from the gills of twenty-one striped mullet, *Mugil cephalus* L.

Family BOMOLOCHIDAE

Tucca impressus Kryer

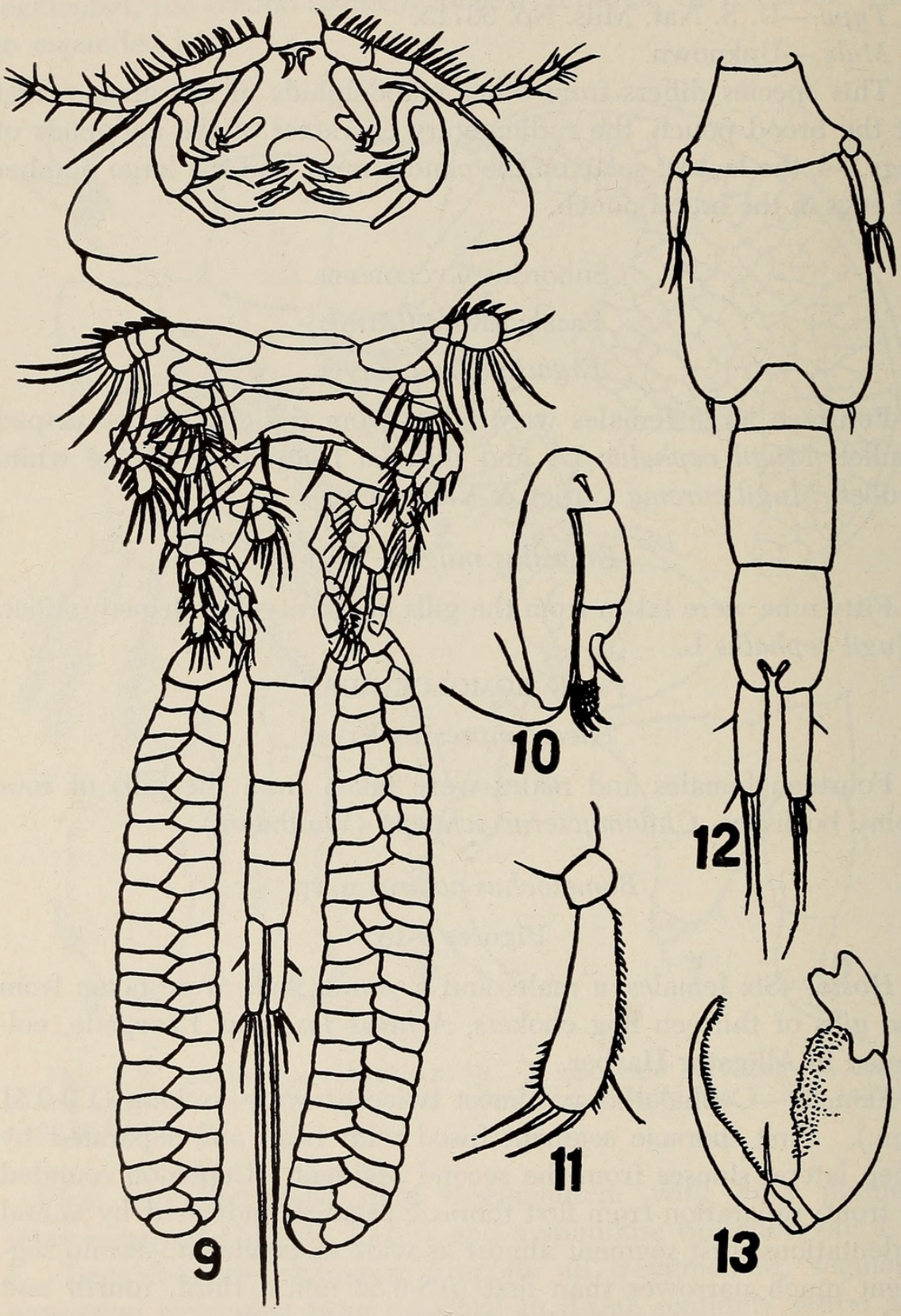
Fourteen females and males were taken from the gills of four spiny boxfishes, *Chilomycterus schoepfi* (Wallbaum).

Bomolochus achirus n. sp.

Figures 9-13

Hosts.—Six females, a male, and a young male were taken from the gills of thirteen hog chokers, *Achirus fasciatus* Lacepede, collected in Alligator Harbor.

Female.—Cephalothorax almost twice as wide as long (1.0-0.51 mm.). First thoracic segment fused with head and separated by deep lateral sinuses from the second segment. Cephalon rounded in front; separation from first thoracic segment indicated by lateral indentations; first segment almost as wide as cephalon; second segment much narrower than first (0.8-0.52 mm.); third, fourth and fifth segments progressively narrower. Genital segment not as wide as preceding segment. Abdomen slender, 3-segmented, segments shorter toward posterior; caudal appendages a little longer than preceding segment, with a short lateral seta near base and a



Figs. 9-13. *Bomolochus achirus* n. sp. 9, female; 10, second antenna; 11, fifth leg; 12, posterior end of male; 13, maxilliped of male.

short, intermediate, and a very long terminal seta. Egg strings (1.2 mm.) reach almost to tip of long setae on caudal appendages.

First antennae long and slender, setose and spinulose on anterior border; one long forwardly directed seta on the base and one backwardly directed at the tip of the base. Two small spines occur between the bases of the antennae. Second antenna stout, a corrugated finger-like process at its tip; the terminal segment with a curved spine near its base and three more slender curved spines at its tip. The second segment has a stout lateral seta near its tip.

The mandibles lie along the posterior border of the upper lip and terminate in a single spine. The first maxilla ends in two stout setae. The second maxilla ends in a single smooth spine. The maxilliped has a stout basal segment and an s-shaped sharp terminal claw which bears a stout basal seta and a sharp lateral hook; the basal segment bears two spines, a stout one at its base and a more slender setose one on its inner margin.

All the swimming legs are biramous and have 3-segmented rami. The fifth legs are 2-segmented with a lateral and three terminal setae; the lateral margin is minutely setose throughout and the median margin on its distal fourth.

Length of female, 2.59 mm.; width of cephalothorax, 1.24 mm., length, 0.95 mm.; length of abdomen, 0.9 mm.; length of egg strings, 1.62 mm.

Type.—U. S. Nat. Mus. No. 93716.

Male.—The body is much smaller than that of the female. The cephalothorax is longer than wide. The second maxillae end in strong curved hooks. The maxillipeds end in a single strong curved hook which is finely spinulose along its entire inner margin; the preceding segment is spinulose on its inner basal third and bears a seta on its distal angle. The swimming legs are similar to those of the female. The abdomen is also 3-segmented but the first segment is shortest and the middle segment longest. The genital segment bears a small appendage with a single terminal seta at its posterior corners. The caudal rami are similar to those of the female.

Type.—U. S. Nat. Mus. No. 93717.

Length of male, 1.24 mm.; width of cephalothorax, 0.42 mm., length, 0.35 mm.; length of abdomen, 0.4 mm.

This species differs strikingly from other in the genus Bomolochus

in the shape of its cephalothorax, the proportions of the male and female abdominal segments. It differs from Wilson's (1913) *B. nothrus* and *B. attenuatus* that he described from the West Indies in the number of segments in the exopod of the first swimming legs, the length of the abdomen, the shape of the cephalothorax, and the size of the abdomen in relation to the egg strings. It is named for its host, *Achirus fasciatus* Lacepede.

Bomolochus mugilis n. sp.

Figures 14-17

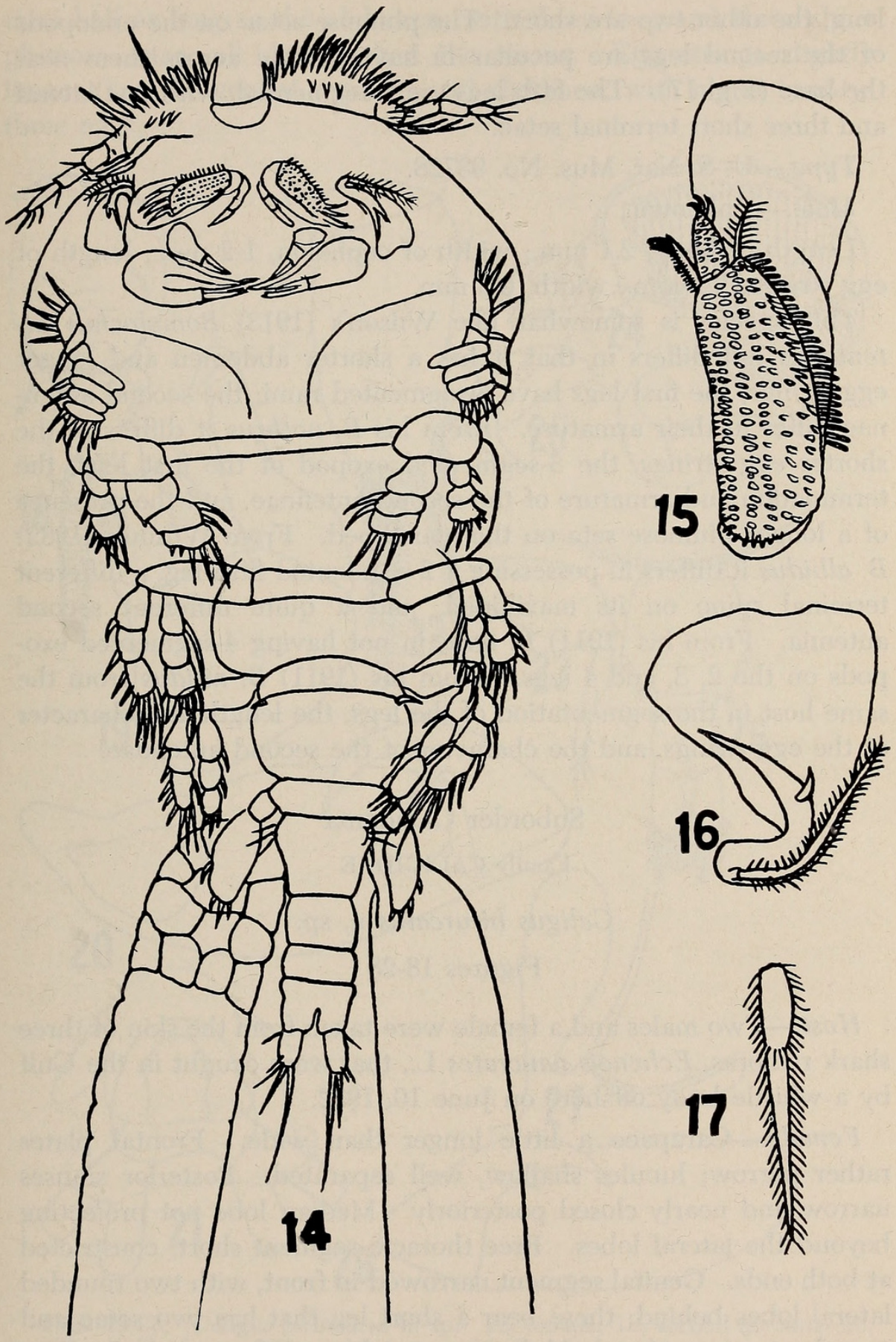
Hosts.—Eight females were taken from the gills of twenty-one mullet, *Mugil cephalus* L., from Alligator Harbor on May 7.

Female.—Cephalic segments rounded in front, about twice as wide as long. Metasome segments decrease in width posteriorly. Genital segment about as wide as preceding segment. Abdomen 3-segmented; second segment shortest; third segment longest. Caudal rami about as long as preceding segment; with a short lateral, two short and two long terminal setae. Ovisacs with 3-4 eggs across, about the same length as the body (2.1 mm.).

First antenna densely setose at base and segments not easily observed; setae spinulose near base and slender near tip; one very long seta near the end of the densely setose basal portion. Second antenna with a smooth basal segment, rugose second segment with a row of small lateral spines with recurved tips, and a bifid terminal rugose segment with one and three spines at the tips of the branches. There is also a terminal seta.

The mandibles are slender and turned under the upper lip. The first maxilla is more robust and ends in three stout setae. The second maxilla has a stout backwardly directed basal segment and ends in two setose tapering segments. The maxilliped has a wide triangular basal segment; the terminal claw is S-shaped, has a sharp lateral spine and a long plumose seta that arises near its base.

The first legs have 3-segmented rami; those of the endopod are very wide, the terminal segment bears five plumose setae, the first and second segments each bear one; the exopod bears 0, 1, and 5 plumose setae. The 2, 3, and 4 legs have 3-segmented rami; the endopod of the second legs has very wide segments with 0, 2, and 5 setae; three of those of the last segment are plumose, stout and



Figs. 14-17. *Bomolochus mugilis* n. sp. 14, female; 15, second antenna; 16, second maxilliped; 17, seta from endopod of third leg.

long, the other two are short. The plumose setae on the endopods of the second legs are peculiar in having setae across them near the base (Fig. 17). The fifth legs are 2-segmented, with one lateral and three short terminal setae.

Type.—U. S. Nat. Mus. No. 93728.

Male.—Unknown.

Length of body, 2.1 mm.; width of cephalon, 1-2 mm.; length of egg strings, 2.1 mm., width, 0.3 mm.

This species is somewhat like Wilson's (1913) *Bomolochus attenuatus* but differs in that it has a shorter abdomen and longer egg strings; the first legs have 3-segmented rami; the second antennae differ in their armature. From his *B. nothrus* it differs in the shorter egg strings, the 3-segmented exopod of the first legs, the termination and armature of the second antennae, and the presence of a longer plumose seta on the maxilliped. From Wilson's (1932) *B. albidus* it differs in possessing a 2-segmented fifth leg, a different terminal spine on its maxilliped, and a quite different second antenna. From his (1911) *B. teres* in not having 4-segmented exopods on the 2, 3, and 4 legs. From his (1911) *B. nitidus* from the same host in the segmentation of the legs, the length and character of the egg strings, and the character of the second antennae.

Suborder Caligoida

Family CALIGIDAE

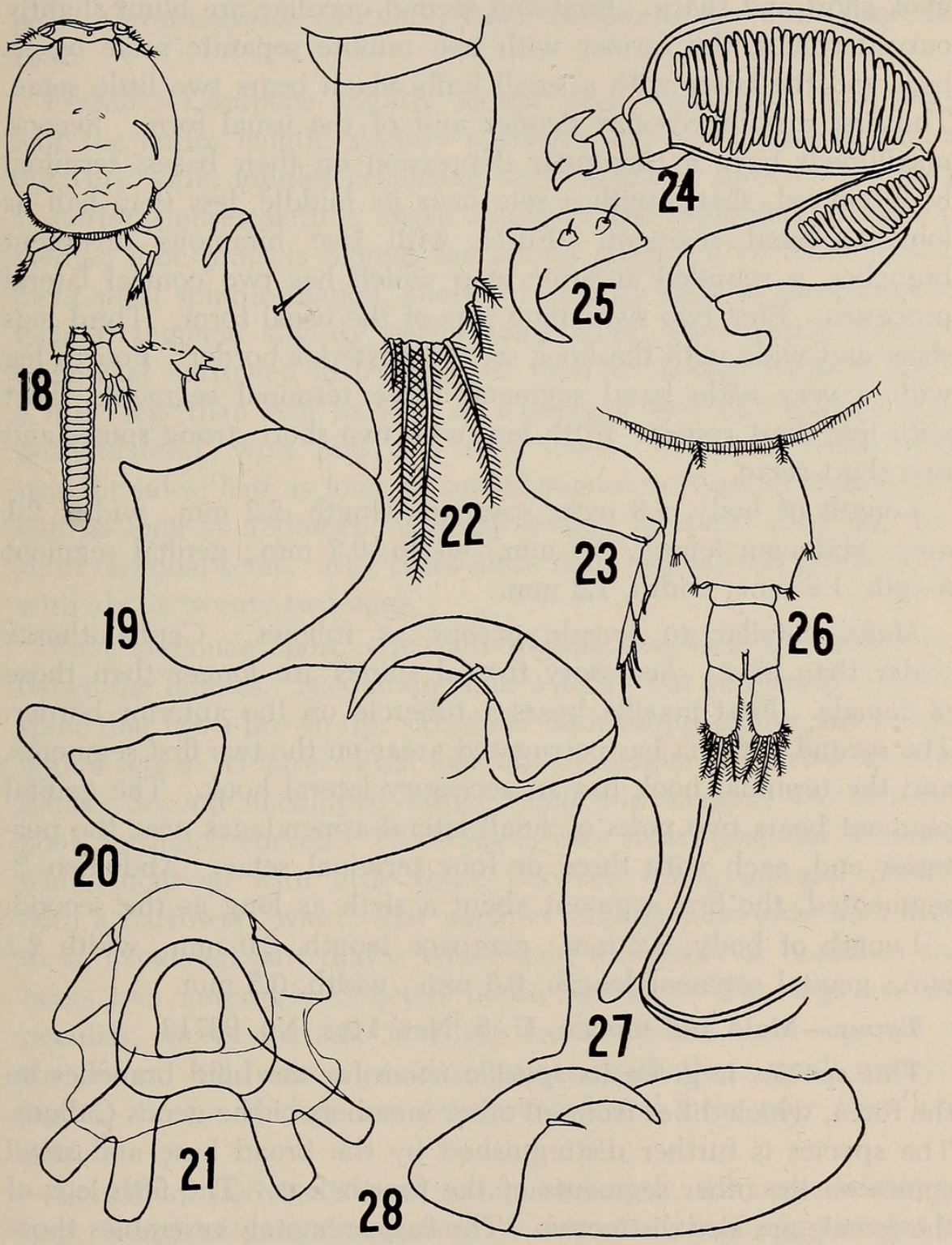
Caligus bifurcatus n. sp.

Figures 18-28

Host.—Two males and a female were taken from the skin of three shark remoras, *Echeneis naucrates* L., that were caught in the Gulf by a whistle buoy offshore on June 10, 1952.

Female.—Carapace a little longer than wide. Frontal plates rather narrow; lunules shallow, well separated. Posterior sinuses narrow and nearly closed posteriorly. Median lobe not projecting beyond the lateral lobes. Free thoracic segment short, constricted at both ends. Genital segment narrowed in front, with two rounded lateral lobes behind; these bear a short leg that has two setae and two short stout spines. Abdomen straight and 1-segmented, about half as long as genital segment, twice as long as wide. Caudal

rami half as long as the abdomen, with three long and three short plumose setae, all shorter than the ramus. Egg strings slightly longer than the genital segment and abdomen; with about twenty-three eggs.



Figs. 18-28. *Caligus bifurcatus* n. sp. 18, female; 19, second antenna; 20, maxilliped; 21, furca; 22, caudal ramus; 23, fourth leg; 24, male second antenna; 25, first maxilla; 26, posterior end of male; 27, posterior sinus; 28, maxilliped.

The first antenna is short; the terminal segment shorter than the preceding one. Behind each frontal plate is a strong accessory spine. Second antenna with a wide basal segment and a slender curved terminal one which bears a seta near its middle; terminal hook short and sharp. First and second maxillae are blunt slightly curved spines, the former with two minute separate setae on its base and the latter with a small bulb which bears two little setae. The first maxillipeds are slender and of the usual form. Second maxillipeds have a triangular depression on their bases; terminal hook curved, sharp, with a seta near its middle, less than half as long as basal segment. Furca with two biramous divergent branches, a rounded anterior loop which has two conical lateral processes. First two swimming legs of the usual form. Third legs short and wide with the hook on the posterior border. Fourth leg with a very wide basal segment; three terminal segments short with five short spines. Fifth legs with two short strong spines and two short setae.

Length of body, 4.8 mm.; carapace length, 2.2 mm., width, 2.1 mm.; abdomen length, 0.6 mm., width, 0.2 mm.; genital segment length, 1.3 mm., width, 1.2 mm.

Male.—Similar to female except as follows. Cephalothorax wider than long. Accessory frontal spines are longer than those of female. First maxilla bears a tubercle on the anterior border. The second antenna has corrugated areas on the two first segments, and the terminal hook has an accessory lateral hook. The genital segment bears two pairs of small lateral appendages near the posterior end, each with three or four terminal setae. Abdomen 2-segmented, the first segment about a sixth as long as the second.

Length of body, 3.2 mm.; carapace length, 2.0 mm., width 2.1 mm.; genital segment length, 0.5 mm., width, 0.5 mm.

Types.—Male and female, U. S. Nat. Mus. No. 93713.

This species is given its specific name for the bifid branches on the furca, which differ from all other members of the genus Caligus. The species is further distinguished by the broad base and small spines on the other segments of the fourth legs. The fifth legs of the female are also distinctive. The furca remotely resembles those of *Lepeophtheirus bifurcatus* Wilson (1905) and *L. hippoglossi* Krøyer (1838), but the lunules on the front definitely place it in the genus Caligus.

Caligus amplifurcus n. sp.

Figures 29-35

Hosts.—A male and a female were taken from two hard tailed jacks, *Caranx crysos* (Mitchill) from Octakocne Cove on June 12, 1952.

Female.—Carapace slightly longer than wide and more than half the entire length, slightly narrower in front. Frontal plates not very wide; lunules projecting very little and directed forward. Posterior sinuses with a sharp angle at the anterolateral corner; median lobe projects behind the lateral lobes. Free thoracic segment short spindle-shaped, about a fourth as wide as the carapace. Genital segment slightly longer than wide, sides nearly straight, somewhat narrowed in front; short rounded lateral lobes at back; a little less than half as long as carapace; two rudimentary legs, posterolateral, with one and two setae. Abdomen wide with straight sides; half as long as genital segment. Caudal rami nearly half as long as abdomen; with three long plumose setae and two short terminal setae. Egg cases more than half as long as the body; with about twenty-two eggs.

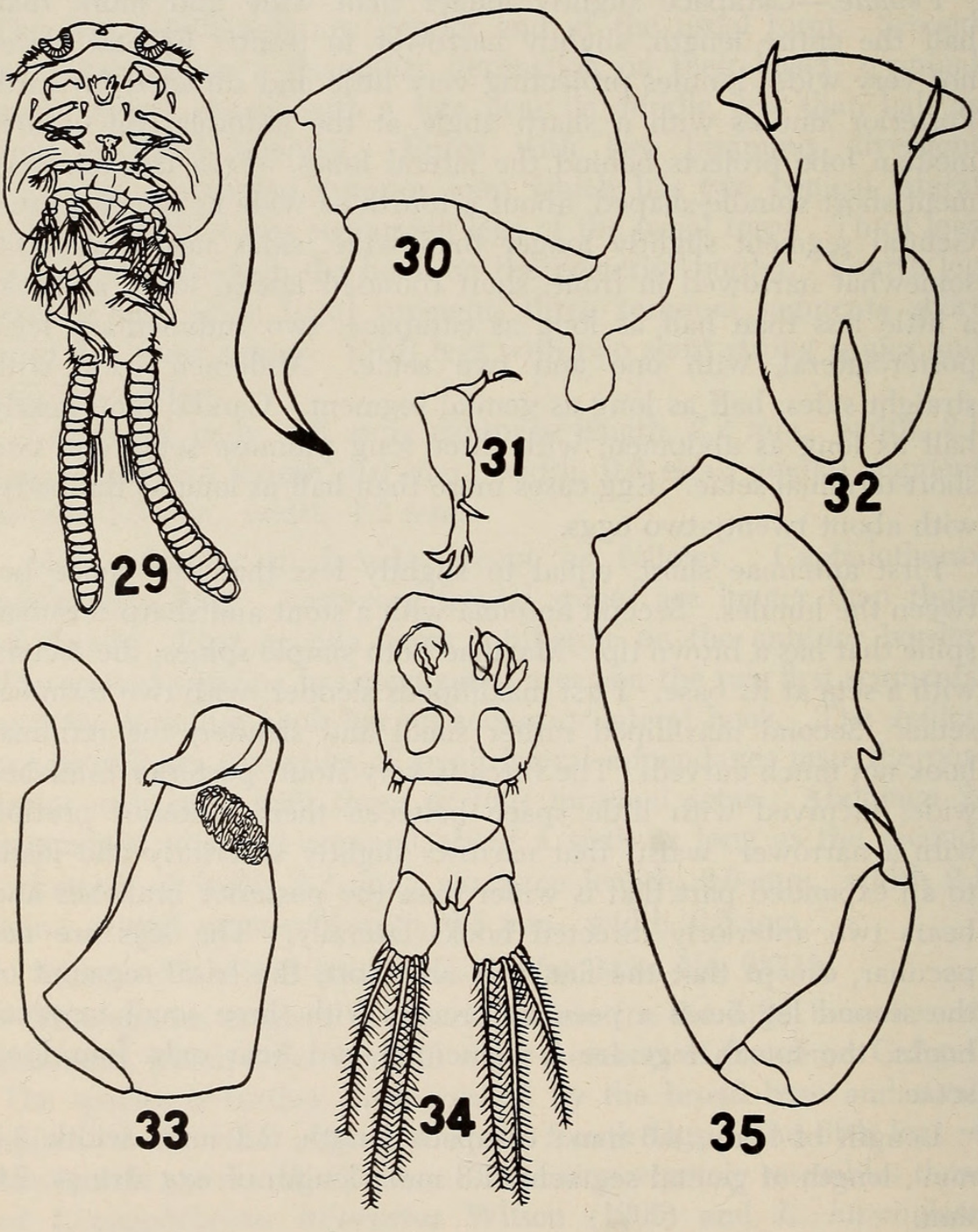
First antennae short, equal to slightly less than the space between the lunules. Second antenna with a stout and sharp terminal spine that has a brown tip. Maxillae both simple spines; the second with a seta at its base. First maxillipeds slender, with two terminal setae. Second maxilliped rather small and slender; the terminal hook not much curved. The furca is very stout; posterior branches wide, incurved with little space between them; anterior portion with a narrower "waist" that narrows slightly anteriorly and leads to an expanded part that is wider than the posterior branches and bears two anteriorly directed hooks laterally. The legs are not peculiar, except that the first legs are short; the basal segment of the second leg bears a peculiar process with three small terminal hooks; the fourth legs are 3-segmented and bear only four long setae.

Length of body, 4.6 mm.; carapace length, 2.2 mm., width 2.1 mm.; length of genital segment, 1.8 mm.; length of egg strings, 2.6 mm.

Male.—Much like the female except as follows. Second antennae with a stronger, longer terminal hook with two small terminal

spines and a corrugated area for it to meet on the preceding segment (Fig. 33). The maxillipeds are wider, have a rounded process on the margin proximal to the hook. The abdomen is rather poorly indicated to consist of two segments, the first being shortest.

Length of body, 3.1 mm.; carapace length, 2.0 mm., width, 1.7 mm.



Figs. 29-35. *Caligus amplifurcatus* n. sp. 29, female; 30, second antenna; 31, appendage on basal segment of second leg; 32, furca; 33, male second antenna; 34, posterior end of male; 35, second maxilliped.

Types.—U. S. Nat. Mus. No. 93710.

This species differs from others in the genus in its peculiar wide furca, the 3-spined appendages on the second legs, and the second antennae of the male with its characteristic terminal hook and its corrugated chitinous area. It perhaps remotely resembles Krøyer's (1863) *C. pelamydis* but its furca is wider, it has three, not four, segments of its fourth leg, and lacks the appendage on the second leg.

Caligus schistonyx Wilson

Two were taken from a bony gar, *Lepisosteus osseus* (L.), and ten from twenty-four striped mullet, *Mugil cephalus* L.

Caligus praetextus Bere

Two specimens were taken from stingarees, *Dasyatis sabina* (Le Sueur), and one from a striped mullet, *Mugil cephalus* L.

Caligus setosus n. sp.

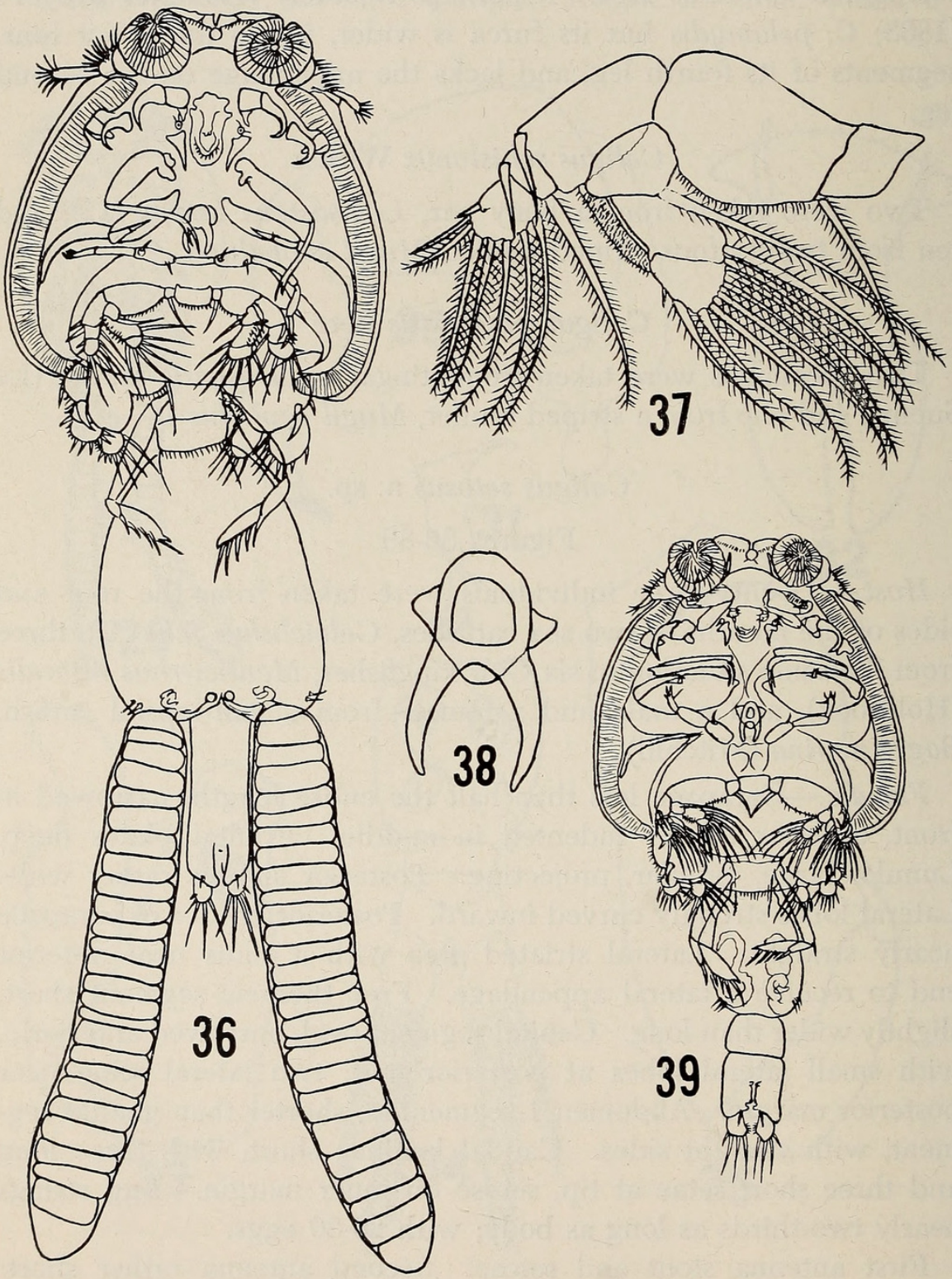
Figures 36-39

Host.—Twenty-three individuals were taken from the roof and sides of the mouths of two sea catfishes, *Galeichthys felis* (L), three from the same situation in six Gulf kingfishes, *Menticirrhus littoralis* (Holbrook), and a male and a female from a gaff-topsail catfish, *Bagre marina* (Mitchill).

Female.—Carapace less than half the entire length, narrowed in front, anterior border indented in middle. Frontal plates deep. Lunules large, circular, projecting. Posterior sinuses rather wide. Lateral lobes strongly curved inward. Posterior border of carapace nearly straight. Lateral striated area with a sinus near anterior end to receive a lateral appendage. Free thoracic segment short, slightly wider than long. Genital segment oval, narrowed anteriorly, with small lateral lobes at posterior end; two lateral setae near posterior margin. Abdomen 1-segmented, shorter than genital segment, with straight sides. Caudal laminae short, with three long and three short setae at tip, setose on inner margin. Egg strings nearly two-thirds as long as body; with 26-30 eggs.

First antenna stout and setose. Second antenna rather short; terminal hook sharp. First maxilla small; with a swollen base and a single terminal hook. First maxilliped slender with two terminal,

curved hooks. Second maxilliped also rather slender; terminal hook with a small seta. Furca with a rounded anterior border that has a slight median notch; posterior branches pointed, incurved,



Figs. 36-39. *Caligus setosus* n. sp. 36, female; 37, second leg; 38, furca; 39, male.

longer than anterior portion; a more delicate triangular projection extends laterally and somewhat posteriorly.

First leg short, slender; with three small terminal claws and a single seta; basal segment with two setae. Second leg biramous, rami 3-segmented; the second segment of the endopod is abundantly provided with about four rows of short setae along its whole posterior margin. This feature of the second segment is unique, and is the basis for the specific name of the species. The other segments of the second leg are not very different from other species in the genus Caligus. Third leg with a wide basal segment; rami separate. Fourth leg 3-segmented, the setae gradually longer toward the tip; leg more than half as long as genital segment.

Length of body, 3.17 mm.; cephalothorax length, 1.35 mm., width, 1.35 mm.; length of abdomen, 0.53 mm.; length of egg strings, 2.1 mm.

Male.—Like female but carapace slightly wider than long; abdomen 2-segmented, the first segment shorter than second; second antenna with long segments and second segment corrugated opposite terminal hook; maxilliped stout, with a strong spine opposite the end of the terminal hook and a seta on the inner margin of the hook; second legs as in female.

Length of body, 2.2 mm.; carapace length, 1.05 mm., width, 1.1; length, genital segment, 0.45 mm., abdomen, 0.35 mm.

Chalimus.—Without lunules; carapace longer than wide, about two-thirds of entire length; genital segment wider than fifth segment, about as long as abdomen, and the latter with very short caudal rami.

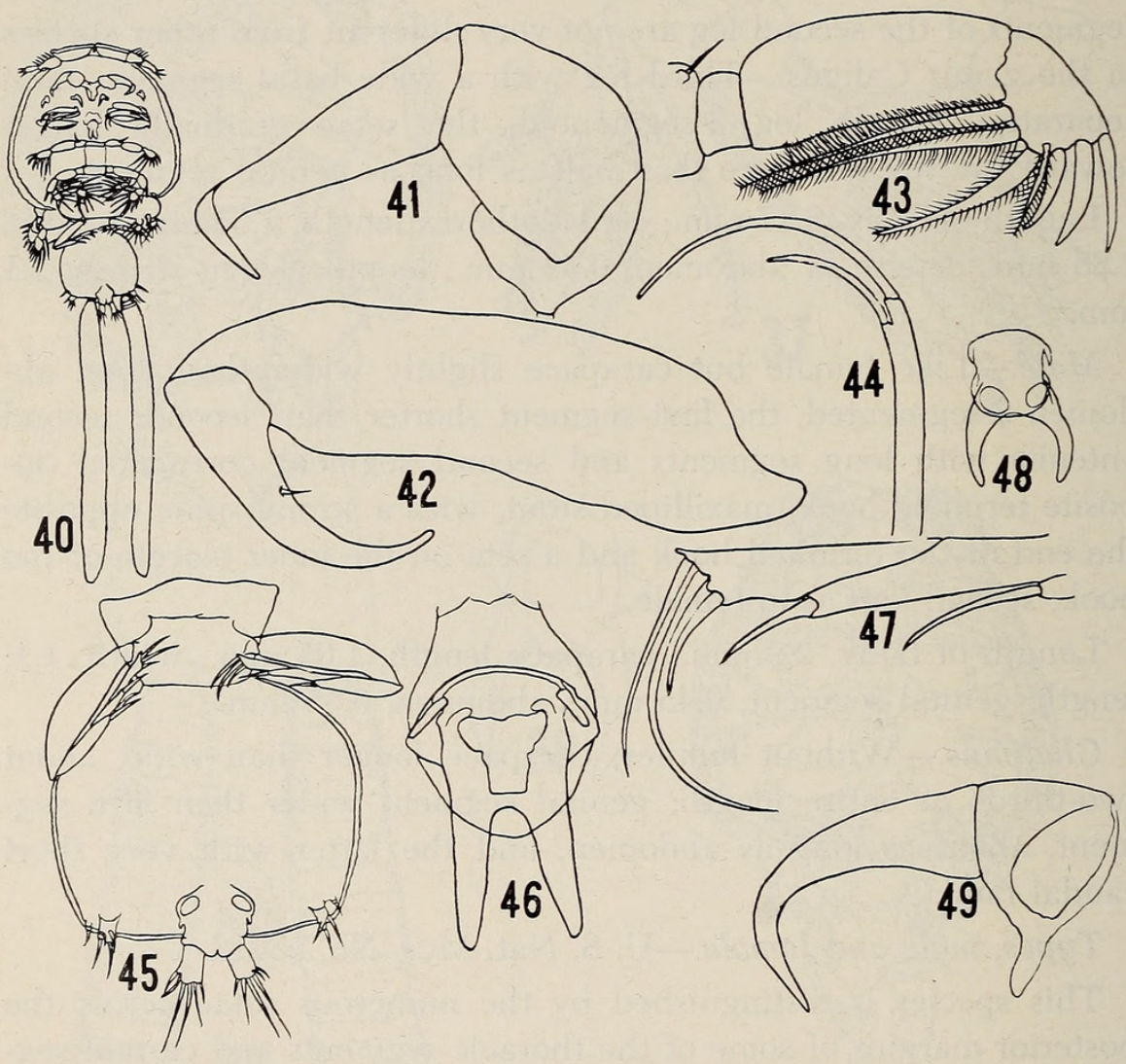
Types, male and female.—U. S. Nat. Mus. No. 93712.

This species is distinguished by the numerous setae across the posterior margins of some of the thoracic segments and certain segments of the second and third legs. This is particularly striking on the lateral margin of the endopod of the second leg of the female and male. Hence the name *setosus* is given. The furca is peculiar, with curved posterior branches and triangular lateral appendages on the base. It resembles Wilson's (1908) *C. rufus* but the cephalothorax is wider, the abdomen is not tapered, the second maxilliped is more ellipsoidal in form, the egg strings are longer, and the furca is quite different.

Lepeophtheirus bonaci n. sp.

Figures 40-49

Host.—A female and what appears to be the carapace and first thoracic segment of a male was taken from the gills of a black grouper, *Mycteroperca bonaci* (Poey), along with two *Thysonate triloba* Pearse and seventy *Hatchekia serrana* Pearse.



Figs. 40-49. *Lepeophtheirus bonaci* n. sp. 40, female; 41, second antenna; 42, second maxilliped; 43, first leg; 44, tip of first maxilliped; 45, posterior end; 46, furca; 47, tip of fourth leg; 48, male furca; 49, second antenna.

Female.—Carapace ovate, a trifle longer than wide, slightly narrower anteriorly. Frontal plates rather wide and not very deep, less than half the width of the carapace. Median lobe half the width of the carapace, slightly rounded on posterior margin, projecting well back of posterior lobes. Posterior sinuses narrow and

short. Free thoracic segment short and less than half as wide as genital segment, widest in middle. Genital segment less than half as long and wide as carapace, slightly narrowed anteriorly, posterior border straight. Abdomen 1-segmented, more than one-sixth as long as genital segment. Caudal rami shorter than abdomen, longer than wide, tipped with three long and three short setae. Egg strings slightly longer than whole body.

First antenna short, with spines and setae. Second antenna rather narrow; terminal hook narrow, tapered, rather straight, with a small sharply bent terminal spine. First and second maxillae each consist of a stout, blunt spine. First maxilliped slender with a long and a short seta at tip. Second maxilliped rather slender, with a curved terminal hook that is half as long as the basal segment and has a short seta near its middle. Furca with straight branches; almost as long as base; with finger-like projections on either side near anterior end of base and a triangular papilla dorsal to that, the center of the base with a space that is rectangular behind and has two blunt triangular processes in front. The first legs have three short terminal spines and a seta at the tip, three plumose setae on the posterior margin of the terminal segment; the posterior margin of the second segment is also plumose. Second leg biramous, with 3-segmented rami. Third leg with a wide flat basal segment, a strong hook, and two short 2-segmented rami. Three basal hooks on fourth leg short, next hook longest; leg 4-segmented. Fifth leg visible in dorsal view, with three setae. Just anterior to this leg near the margin of the genital segment is a small seta which has an expanded base and is also visible in dorsal view.

Total length, 3.9 mm.; carapace length, 2.4 mm., width, 2.3 mm.; genital segment length, 1.0 mm., width, 1.0 mm.; abdomen length, 0.25 mm., width, 0.25 mm.

Tentative male cephalothorax.—Cephalothorax longer than wide. Appendages on it similar to those of female, as far back as first leg. Second antenna with a longer, more curved terminal hook. Furca with curved branches. Width of cephalothorax, 1.45 mm.

Types.—U. S. Nat. Mus. No. 93709.

This species is much like *L. dissimulatus* Wilson (1905), but differs in the character of the furca of the male and female; shape of the genital segment, the longer egg strings, the larger number of setae on the caudal rami, the comparative length of the claws on the

fourth leg, the presence of a seta on the middle of the terminal claw of the second maxilliped, the comparative length of the cephalothorax with the remainder of the body, and the simpler border of the male second antenna.

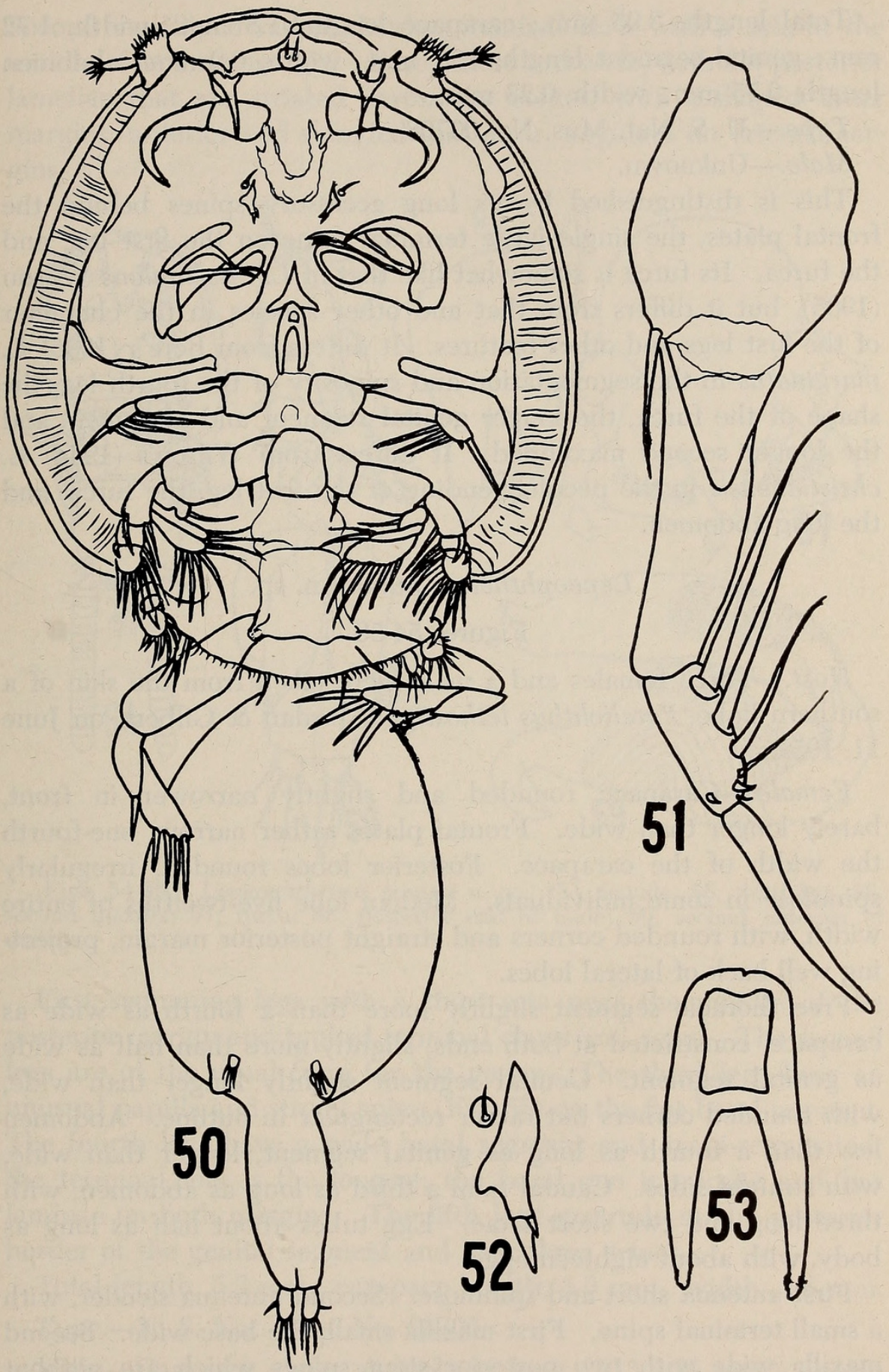
Lepeophtheirus unispinosus n. sp.

Figures 50-53

Host.—A single female was taken from the gill of a sea catfish, *Galeichthys felis* (L.), caught in Alligator Harbor. This fish also had twelve *Caligus setosus* on the roof of its mouth. It had been in an outdoor tank for several days and was examined on May 22, 1952. Another individual was taken from the same host from the same locality on May 12, 1952.

Female.—Carapace elliptical, a little longer than wide. Frontal plates with posterior rounded projections; on these the forked bases of two long accessory spines rest. Posterior sinuses narrow with sides nearly parallel. Free thoracic segment short and narrow, about a fourth as wide as genital segment. Genital segment elliptical, half as wide as carapace. Abdomen more than a third as long as genital segment. Caudal rami short, less than a fifth as long as the abdomen. No egg strings present.

First antennae short, the basal segment about the same length as the terminal one. Second antenna with the curved terminal claw longer than the base. First maxilla slender, with a small lateral spine. Furca narrow, the branches slender, straight, and longer than base, which has a narrow margin, is rounded anteriorly, and has almost straight sides. First maxilliped slender and short. Second maxilliped curved terminal hook two-thirds as long as base; with an oval thin section in the basal two-fifths. The terminal segment of the first legs is quite peculiar and gives the species its name; basal segment with a seta and a triangular terminal process with a rounded tip; terminal segment with the usual three setae and a single terminal spine with two minute spines at its base. Second legs with the second and third segments of the endopod very broad and narrow; the spine on the first segment of the exopod large, and that on the second segment a third as long and more curved. Third legs wide and rather short. Fourth legs 3-segmented, short, with short spines.



Figs. 50-53. *Lepeophtheirus unispinosus* n. sp. 50, female; 51, first leg; 52, first maxilla; 53, furca.

Total length, 3.95 mm.; carapace length, 1.8 mm., width, 1.72 mm.; genital segment length, 1.27 mm., width, 0.9 mm.; abdomen length, 0.55 mm., width, 0.23 mm.

Type.—U. S. Nat. Mus. No. 93708.

Male.—Unknown.

This is distinguished by its long accessory spines behind the frontal plates, the single large terminal spine on the first leg, and the furca. Its furca is somewhat like that of *L. dissemulans* Wilson (1905), but it differs from that and other species in the character of the first legs and other features. It differs from Bere's (1936) *L. marginatus* in the segmentation and spinosity of the fourth leg, the shape of the furca, the longer genital segment and abdomen, and the longer second maxilliped. It differs from Wilson's (1944) *L. christianensis* in the peculiar ending of the first leg, the furca, and the long abdomen.

Lepeophtheirus hummi n. sp.

Figures 54-59

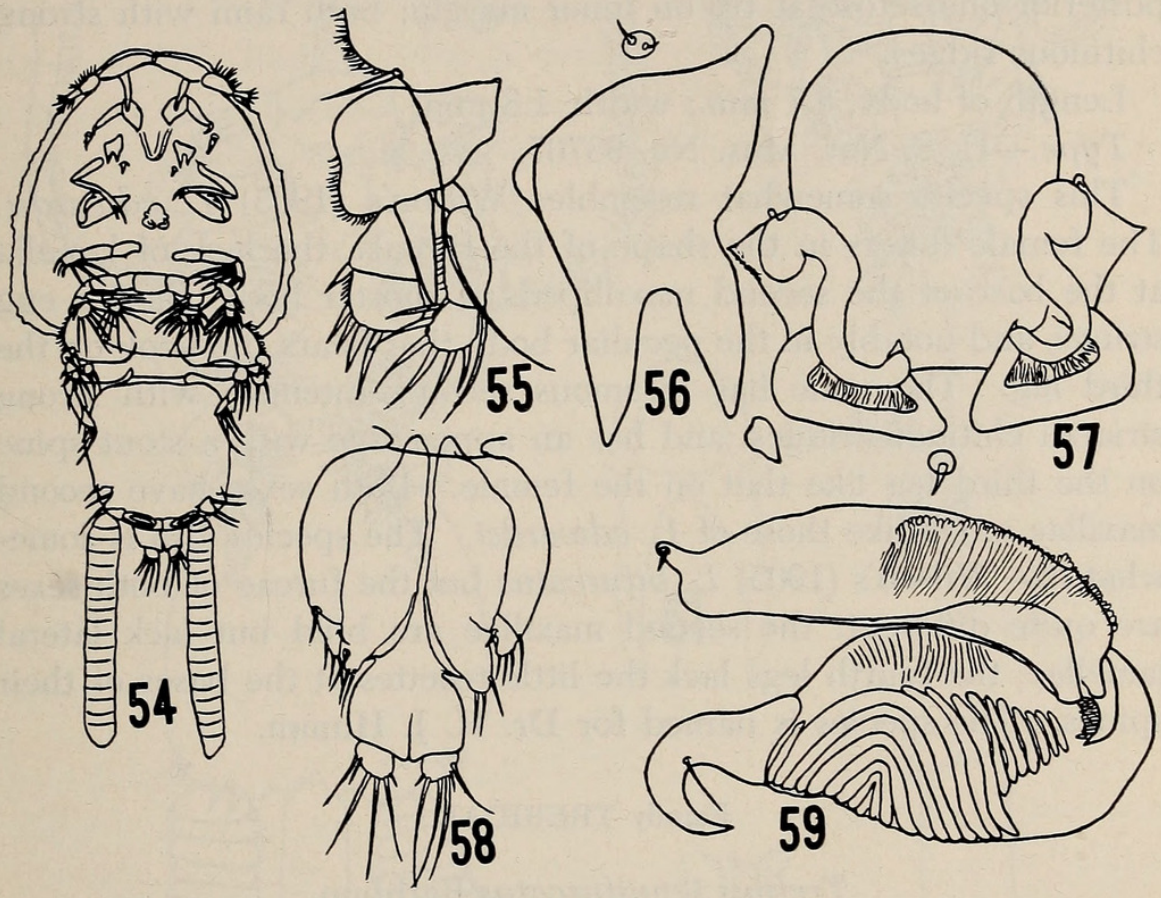
Host.—Three females and a male were taken from the skin of a southern fluke, *Paralichthys lethostigma* Jordan & Gilbert, on June 11, 1952.

Female.—Carapace rounded and slightly narrower in front, barely longer than wide. Frontal plates rather narrow, one-fourth the width of the carapace. Posterior lobes rounded, irregularly spinulose in some individuals. Median lobe five-twelfths of entire width, with rounded corners and straight posterior margin, projecting well back of lateral lobes.

Free thoracic segment slightly more than a fourth as wide as carapace, constricted at both ends; slightly more than half as wide as genital segment. Genital segment slightly longer than wide, with rounded corners but rather rectangular in outline. Abdomen less than a fourth as long as genital segment, longer than wide, with straight sides. Caudal rami a third as long as abdomen, with three long and two short setae. Egg tubes about half as long as body, with about eighteen eggs.

First antenna short and spinulose. Second antenna slender, with a small terminal spine. First maxilla small, the base wide. Second maxilla wide with two posterior stout spines which are without lateral lamellae. First maxilliped slender, with two terminal setae.

Second maxilliped rather slender, terminal claw with a seta at the middle of its inner margin. Furca short and wide, with flat posterior lamellae that are striated across the center, with S-shaped inner margins; anterior end rounded and clear, angulate on lateral margins.



Figs. 54-59. *Lepeophtheirus hummi* n. sp. 54, female, 55, third leg; 56, second maxilla; 57, furca; 58, posterior end of male; 59, second antenna of male.

First swimming legs with a short seta near the middle of the posterior margin and typical terminal claws and setae. The second legs are of the usual form for the genus. The third legs bear an unusual papilla and strong spine (Fig. 55) on the flat basal segment. The fourth legs have a wide basal segment and are 4-segmented; the terminal seta is the longest; the basal one is minute and has laminae on both margins. The fifth legs protrude at the posterior border of the genital segment and bear three setae.

Total length, 5.2 mm.; carapace length, 3.0 mm., width, 2.8 mm.

Type.—U. S. Nat. Mus. No. 93706.

Male.—Carapace about as wide as long (2.15:2.18 mm.); nearly half as long as entire body; median lobe extending behind the

lateral lobes; posterior sinuses rather wide and deep. Genital segment as wide as long, rounded in front and constricted; at the posterior corners are two short conical appendages with rounded tips and plumose setae. Second antenna biramous; both rami with terminal hooks, the anterior one most robust and more curved, the posterior one setose at tip on inner margin; both rami with strong chitinous ridges.

Length of body, 3.7 mm.; width, 1.8 mm.

Type.—U. S. Nat. Mus. No. 93707.

This species somewhat resembles Wilson's (1905) *L. edwardsi.* The female differs in the shape of the furcula, the lack of lamella at the base of the second maxillipeds, a shorter body, shorter egg strings, and notably in the peculiar body that bears the hook on the third leg. The male has biramous second antennae with strong striated chitinous ridges, and has an appendage with a stout spine on the third leg like that on the female. Both sexes have second maxillae much like those of *L. edwardsi.* The species also is somewhat like Wilson's (1905) *L. bifurcatus* but the furcae of both sexes are quite different; the second maxillae are bifid but lack lateral lamellae; the fourth legs lack the little rosettes at the bases of their spines. The species is named for Dr. H. J. Humm.

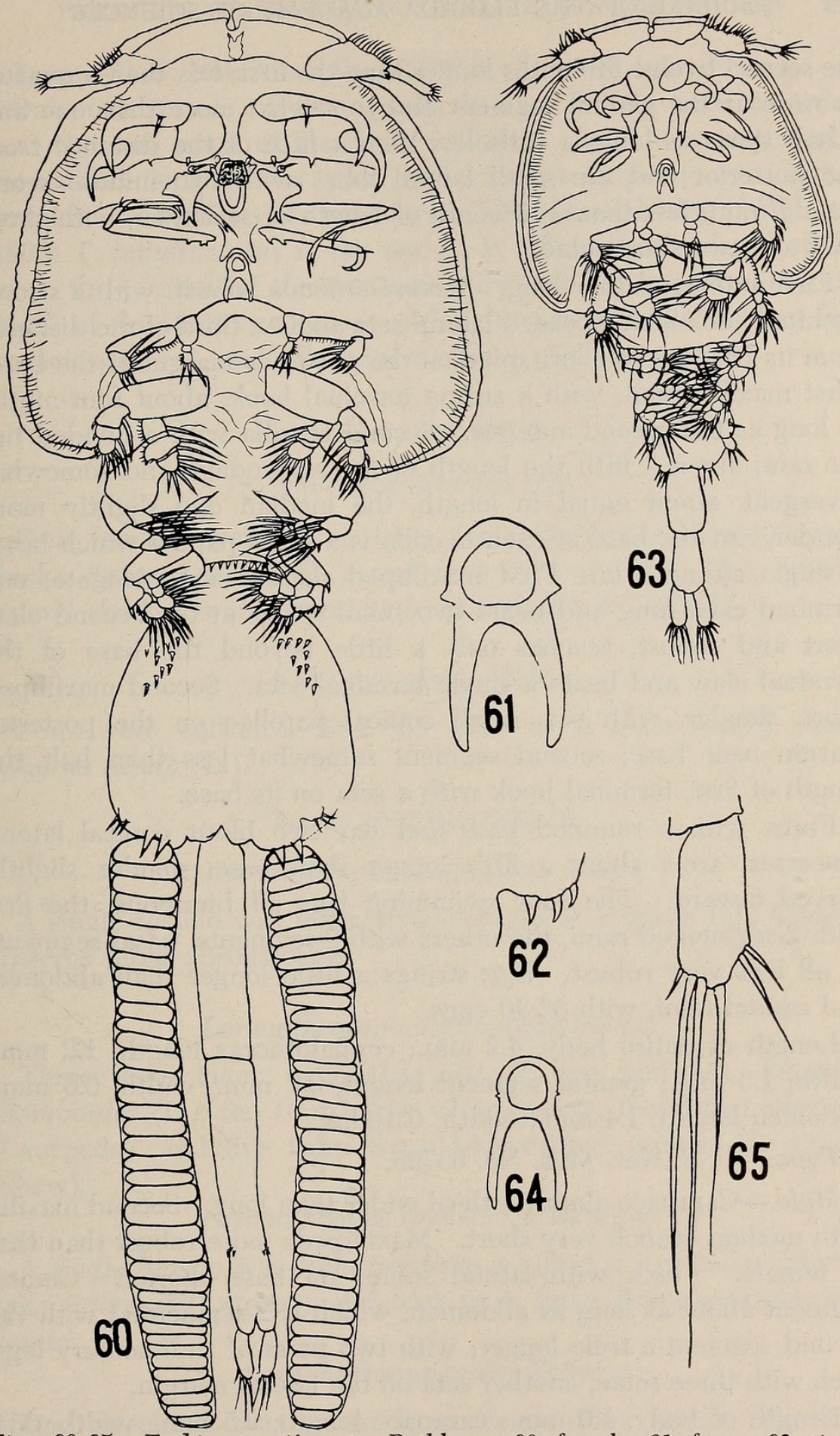
Family TREBIDAE

Trebius tenuifurcatus Rathbun

Figures 60-65

Hosts.—Thirty-two males and females were taken from the skin of eight stingarees, *Dasyatis sabina* (Le Sueur) on May 9, and fourteen from a single representative of the same host on May 20. These parasites moved about actively.

Female.—Carapace slightly wider than long, sides not much curved. Frontal plates of medium width, together more than half as wide as carapace; no lunules. Eyes in contact. Free thoracic segment small, about a sixth as wide as carapace, wide in the middle. Genital segment oval, without posterior lobes but with three dorsal spines; on the ventral surface is a small lobe with three setae and two spines, on the lateral surfaces in the anterior third there are about eleven small spines and a row of eight similar spines across the anterior end. Abdomen elongated and narrow, 2-segmented,



Figs. 60-65. *Trebius tenuifurcatus* Rathbun. 60, female; 61, furca; 62, tip of posterior lobe; 63, male; 64, furca; 65, caudal ramus.

the second twelve-fifteenths longer than the first; less than a quarter as wide as the genital segment and somewhat more than one and a half times as long; a little less than a fifth of the distance from the posterior end are small lateral lobes with two minute setae. Caudal rami less than a fifteenth of length of abdomen, with three long and two short setae.

First antenna rather long. Second antenna robust, with a strong terminal hook which bears a lateral seta about a third of the distance from its base and a short spine on the posterior margin of the base. First maxilla stout, with a strong terminal hook, about four-ninths as long as the second antenna. Second maxilla with a divided tip, the rami about a fifth the length of the appendage and somewhat divergent, about equal in length, the median one slightly more slender. At the base of each maxilla is a small papilla which bears a single strong seta. First maxilliped slender and elongate, one terminal claw long and bears two small spines at tip; second claw short and robust, reaches only a little beyond the base of the terminal claw and bears a single terminal seta. Second maxilliped short, slender, with two small conical papillae on the posterior margin near base; second segment somewhat less than half the length of first, terminal hook with a seta on its base.

Furca with a rounded base that has two blunt conical lateral processes; arms about a fifth longer than base, slender slightly curved inward. The four swimming legs all biramous; the first with 2-segmented rami, the others with 3-segments; basal segments of all legs very robust. Egg strings a little longer than abdomen and caudal rami, with 32-40 eggs.

Length of entire body, 4.2 mm.; cephalothorax length, 1.2 mm., width, 1.3 mm.; genital segment length, 0.7 mm., width, 0.6 mm.; abdomen length, 1.4 mm., width, 0.3 mm.

Type.—U. S. Nat. Mus. No. 93705.

Male.—Carapace almost a third wider than long. Second maxilla with median branch very short. Maxillipeds more robust than that of female. Furca with lateral spines on base shorter. Genital segment about as long as abdomen, which is 2-segmented with the second segment a trifle longer; with two pairs of rudimentary legs, each with three setae, another seta on the lateral margin.

Length of body, 1.6 mm.; carapace length, 0.5 mm., width, 0.75 mm.; genital segment length, 0.3 mm.; abdomen length, 0.5 mm.

Type.—U. S. Nat. Mus. No. 93705.

Only one female of this species has previously been recorded from the east coast of the United States. As it was imperfectly known and no male has been seen it seems proper to give rather complete descriptions of both sexes. The writer doubts if Wilson's (1908) *T. tenuifurcatus* is the same. It differs in the shape of the furca, the position of the terminal spines on the first maxillae, the length of the short egg strings and short abdomen, the shorter free thoracic segment, and the shape of the genital segment.

Family PANDARIDAE

Pandarus sinuatus Say

Four females were taken from the skin of seven bonnet-head sharks, *Sphyrna tiburo* (L.), and four from the skin of a spot-fin ground shark, *Carcharhinus limbatus* (Muller & Henle).

Nesippus alatus Wilson

Four were collected from the skin of a bonnet-head shark, *Sphyrna tiburo* (L.).

Family ANTHOSOMIDAE

Lernanthropus longilamina Pearse

A single female was taken from the gill of a spade fish, *Chaetodipterus faber* (Broussonet).

Lernanthropus amplitergum Pearse

Three were taken from the gills of two pinfishes, *Lagodon rhomboides* (L.), ten from eight white grunts, *Haemulon plumieri* (Lacepede), and five from three blue-striped grunts, *H. sciurus* (Shaw).

Lernanthropus brevoortae Rathbun

A single female was collected from a gill of a menhaden, *Brevoortia tyrannus* (Latrobe), and four from three *Brevoortia patronus* Gunter.

Lernanthropus leidyi Wilson

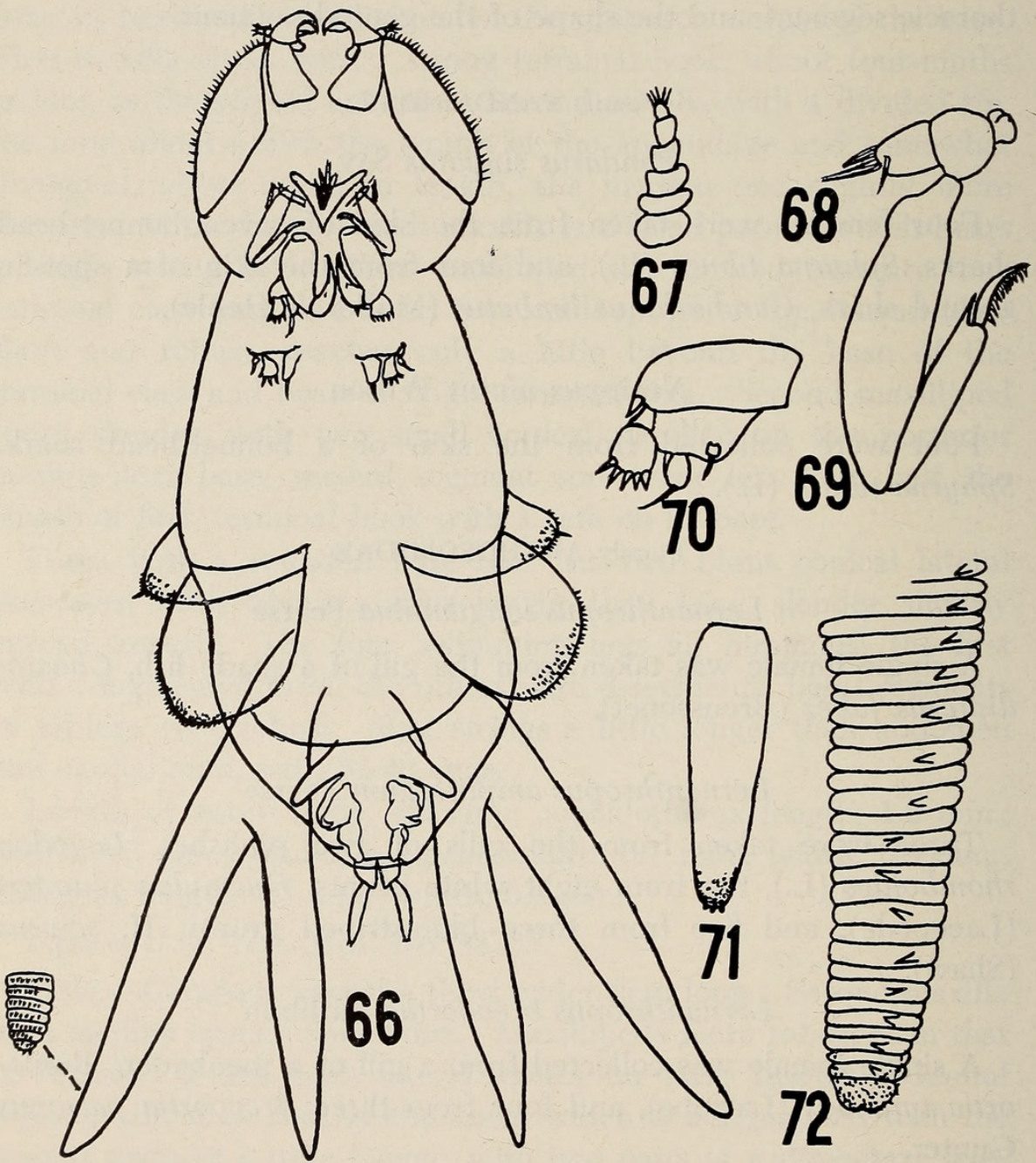
One specimen was taken from three silver perch, *Bairdella chrysura* (Lacepede).

Lernanthropus hirsutus n. sp.

Figures 66-72

Host.—A single female was taken from the gill of a white grunt, *Haemulon plumieri* (Lacepede), caught in Alligator Harbor on May 21.

Female.—Body rather robust. Cephalon, with posterior border



Figs. 66-72. *Lernanthropus hirsutus* n. sp. 66, female; 67, first antenna; 68, first maxilla; 69, second maxilla; 70, first leg; 71, caudal ramus; 72, tip of ramus of fourth leg.

slightly indented, with two long lateral plates with hirsute margins, narrower in front. Post cephalic body slightly wider than cephalon, a shallow indentation where the third legs arise; posterior end tapered, but with a straight posterior border, reaching to middle of abdomen. Two finger-like lateral lobes at anterior end of genital segment, which is short. Caudal rami, short, narrow with three minute spines and smaller brown denticles at tip.

First antenna short, 6-segmented, with setose tip. Second antenna, curved, tapered; terminal hook sharply bent. Mouth tube, conical, pointed posteriorly. First maxilla with rounded tip and three setae. Second maxilla slender, terminal claw minutely spinulose on inner margin. Maxilliped robust, terminal claw two-thirds as long as preceding segment. First legs with a lateral spine on basal segment; exopod with five spines; endopod with a single terminal seta; a small papilla with a single seta on basal segment. Second leg with a round papilla with a single seta on lateral margin; exopod with four spines; endopod with a single terminal seta. Third leg with two very short hirsute rami. Fourth legs nearly two-thirds as long as body; both rami with small cross segments; exopod with both dorsal and ventral surfaces with a spine on about every second segment; margins also minutely hirsute; endopod with a row of minute spines across each segment. The tips of the rami of the third and fourth legs, and the caudal rami and the lateral margins of the cephalon are thickly covered with minute brown bodies which are setose on the cephalon and are minute granules on the legs. No egg strings are present.

Total length, 3.2 mm. with the fourth legs, 2.8 mm. without them; carapace length, 0.6 mm., width, 0.7 mm.; post cephalic body length, 1.7 mm., width, 0.8 mm.

Type.—U. S. Nat. Mus. No. 93703.

Male.—Unknown.

This species is unique in its hirsute lateral plates on the cephalothorax, the pseudo-segmented spinulose rami of the fourth legs, and the short flat rami of the third legs. It is named for the hirsute border of the cephalon. The general form is somewhat like Wilson's (1913) *L. spiculatus* and his (1935) *L. manicatus* but it differs from these in the features just mentioned and others.

Lernanthropus wilsoni n. sp.

Figure 73

Host.—Two males were taken from the gills of a black grouper, *Mycteroperca bonaci* (Poey), collected near the light buoy offshore in the Gulf of Mexico.

Male.—Body short and stocky. Cephalothorax about as long and wide as body, with smooth lateral margins, somewhat narrower in front. Remainder of body about as long as cephalothorax. Abdomen short and narrow, longer than wide, with three lateral lobes that are narrower posteriorly, rounded on margins. Caudal rami divergent, half as long as abdomen with a dorsal and two terminal setae.

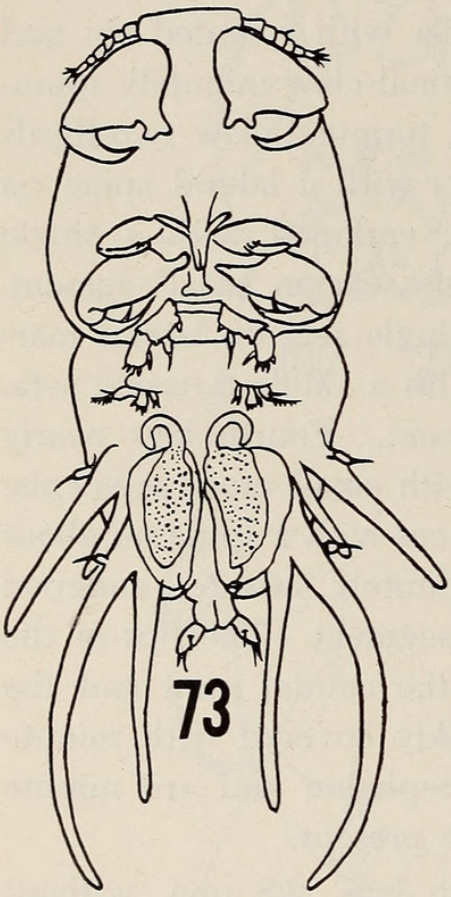


Fig. 73. *Lernanthropus wilsoni* n. sp. Male.

First antenna 6-segmented, with a seta on the third segment and about five on the tip. Second antenna very stout, with a projection on base opposite the tip of the curved terminal claw. Second maxilla rather short and robust, terminal claw two-thirds as long as preceding segment and spinulose at tip. Maxilliped very stout; terminal claw also robust, slightly curved.

First leg with endopod much smaller than exopod, with a single terminal seta; exopod with five short blunt spines; a minute spine mesiad to the base of the endopod. Second leg with a papilla with a stout terminal and a slender lateral seta on the lateral margin; exopod with a short lateral spine and three minute terminal spines; endopod with a single basal papilla with a minutely plumose terminal seta. Third and fourth legs biramous and unsegmented; third with endopod half as long as exopod; fourth with endopod three-fourths as long as exopod; both legs have a lateral papilla with a single seta on the base of the exopod.

Length of body, 1.7 mm., with fourth legs 1.9 mm.; carapace length, 0.85 mm., width, 0.78 mm.

Type and cotype.—U. S. Nat. Mus. No. 93704.

Female.—Unknown.

This species is somewhat like Wilson's (1922) *L. paenulatus*. But it differs from this and all other species in the genus in the length of the rami on the third and fourth legs and the papilla with a single seta on the bases of those legs. The proportions of the cephalon and the remainder of the body are like Wilson's *L. brevoortae* but the biramous third and fourth legs with their basal setose papillae differ. The shape of the body is somewhat like Burmeister's (1833) *L. pupa* but there are setose papillae on the third and fourth legs, those legs are longer and more slender, and the caudal rami are 1-segmented.

Family EUDACTYLINIDAE

Nemesis tiburo n. sp.

Figures 74-81

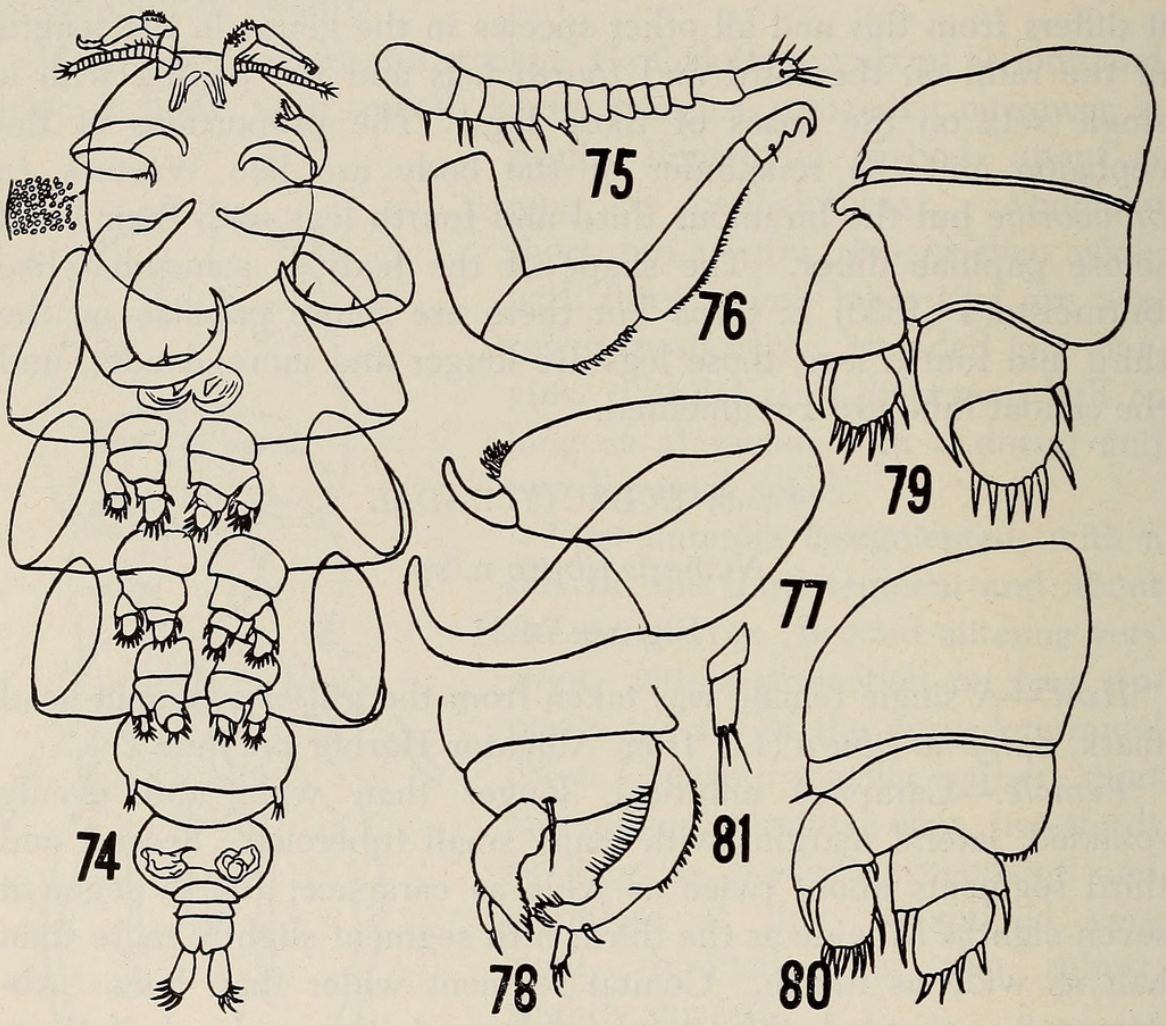
Host.—A single female was taken from the gill of a bonnet-head shark, *Sphyrna tiburo* (L.), from Alligator Harbor on June 2.

Female.—Carapace elliptical, longer than wide and evenly rounded, lateral margins with many small tubercles. Second and third segments about twice as wide as carapace; fourth segment seven-eighths as wide as the third; fifth segment slightly more than half as wide as fourth. Genital segment wider than long. Abdomen 3-segmented, third segment longest; two and a half times narrower than genital segment. No egg strings present.

First antenna with about thirteen segments. Second antenna with setose posterior margin; terminal hook slender, sharply recurved at tip, and rather slender, with a seta near base. Second maxilla stout, with a short curved terminal spine that is minutely spinulose along its margins; and the preceding segment spinulose where the claw meets it. Second maxilliped large, with a long curved terminal claw that has two short setae on its inner margin.

First leg with wide basal segment, exopod longer than endopod, setose on both margins of basal segment, terminal segment with two setae at tip; endopod with second segment shorter and more slender than first, with a terminal seta; basal segment setose at tip.

Second leg with exopod a little shorter than endopod, terminal segment with seven and six spines. Third leg with exopod almost as long as endopod, with eight and four spines. Fourth leg with exopod a little shorter than endopod, with eight and four spines. Fifth leg, slender, with three terminal setae.



Figs 74-81. *Nemesis tiburo* n. sp. 74, female; 75, first antenna; 76, second antenna; 77, second maxilliped; 78, first leg; 79, second leg; 80, fourth leg; 81, fifth leg.

Length of body, 2.7 mm.; cephalon length, 0.9 mm., width, 0.7 mm.

Type.—U. S. Nat. Mus. No. 93702.

Male.—Unknown.

This female differs from other species in the genus in the straight terminal hook on the second antenna with its short sharply curved tip. Her 2 to 4 legs also differ in the number of spines on the exopods. Her first legs also differ in the shape and spinosity of the segments. She appears to be closest to the writer's *N. pilosus* (1951)

and Wilson's (1932) *N. pallida* but the second antenna differs in structure. The number and length of the spines on the legs and the comparative width of the segments is different. As the specimen bears no egg strings or spermatophores it is probably somewhat juvenile, but its appendages appear to be mature.

Eudactylina longispina Bere

Ten females were collected from a bonnet-head shark, *Sphyrna tiburo* (L.).

Eudactylina turgipes Bere

Two were collected from the gills of five butterfly rays, *Pteroplatea micrura* (Schneider).

Family PSEUDOCYCNIDAE

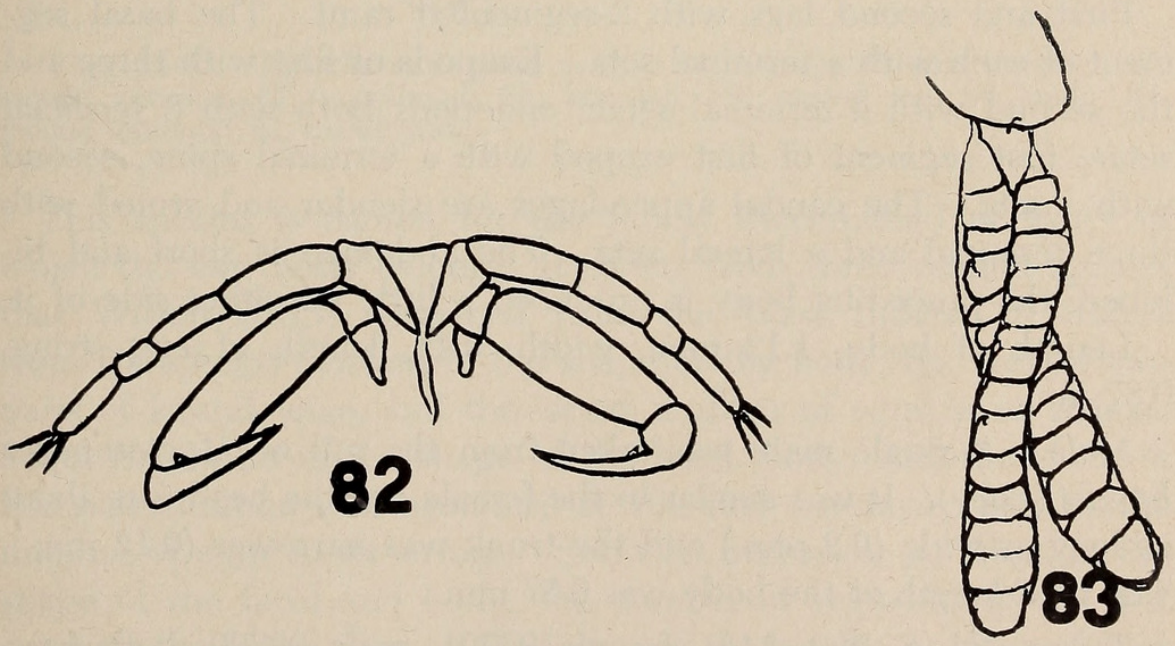
Cybicola elongata Pearse

Four were taken from the gills of a king mackerel, *Scomberomorus cavalla* (Cuvier & Valenciennes).

Family DICHELESTHIDAE

Hatschekia linearis Wilson

Twelve were taken from the gills of seven white grunts, *Haemulon plumieri* (Lacepede), and one from a gill of a pinfish, *Lagodon rhomboides* (L.).



Figs. 82-83. *Hatschekia harkema* Pearse. 82, first and second antennae; 83, egg strings.

Hatschelsia harkema Pearse

Figures 82-83

Twenty-three females and seven males were collected from spiny boxfish, *Chilomycterus schoepfi* (Walbaum), April 23 and May 26. These furnished better materials than those collected at Beaufort, N. C. The females had 4-segmented first antennae. Some of them also bore a lineal series of egg strings which contained about a dozen eggs.

Hatschekia serrana n. sp.

Figures 84-92

Hosts.—One hundred and thirty-two (0,131,1) females were obtained from the gills of three red groupers, *Ephinephelus morio* (Cuvier & Valiencennes), and 78(8,70) from two black groupers, *Mycteroperca bonaci* (Poey).

Female.—Head slightly wider than long, nearly circular in outline; narrower than trunk (0.31-0.46 mm.). Eggs large, 4-6(7) in a string.

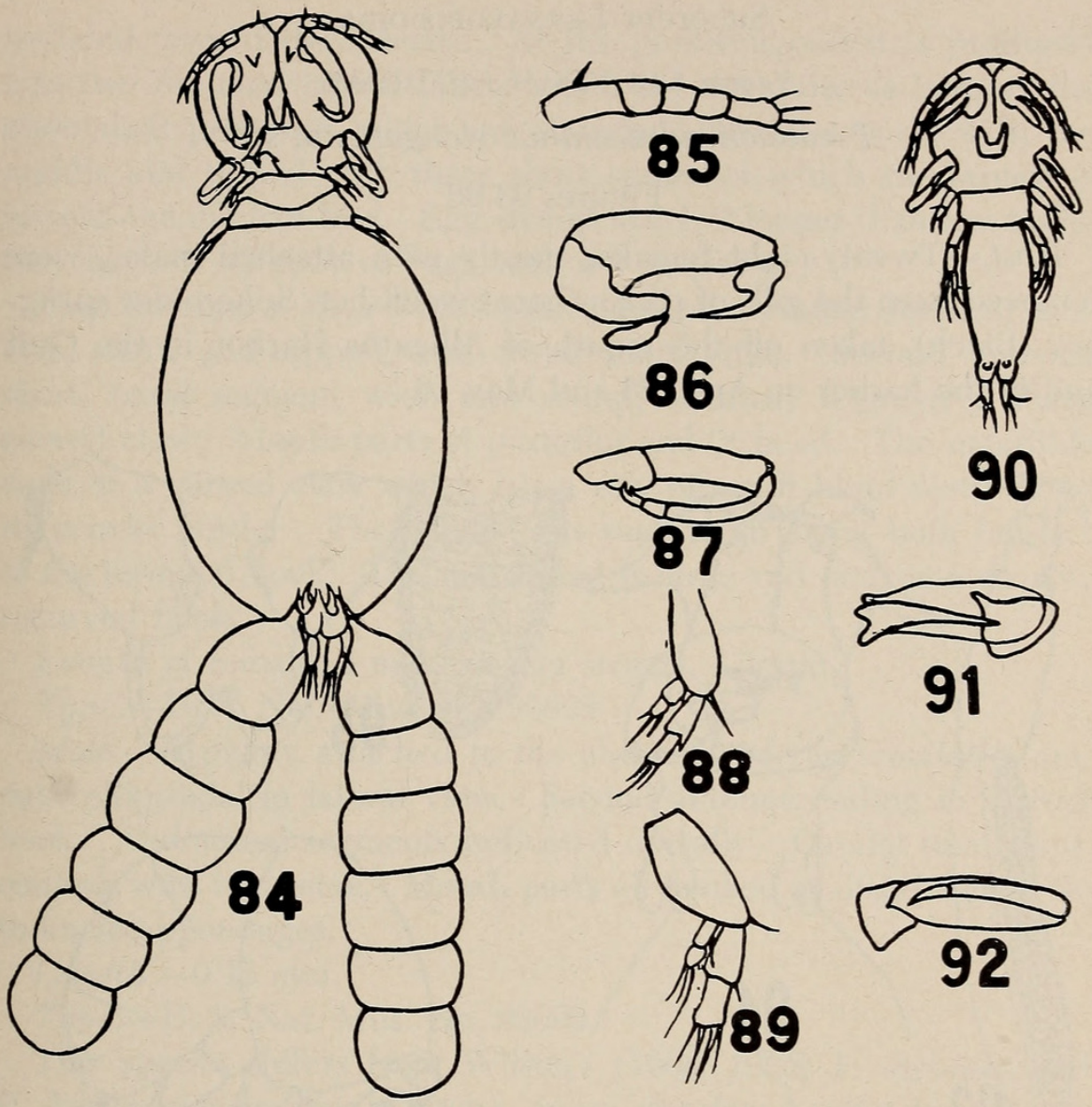
First antenna 5-segmented, with few setae. Second antenna 2-segmented and armed with a sharp terminal claw. Mouth tube anterior to bases of maxillipeds, nearly rectangular, longer than wide. Maxilliped more slender than second antennae, with a large and a small terminal claw.

First and second legs with 2-segmented rami. The basal segment of each with a terminal seta. Exopods of first with three and the second with 4 terminal setae; endopods both with 3 terminal setae; first segment of first exopod with a terminal spine, second with a seta. The caudal appendages are slender and armed with three terminal and a lateral seta. The abdomen is short and bilobed; the preceding body is produced a little on either side of it.

Length of body, 1.12 mm., width, 0.48; length of egg string, 0.87 mm.

Male.—A single male was taken from the gill of *Mycteroperca bonaci* (Poey). It was similar to the female but the head was about as long as wide (0.2 mm.) and the trunk was narrower (0.12 mm.). The total length of the body was 0.57 mm.

Types.—U. S. Nat. Mus. female 93701, male 93700; both from *Mycteroperca bonaci* (Poey).



Figs. 84-92. *Hatschekia serrana* n. sp. 84, female; 85, first antenna; 86, second antenna; 87, maxilliped; 88, first leg; 89, second leg; 90, male; 91, second antenna; 92, maxilliped.

This species is named for the family (Serranidae) of fishes to which the two hosts belong. It differs from three related species that Wilson (1913) described from the West Indies. It differs from *Hatschekia insolata* in the shape of the body, the lack of two pairs of lateral setae, and the larger number of eggs in its strings. From *H. uncata* in the shape of the head, body, and abdomen; in the segmentation and armature of the first antennae; and in the number of eggs in its strings. From *H. iridescens* it differs in the shape of the head and body, the number of segments in the first antenna, the fewer setae on the legs, and the smaller number of eggs in its strings.

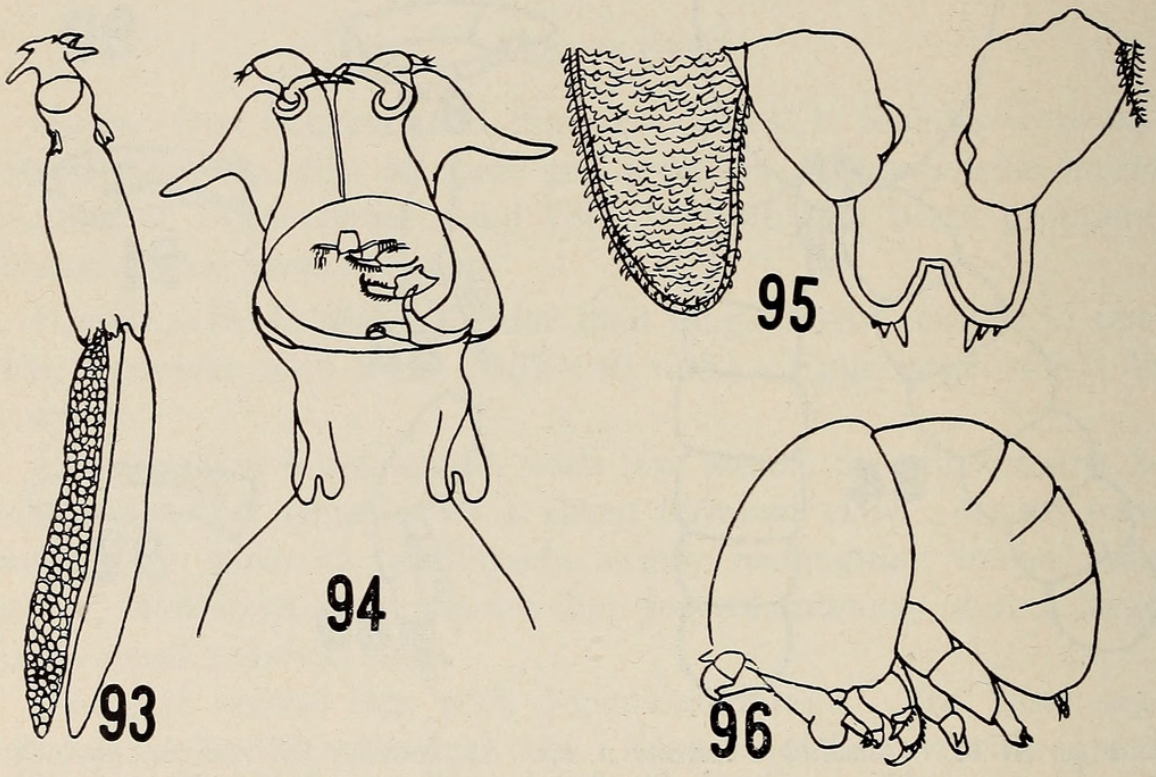
Suborder LERNAEOPODOIDA

Family CHONDRACANTHIDAE

Pseudochondracanthus elongatus n. sp.

Figures 93-96

Host.—Twenty-eight females, mostly with attached males, were removed from the gills of six southern swellfishes, *Spheroides spengleri* (Bloch), taken off the mouth of Alligator Harbor in the Gulf and in the harbor on April 23 and May 16.



Figs 93-96. *Pseudochondracanthus elongatus* n. sp. 93, female; 94, anterior end that shows first antennae, second antennae, lateral horns, mandibles, maxilla, maxilliped, legs; 95, posterior end; 96, male.

Female.—Head longer than wide, truncate in front, one-fourth narrower in front than further back, rounded posteriorly; from each anterior corner a blunt, slightly curved, and strongly tapered horn extends laterally. Head is partially covered with a carapace that is narrower anteriorly, and has a deep median groove for the anterior half of its length. A single free thoracic segment is slightly narrower than the head; it bears a pair of unsegmented, biramous appendages, with very short rami. A narrower neck succeeds the second segment. Behind this the body is unsegmented and covered with minute scales, which are more spinulose at the margins and

rounded toward the interior. At the posterior end it is produced into two rounded lateral lobes, which are not quite as long as the abdominal processes which are rounded, clearly separated in the middle and tipped with three short spines of which the largest is toward the median line. Egg strings are 1/9 longer than the body; they have 37-43 rows of eggs with 4-9 in a row.

First antenna with a wide basal segment; terminal segment narrow, short, and tipped with three short setae. Second antenna short; basal segment wide and round, terminal segment a sharp curved claw. Mouth parts at posterior end of head. The mandible ends in a curved claw which has a row of small blunt teeth along its convex border. The maxilla has such teeth along both borders of the terminal hook. The maxilliped is large and ends in a sharply recurved hook.

Length of female, 4 mm.; of egg strings, 4.5 mm.

Type.—U. S. Nat. Mus. No. 93698.

Male.—A pigmy attached to the abdomen of the female. Carapace ellipsoidal in lateral view. Second antenna ending in a stout hook. Abdominal segments indicated dorsally. Caudal rami short, conical, with two setae. Mouth parts all hooked at distal ends. No thoracic appendages.

Length.—0.42 mm.

Type.—U. S. Nat. Mus. No. 93699.

This species differs from Wilson's (1908, 1935) *P. diceraus* and *P. hexaceraus* in being longer, more slender, having longer egg strings, non-articulated caudal rami, the structure of the legs, the shape of the cephalon and the following neck, and the character of the first antenna. The male differs in the shape of the cephalothorax, the segmentation of the abdomen, and the character of the appendages. It is on the whole closest to Wilson's *P. diceraus* but is easily separated from it by the female caudal rami and first legs and by the shape of the male cephalon.

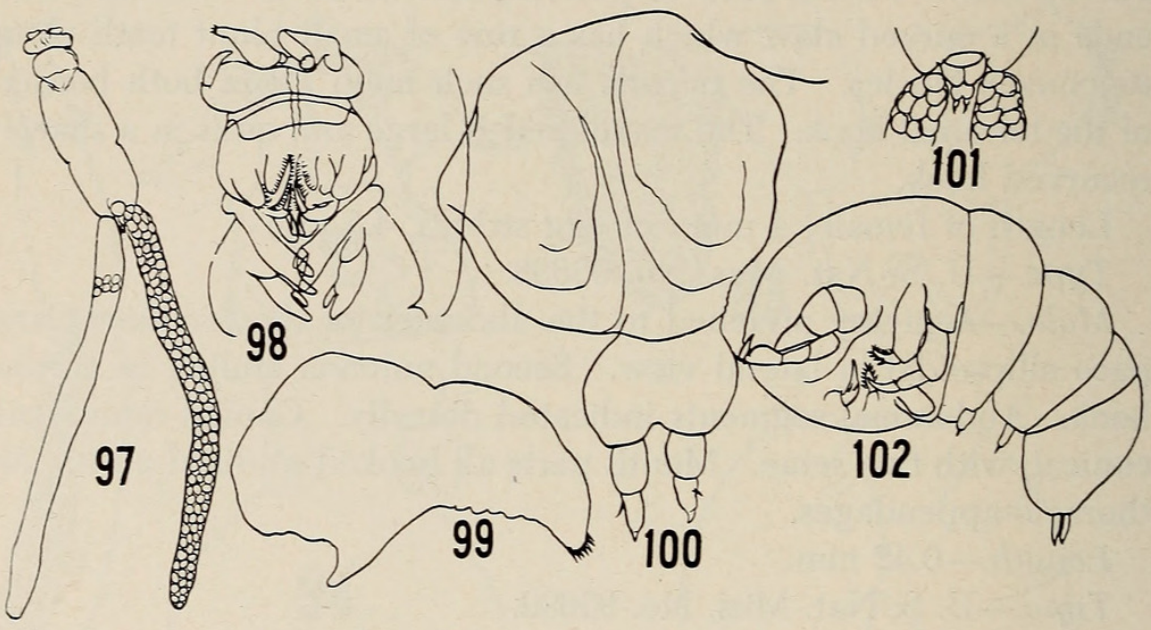
Acanthochondria tenuis n. sp.

Figures 97-102

Host.—Two females with attached males were taken from four bat-fishes, *Ogcocephalus nasutus* Ginsberg, on April 19 and 24.

Female.—Head with posterior margin straight; narrower toward anterior end, but with two anteriorly directed rounded lateral lobes.

First metasome segment short and distinct; second segment twice as wide as long, not clearly defined; third and fourth segments slightly longer than wide, their limits indicated by slight lateral indentations. End of fused thorax with very short rounded lateral prolongations and a very short median plate between them. Genital segment slightly wider than long, widest near anterior end. Abdomen 1-segmented, wider than long, shorter than genital segment. Caudal rami stout, 2-segmented, with a single short terminal spine and a short lateral seta.



Figs. 97-102. *Acanthochondria tenuis* n. sp. 97, female; 98, anterior end; 99, first antenna; 100, 101, posterior end; 102, male.

First antenna narrow and cylindrical; setose at tip. Second with a stout basal segment and a curved terminal claw. Mandibles curved, spinules on anterior smaller than those on the posterior margin. Second maxilla stout, terminal claw with spinules on anterior smaller than those on the posterior margin. Maxillipeds rather slender. First and second legs cylindrical, biramous, exopod longer than enodopod, rami unsegmented, shorter than basal portion.

Length of body, 4.1 mm., width, 1.0 mm.; length of egg strings, 5.8 mm.

Male.—Cephalothorax robust, with a dorsal sinus that indicates the boundary between the head and thorax. Trunk 3-segmented. Caudal rami rather stout and sharply pointed. First antenna small and short. Second antenna robust, with a curved terminal hook,

mandibles similar to those of female. Maxillae stout with a single terminal spine. Maxillipeds slender, 3-segmented with a terminal hook. Legs both 1-segmented with a single terminal spine.

Length of body, 0.54 mm.

Types, male and female.—U. S. Nat. Mus. No. 93695.

This species is named for its slender form. It differs from others in the genus Acanthochondria in the short processes at its posterior end, the great length of its egg strings, and the shape of its abdomen. It also differs from those described by Wilson (1908, 1935) from the Pacific Coast in the same features, and from Scott's (1913) figures of Chondracanthus.

Acanthochondria albigutta n. sp.

Figures 103-110

Host.—Two females, each with an attached male, were taken from the roofs of the mouths of two flounders, the Gulf flukes, *Paralichthys albiguttulus* Jordan & Gilbert. One of these bore egg strings and was 8.3 mm. long, the other had none and measured 4.3 mm. in length. The species is named for the host.

Female.—Head elliptical, slightly longer than wide, with lateral lobes at the anterior end; split to near the posterior margin along the median line; a dorsal plate covering the posterior third. First two metasome segments free; the first very short and not as wide as head; the second somewhat wider than head and with two anterior lobes. The two pairs of legs are biramous and unsegmented; the exopods project at the side of the body. Third segment of thorax free; fourth and fifth segments fused; all these wider than head. The fifth segment is produced into two posterior processes with rounded tips; these are less than 2.5 as long as the preceding segment is wide. Genital segment, tapering, somewhat wider than long. Abdomen nearly twice as wide as long; near its base on each side is a stout 2-segmented seta on a small caudal ramus.

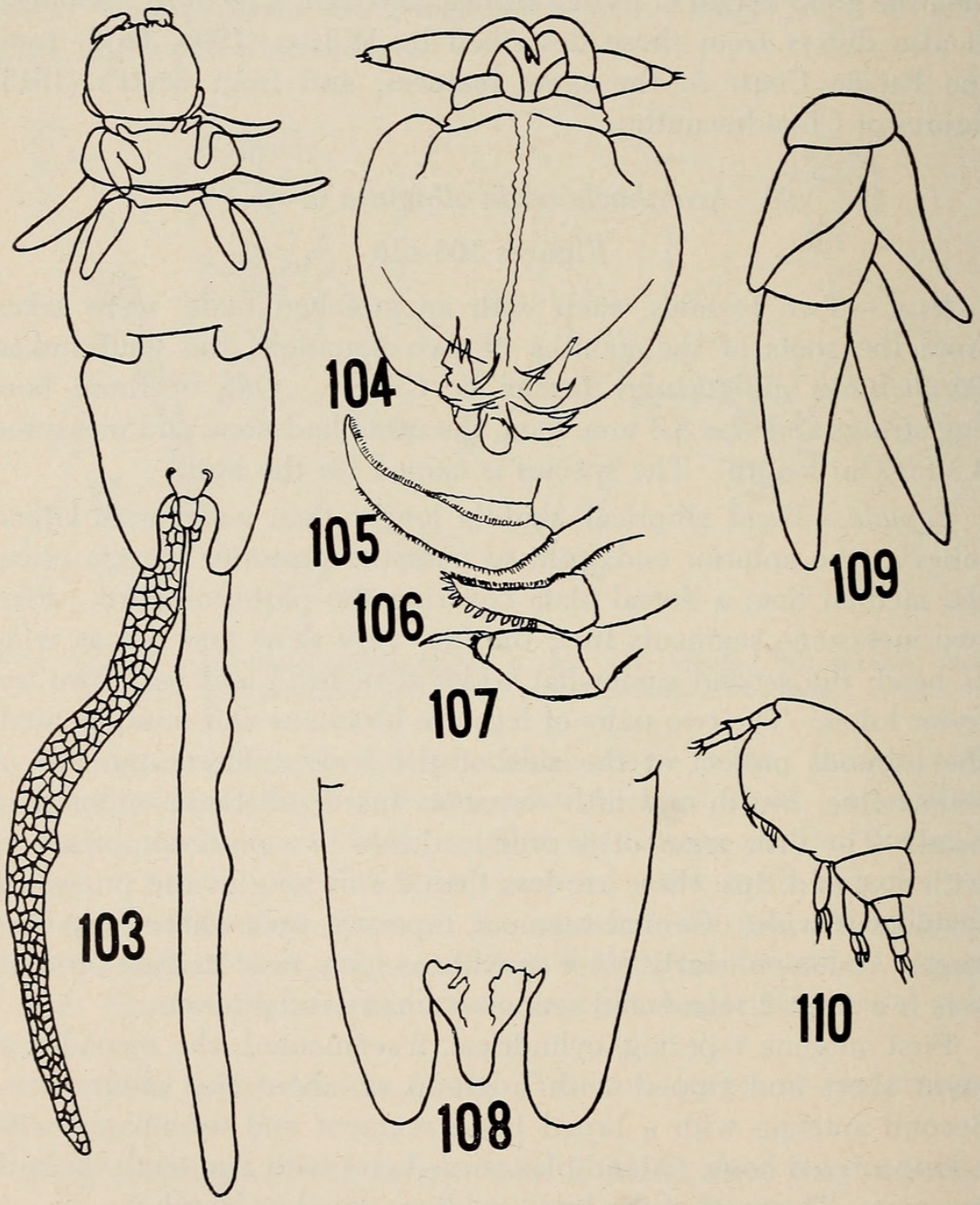
First antenna tapering, cylindrical, 2-segmented; the second segment short and tipped with a group of about five short setae. Second antenna with a broad basal segment and terminated with a long curved hook. Mandibles curved and with fine teeth on both margins. The rami of the legs are about equal in length.

Length of body, 8.3 mm., width, 2.4 mm.; length of egg strings, 11.0 mm.

Type.—U. S. Nat. Mus. No. 93696.

Male.—Cephalothorax rounded dorsally. First antenna 3-segmented. Two pairs of biramous legs on last two thoracic segments. Abdomen 3-segmented, the last segment longest. Caudal rami stout, less than half as long as preceding segments; tipped with two short setae.

Length of body, 0.16 mm.



Figs. 103-110. *Acanthochondria albiguttula* n. sp. 103, female; 104, anterior end; 105, mandible; 106, maxilla; 107, maxilliped; 108, posterior end; 109, first and second legs; 110, male.

Type.—U. S. Nat. Mus. No. 93697.

This species differs from others in the genus in that the first thoracic segments are not both narrower or wider than the head. The head is peculiar in having anterior lateral lobes, and such lobes are present on the second thoracic segment. The third thoracic segment is clearly set off from the fourth. The posterior processes are too short for Wilson's (1932) *A. exilipes* and too long for Krøyer's (1863) *A. flurae.* The male is unique in having 3-segmented antennae, large biramous swimming legs on the thorax, and a long 3-segmented abdomen. It differs from the writer's *A. cyclopsetta* (1952) in the shorter legs, the first antenna, and the stouter second maxilliped. The male differs from all of Oakley's (1930) species.

Triphyllacanthus ancoralis Bere

Four were taken from the gills of three short-nosed bat-fishes, *Ogcocephalus radiatus* (Mitchill) and one from two other bat-fishes, *O. nasutus* Ginsberg.

Family LERNAEOPODIDAE

Thysanote triloba n. sp.

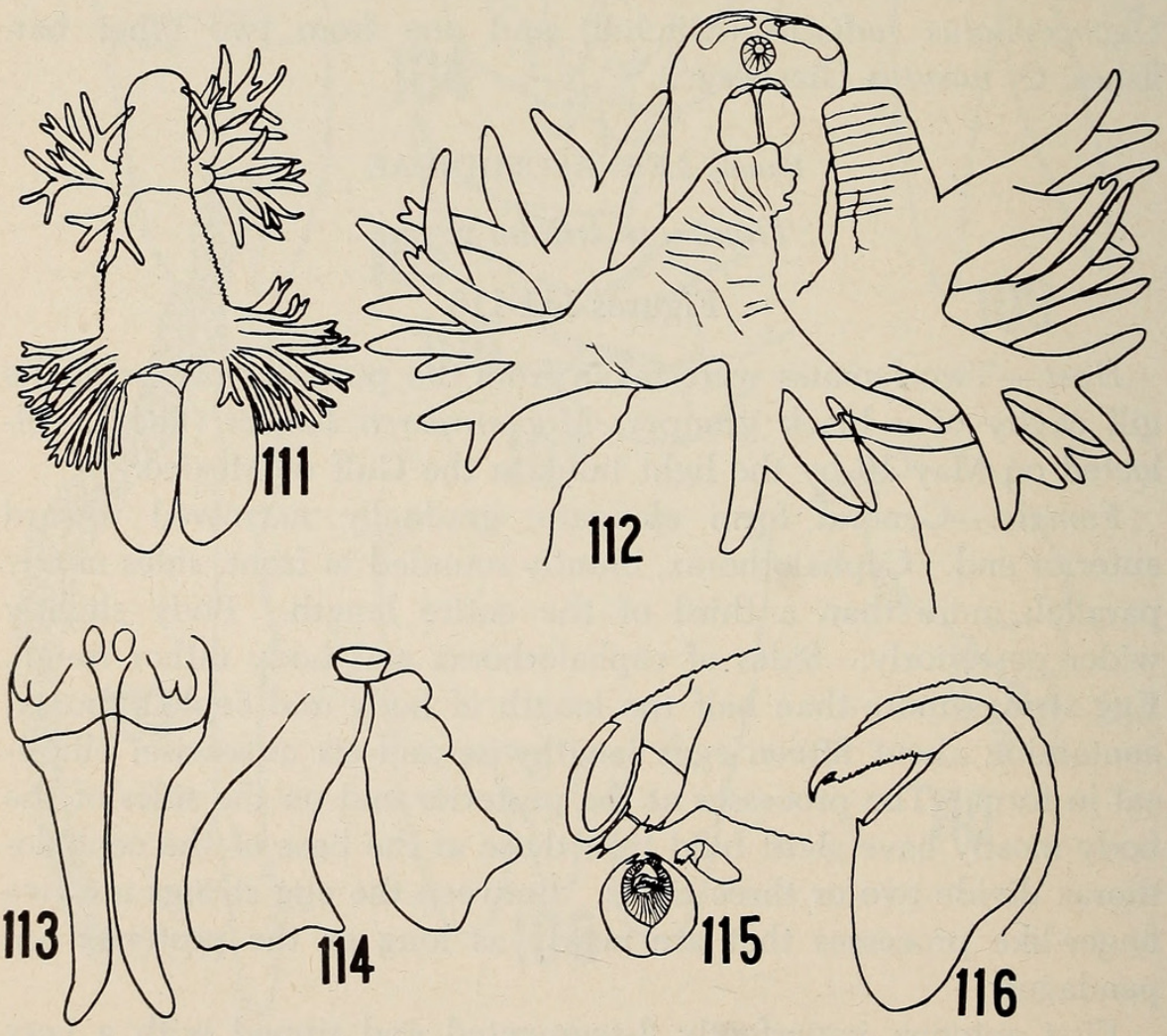
Figures 111-116

Host.—Two females were taken from the posterior corner of the gill cavity of a black grouper, *Mycteroperca bonaci* (Poey), collected on May 16 by the light buoy in the Gulf of Mexico.

Female.—General form elongate, gradually narrowed toward anterior end. Cephalothorax, bluntly rounded in front, sides nearly parallel; more than a third of the entire length. Body slightly wider posteriorly. Sides of cephalothorax and body rather rough. Egg strings more than half the length of body and cephalothorax; containing about fifteen eggs lengthwise and six crosswise; elliptical in form. The processes at the posterior end on the sides of the body mostly have short bifid tips; those at the base of the cephalothorax divide two or three times. Between the egg strings are two finger-like processes that are nearly as long as the posterior appendages.

First antenna imperfectly 3-segmented and tipped with a very short pair of spines. Second antenna biramous, bent across the anterior end, and meeting in front of the mouth tube; exopod broad,

1-segmented, and bluntly rounded; endopod 2-segmented, narrower and tipped with two spines. Mandibles curved, with about twelve strong teeth on the posterior margin. First maxilla with a broad base and tipped with five stout setae. Maxilliped with basal segment nearly twice as long as wide, rather stout, with a short spinous process where the terminal hook meets it; terminal hook corrugated on inner margin, with a small seta near tip. Second maxilla fused at tip, with a short terminal bulla, shorter than the cephalothorax, reaching slightly beyond the eyes but not to the anterior end. The branches on the tips of the lateral processes number 14, 21, 16 and 16 on the two specimens available; those on the sides of the posterior end of the body number about 28, 26, 21, and 21. The smaller numbers probably are on less mature appendages, or one has been lost.



Figs. 111-116. *Thysanote triloba* n. sp. 111, female; 112, ventral view of anterior end; 113, caudal rami; 114, second maxillae; 115, left side of anterior end, ventral; 116, maxilliped.

Length of body, 4.5 mm.; cephalothorax length, 1.0 mm., width, 0.6 mm.; body length, 2.0 mm., width, 1.2 mm.; egg strings length, 2.8 mm., width, 0.7 mm.

Type.—U. S. Nat. Mus. No. 93694.

Male.—Unknown.

This species is like Heller's (1865) *T. lobiventris* but the egg strings are visible for their entire length; the posterior processes are separate to nearer their bases; the egg strings are somewhat longer; the body is narrower. The species name indicates that many of the lateral processes are branched three times.

Naobranchia lizae Kryer

Eight taken from the gills of a short-nosed bat-fish, *Ogcocephalus radiatus* (Mitchill), seventy from six other bat-fishes, *O. nasutus* Ginsberg, fifty-nine from twenty-five striped mullet, *Mugil cephalus* L., and six from a spiny boxfish, *Chilomycterus schoepfi* (Walbaum).

Naobranchia variabilis Brian

One was taken from the gill of a common sea bass, *Centropristes striatus* (L.), one from ten sand fishes, *Diplectum formosum* (L.), and two from ten white grunts, *Haemulon plumieri* (Lacepede).

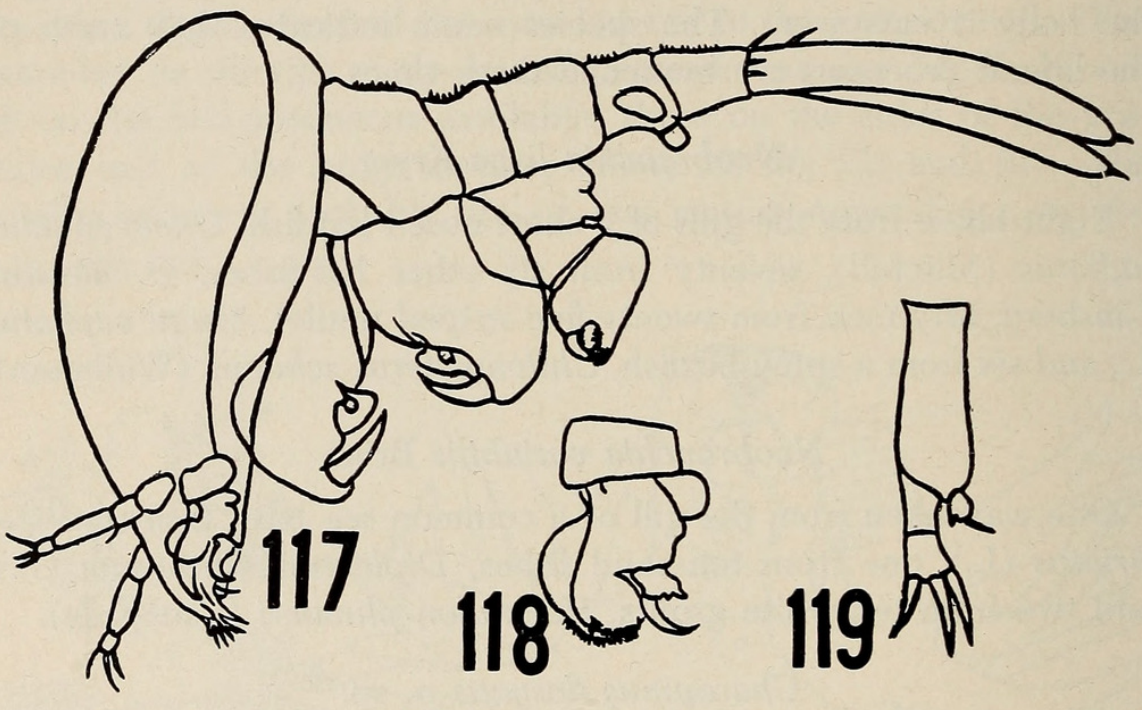
Charopinus dasyatis n. sp.

Figures 117-119

Host.—A single male was taken from the skin of a stingaree, *Dasyatis sabina* (Le Sueur), one of eight taken in Alligator Harbor on May 9.

Male.—Head elongated, tapered toward the front. Antenna 4-segmented; with three terminal setae, one of which is spinulose near the tip. Second antenna biramous, the exopod 2-segmented, the basal segment extends past the terminal one and is twice as long as it; the terminal segment is wider than long and is armed with a separate curved claw; the endopod is shaped like the basal segment of the exopod, exceeds it a little in length and has a fringe of minute bristles at its tip. The first maxilla is biramous, the basal segment nearly twice as long as the 2-segmented endopod; exopod very short and bearing a single terminal seta and a minute lateral spine. Second maxilla larger than maxilliped and subchelate with a clear expansion for the terminal claw to meet. Maxilliped 3-

segmented, the second segment very short, the third segment square, almost twice as wide as long, terminal claw stout and sharply curved; projection that claw meets minutely ciliate. The free thoracic and abdominal segments are minutely ciliate on their anterior dorsal regions. The genital segment bears a ventral process. The caudal rami are nearly as long as the combined cephalic, thoracic, and abdominal segments; each bears a short terminal seta.



Figs. 117-119. *Charopinus dasyatis* n. sp. 117, male; 118, second antenna; 119, first maxilla.

Length of male body, 2.72 mm.; length of cephalon, 1.35 mm.; length of caudal rami, 0.83 mm.

Type.—U. S. Nat. Mus. No. 93693.

Female.—Unknown.

This male differs from others in the genus Charopinus in the structure of the first maxillae, the great length of the caudal rami. It somewhat resembles Retzius' *C. dalmanni* (1830), but differs in the length of the caudal rami, larger size, and more slender first antenna and the greater number of segments in it. Its specific name refers to the host.

Clavellopsis longilamina Bere

Eleven specimens were taken from the gills of twenty-nine striped mullet, *Mugil cephalus* L.

Brachiella concava Wilson

Four females were taken from the gills of nine stingarees, *Dasyatis sabina* (Le Sueur).

Brachiellina, n. gen.

Family Lernaepodidae; Subfamily Clavellinae

Female cephalothorax about as long as second maxillae. Second maxillae have three ovoid appendages on their median surfaces, and a similar appendage and two groups of three are attached to the posterior end.

Genotype, *Branchiellina papillosa* Pearse

Brachiellina papillosa, n. sp.

Figures 120-121

Host.—A single female was collected from the gill of a cowfish, *Lactophrys tricornis* (L.), on June 7.

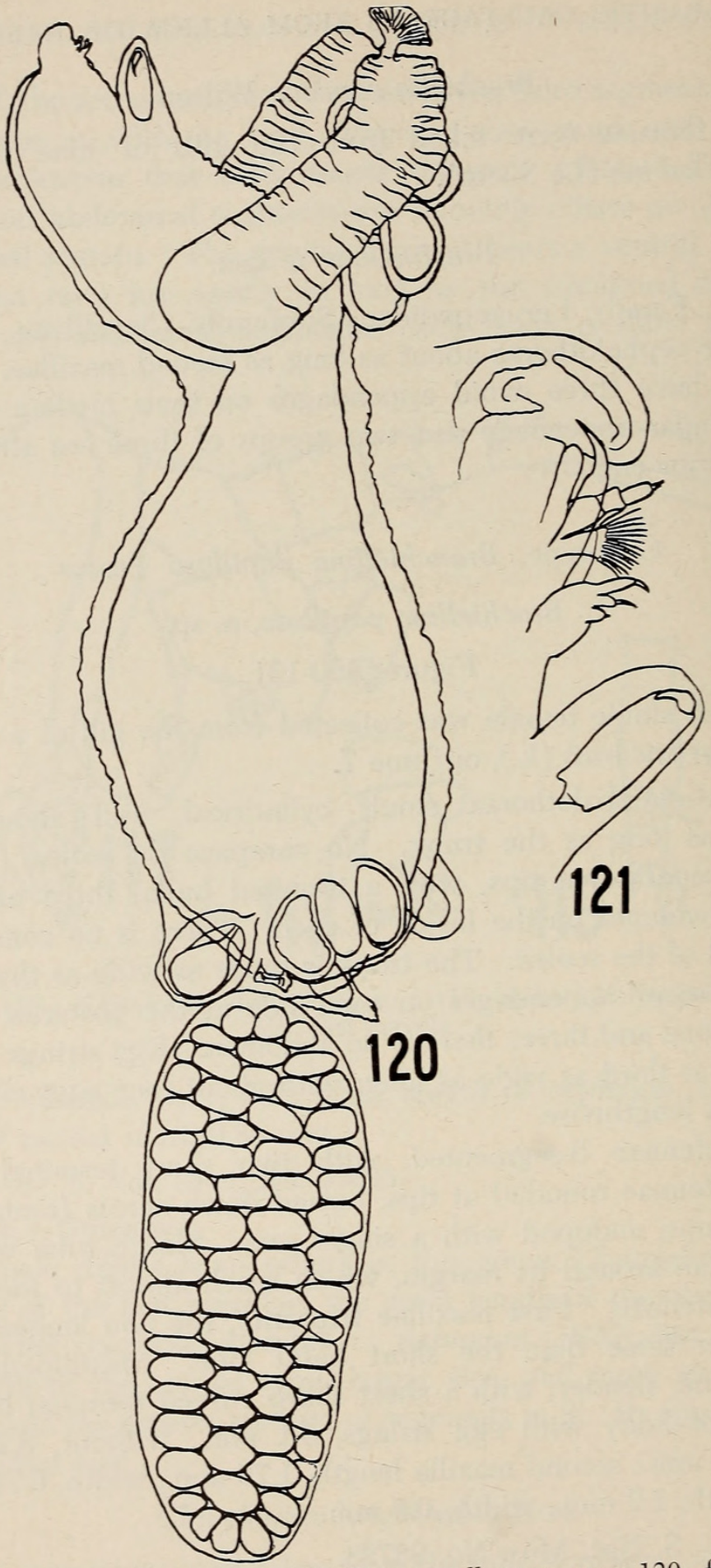
Female.—Cephalothorax stout, cylindrical, and about four-sevenths as long as the trunk. No carapace on scolex. Second maxillae separate to tips, with a terminal bulla, there are three ovoid appendages on the inside of each. There is no constriction at the end of the scolex. The trunk is twice as wide as the scolex, with four ovate appendages on each side at the posterior end in groups of one and three; there is no abdomen. Egg strings slightly more than a third as wide as long; with about four eggs crosswise and fifteen lengthwise.

First antennae 3-segmented, with two short terminal setae. Second antennae rounded at tips, turned down across frontal margin, biramous, endopod with a single seta. Mouth tube with divergent setae around its margin, which reach almost to the tip of the first antennae. First maxillae tripartite, the two longest lobes with longer setae than the short basal lobe. Maxillipeds in a separate lobe, slender; with a short sharp curved terminal hook.

Length of body with egg strings, 5.1 mm., without, 3.2 mm., width, 1.15 mm.; second maxilla length, 1.75 mm., width, 0.71 mm,; scolex length, 1.2 mm., width, 0.6 mm.

Type.—U. S. Nat. Mus. No. 93723.

Male.—Unknown.



Figs. 120-121. *Brachiellina papillosa* n. sp. 120, female; 121, antennae and mouth parts.

The species is named for the ovoid papillae on the end of the abdomen and on the second maxillae. It differs from all lernaeopodids in possessing these ovoid papillae.

Order ISOPODA

Suborder CYMOTHOIDEA

Family AEGIDAE

Rocinela signata Schiodte & Meinert

A female was taken from a blue-striped grunt, *Haemulon sciurus* (Shaw), that was caught in a trawl near Buoy 26, nine miles southeast of Alligator Point.

Family CYMOTHOIDAE

Agathoa medialis Richardson

Eight were taken from the skin of eight stingarees, *Dasyatis sabina* (Le Sueur), and one from a gill of a pinfish, *Lagodon rhomboides* (L.).

Agathoa oculata (Say)

Four were taken from the skin of a bony gar, *Lepisosteus osseus* (L.).

Family SPHAERIDAE

Paracerceis caudata (Say)

A single female was collected from twenty-five ascidians, *Styelia plicata* (Le Sueur).

Suborder BOPYROIDEA

Family BOPYRIDAE

Capitetragonia n. gen.

Body of female broad, flattened and somewhat asymmetrical. Abdomen unsegmented, but segmentation indicated by lateral notches. Head square, as the name indicates; posterior corners more rounded than anterior. All seven pairs of thoracic legs present. Five pairs of pleopods biramous, rugose. Uropods absent. Male with thoracic segments distinct and each with a pair of legs. Abdominal segments fused, appendages indicated by five pairs of rounded nodules and lateral indentations. Branchial parasites.

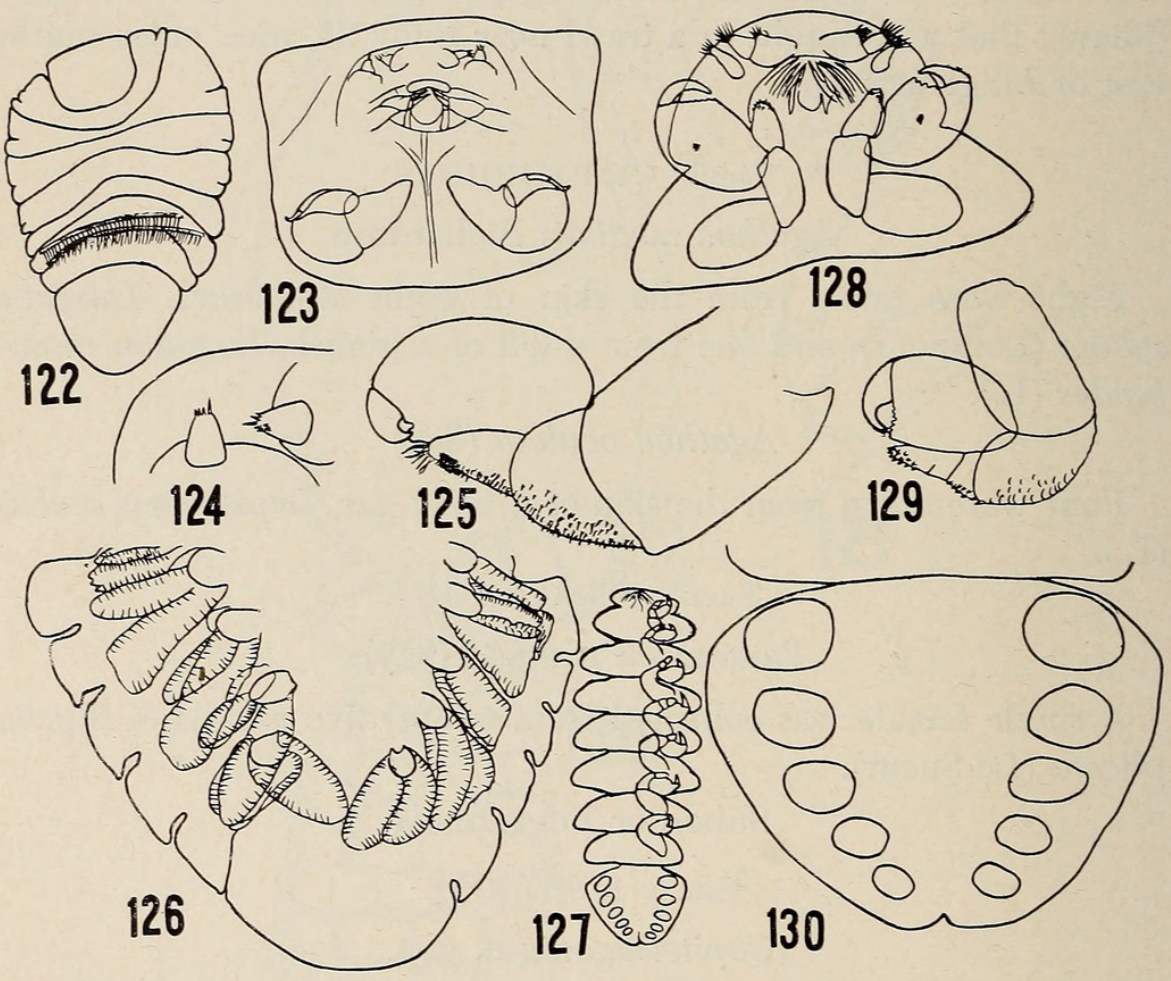
Type.—Capitetragonia asperotibialis Pearse.

Capitetragonia asperotibialis n. sp.

Figures 122-130

Host.—Two females with attached males were taken from the gill chambers of two shrimps, *Crangon normanni* (Kingsley).

Female.—Head wider than long, square with rounded corners. Eyes absent. Both pairs of antennae with a very wide rounded base and a single conical terminal segment which is setose at tip. Maxillipeds with palp that has a small claw at tip.



Figs. 122-130. *Capitetragonia asperotibialis* n. sp. 122, female; 123, head ventral view; 124, first and second antennae; 135, seventh leg; 126, abdomen ventral view; 127, male; 128, head and first thoracic segment; 129, seventh leg; 130, abdomen ventral view.

Thorax with separate segments; the first four with a small posterior lateral lobe; epimeral plates on second and third segments wide. Legs all present, with strong curved terminal claw. Marsupial plates narrow, last one with about forty-three setae across posterior margin.

Abdomen unsegmented but segmentation indicated by lateral notches. Sixth segment without appendages, rounded and short; all other segments with biramous lamellate appendages that have rounded tips posteriorly, but the endopods are wider and truncate toward the anterior margin.

Length of body, 5.2 mm., width, 3.1 mm.; head length, 1.0 mm., width, 1.2 mm.; abdomen length, 1.5 mm., width, 2.03 mm.

Male.—Head fused with first thoracic segment much wider than long; with small eyes. First antenna 2-segmented, setose on antero-distal corner of basal segment and at tip of terminal segment. Second antenna 1-segmented, setose at tip.

Thoracic segments separate, about equal in length, widest in middle of body. The seven pairs of legs quite similar, with short curved terminal hooks, anterior borders lamellose and spinulose.

Abdomen unsegmented, a median notch at posterior end; appendages indicated by five rounded ventral nodules; no uropods.

Length of body, 1.35 mm., width, 0.47 mm.; head length, 0.12 mm., width, 0.24 mm.; abdomen length, 0.3 mm., width, 0.37 mm.

Types, male and female.—U. S. Nat. Mus. No. 93720.

This species resembles Shino's (1933) *Bopyrella pacifica* in the general form of the female, but differs in the shape of the head and the character of the abdominal appendages of the female. The male has differently shaped thoracic appendages and his abdomen has no lateral notches. It also resembles Krøyer's (1838) *Bopyroides hippolytes,* but the antennae of both males and females have fewer segments; the abdominal segments of the female are not indicated by lateral sinuses and show no other evidence of segmentation except the biramous pleopods; the male thoracic segments and abdomen are quite different in shape.

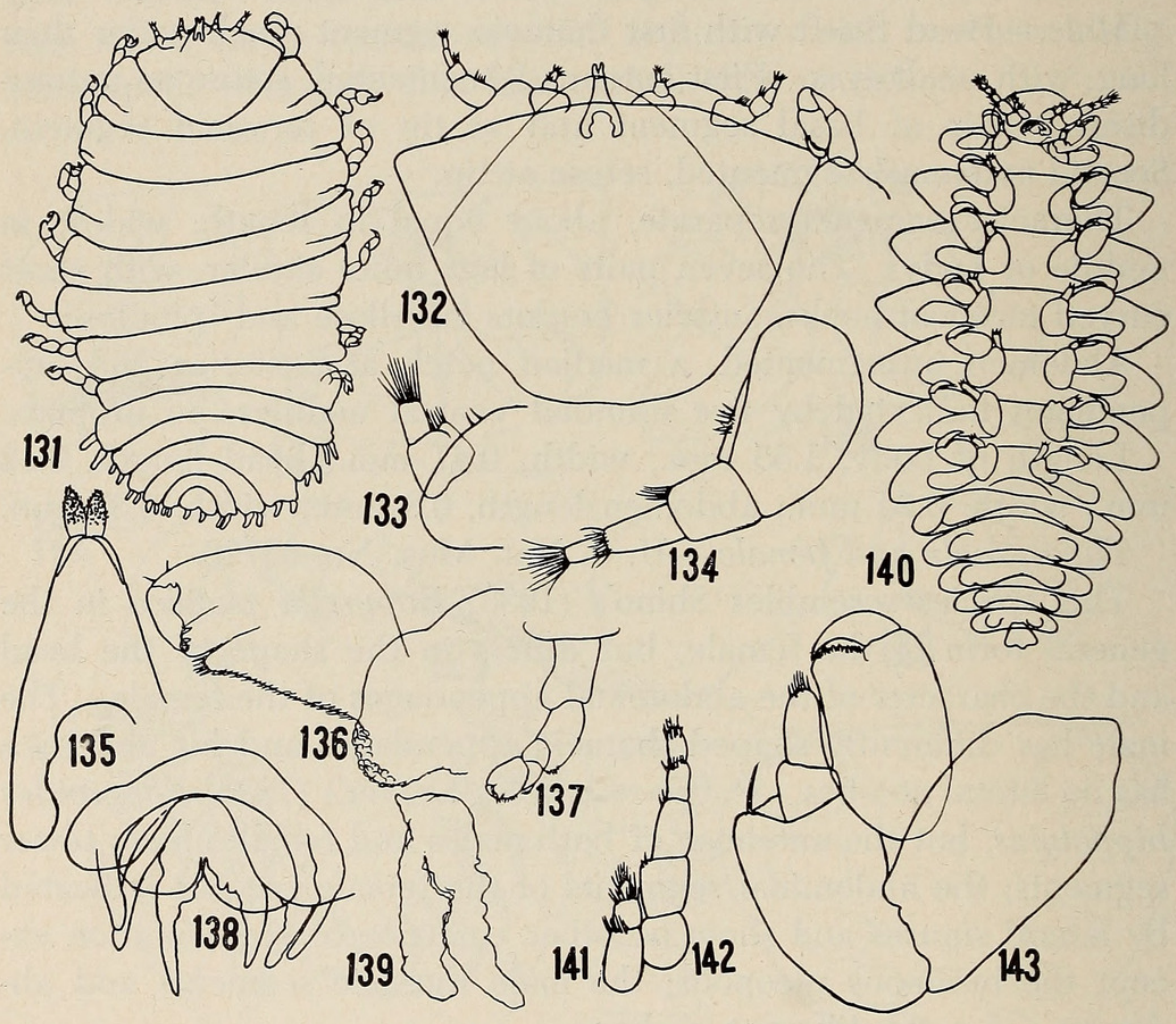
Phyllodurus robustus n. sp.

Figures 131-143

Host.—A female with an attached male was taken from the branchial cavity of *Upogebia affinis* (Say) on June 19 by Dr. H. J. Humm and forwarded to the writer. The host was collected on the flats west of Alligator Point.

Female.—Body three-fifths as wide as long; rounded at both ends. Head a third as long as wide, somewhat triangular and front little curved, corners rounded. Eyes absent. First antenna 3-

segmented; basal segment very wide; terminal segment with about eighteen terminal setae; middle segment with about six on its medio-distal angle; basal segment with two setae. Second antenna 4-segmented; two distal segments setose around tip; two proximal segments setose on anterior distal corner, two short spines among the setae on the basal segment.



Figs. 131-143. *Phyllodurus robustus* n. sp. 131, female; 132, head and right leg; 133, first antenna; 134, second antenna; 135, frontal process; 136, seventh leg; 137, sixth leg; 138, posterior end of abdomen; 139, fifth abdominal leg; 140, male; 141, first antenna; 142, second antenna; 143, fourth leg.

Seven distinct segments in the thorax; the first five with a small rounded lobe behind the epimeral plates. Abdomen with six distinct segments which are more strongly curved posteriorly, and the last two are completely enclosed, except behind, by the preceding segment. Abdominal appendages unsegmented; first five biramous and sixth uniramous. The sixth segment is wider than long, rounded in front and with a median notch behind.

There are five pairs of incubatory plates; the posterior pair have a row of stout setae across the posterior border. The seven pairs of legs are subchelate; the terminal claw is not sharply pointed and may bear accessory spines.

Length of body, 8.2 mm., width, 5.0 mm.; head length, 1.5 mm., width, 1.95 mm.

Male.—Body twice as long as wide. Head slightly more than half as long as wide. Eyes small, elongated, near posterior margin and not very close to lateral margins. First antennae 3-segmented; segments decrease in length and width from base to tip; setae also decrease in the same way. Second antenna 5-segmented, basal segment widest, second segment longest, setae increase from second segment to tip. The thoracic segments decrease in width in the following order: 5, 4, 6, 3, 7, 2, 1; all have rounded lateral angles and those on 6 and 7 slant backward. The thoracic legs are 5-segmented; segment 4 is beside 5 and bears a bunch of about ten terminal setae; terminal hook curved, sharp and bears against a surface with rough granulations. The six abdominal segments decrease progressively in width; terminal segment with base less than half as wide as tip, which has three short rounded lobes. Abdominal appendages are indicated by rounded ventral protruberances.

Length of body, 2.7 mm., width, 1.35 mm.

Types, male and female.—U. S. Nat. Mus. No. 93719.

This species differs from Stimpson's (1857) *P. abdominalis,* as described by Richardson (1903). The female does not have her abdomen tapered and it does not end in a pointed terminal segment but in a segment that is wider than long with a median sinus. The abdominal segments grow gradually narrower and wrap about one another more and more. The posterior incubatory plates have a row of stout setae across them. The male has the fifth thoracic segment widest; the head is much narrower; all thoracic segments have rounded and more pointed lateral epimera; the final abdominal segment is similar in shape but much shorter.

Suborder Amphipoda

Family LEUCOTHOIDAE

Leucothoe spinicarpa (Albidaard)

Five were taken from twenty-five ascidians, *Styelia plicata* (Le Sueur); sixteen from twenty other ascidians, *Molgula occidentalis*

Traustedt; and one from eight stingarees, *Dasyatis sabina* (Le Sueur).

Family GAMMARIDAE

Melita nitida Smith

From twenty ascidians, *Molgula occidentalis* Traustedt, a single female was taken.

Melita fresnelii (Audouin)

From twenty ascidians, *Molgula occidentalis* Traustedt, sixteen specimens were taken, and from twenty-five other ascidians, *Styelia plicata* (Le Sueur) sixteen were collected.

Corophium lousiananum Shoemaker

Hosts.—Several specimens were taken from an ascidian, *Styelia plicata* (Le Sueur), and from an unidentified colonial ascidian, both from Alligator Harbor.

Order CIRRIPEDIA

Suborder LEPADOMORPHA

Family LEPADIDAE

Octolasmis mulleri Coker

This barnacle commonly occurred on the gills and mouth parts of the blue crab, *Callinectes sapidus* Rathbun.

Suborder BALANOMORPHA

Family BALANIDAE

Chelonibia patula (Ranzani)

Common on the blue crab, *Callinectes sapidus* Rathbun, on the carapace and appendages.

Suborder RHIZOCEPHALA

Loxocephalus texanus Boschma

From one to five were present on the abdomens of blue crabs, *Callinectes sapidus* Rathbun.

Order DECAPODA

Suborder PAGUROIDEA

Family PAGURIDAE

Pagurus floridanus (Benedict)

This hermit crab sometimes occupied a snail shell but more often lived in a sponge which it dragged about.

SUMMARY

Three hundred and eighty-six fishes of seventy-seven species were examined. Thirty-nine of these harbored parasites:— copepods 36, isopods 11, and amphipods 1. Fifty species of copepods were found and twenty of these appear to be new. Six species of isopods were recorded from fishes, shrimps, and ascidians; two apparently new. Four species of amphiopods occurred in ascidians, and one also in a stingaree. Three barnacles lived in or on crabs; one of these was a sacculinid. A hermit crab commonly lived in a sponge, which it dragged about over the floor of the ocean. One copepod occurred in an oyster.

The writer made similar studies at Bimini in the Bahamas (1951) and at Port Aransas, Texas (1952). The collections at Bimini were about coral islands in the open sea; those at Port Arkansas were from the open Gulf of Mexico and the channels between the islands alongshore and the Gulf; and those at Alligator Harbor were from a long completely enclosed bay and from the open Gulf. The last had the closest association with fresh water, but Port Aransas furnished collections from the greatest variety of habitats. Table 1 shows the influence of habitat on the occurrence of parasitic copepods. Of course some of the results are due to the chance opportunity to examine hosts, but on the whole they have some significance. Most argulids were found at Alligator Harbor, most cyclopods and caligids at Port Aransas, and equal number of lernaepodids at Port Aransas and Alligator Harbor. The hosts at Bimini were fresh and in good condition, but at the other two localities they were often old or had been preserved, yet there were no argulids at Bimini. In general there were the greatest number of types of parasites where there was the greatest variety of habitats explored (Port Aransas) and fewest where there were fewer types available.

TABLE 1

Distribution of Genera of Parasitic Copepods in Three Localities Along or in the Gulf of Mexico or in the Gulf Stream

Number of new species found is indicated in parentheses

Genera	Bimini	Port Aransas	Alligator Harbor
Arguloida			
Argulus			4
Dolops		1	
Cyclopoida			
Bomolochus		3	2 (2)
Ergasilus		1	2
Grandiungus		1 (1)	
Taeniacanthus		1 (1)	
Telson		1 (1)	
Tucca		1	1
Tuccopsis		1 (1)	
Total cyclopids	0	9 (4)	5 (2)
Caligoida			
Anthosoma		1	
Anuretes	1		
Caligus	3 (3)	9 (5)	5 (2)
Cybicola	1 (1)	1	1
Dysgamus		1 (1)	
Echetus		1	
Eirgos		1 (1)	
Elytrophora		1 (1)	2
Eudactylina		1 (1)	2
Hatschekia	9 (4)	1	3 (1)
Kroyeria	1	1	
Lepeophtheirus		2	4 (2)
Lernanthropus	5 (4)	8	7 (2)
Lernaeeicus	1	1	
Nemesis	1 (1)		1 (1)
Nesippus		1	1
Pandarus		1	1
Perissopus		1	
Pseudocycnus	1	1 (1)	
Sagum		1 (1)	
Trebius			1
Tuxophorus		1	
Total caligids	23 (14)	35 (11)	26 (8)
Notodelphyoida			
Doropygus			2 (2)
Pseudomyicola			1
Total notodephids	0	0	3 (2)
Lernaeopodoida			
Acanthochondria		1 (1)	2 (2)
Brachiella		4 (1)	1 (1)
Charopinus			1 (1)
Clavellopsis		2	1 (1)
Naobranchia		2 (1)	2
Paeon		1	
Pseudochondracanthus			1 (1)
Thysanote	1		1 (1)
Tryphyllacanthus			1
Total lernaepodids	1	10 (3)	10 (7)
Grand Total	24 (14)	45 (15)	43 (17)

However, the number and variety of hosts was different at the three localities. At Bimini 368 fishes and 73 species were studied, at Port Aransas 803 fishes of 138 species, and at Alligator Harbor 386 fishes of 77 species. This indicates that Alligator Harbor with fewer hosts and species examined and nearly equal degree of infestation was more favorable for parasitic copepods than the other two localities. Furthermore infestation was at times very heavy. For example, eight stingarees, *Dasyatis sabina* (Le Sueur), harbored 8 argulids, 33 caligids, 8 isopods, and 1 amphipod on the outsides of their bodies, and 2 lernaepodids on their gills. A black grouper, *Mycteroperca bonaci* (Poey), 1 caligid on its skin, 2 Thysanotes at the bases of its gills, 70 Hatschekias, 2 lernaepodids, and a nematode on its gills. Altogether the findings indicate that Alligator Harbor with its less direct connection with the open sea is most favorable for the development of large infestations with copepod parasites. Limited observations on isopod, amphipod, and barnacle parasites point in the same direction.

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