



Cumaceans of the American
Atlantic Boreal Coast Region
(Crustacea: Peracarida)

CARL ZIMMER

Edited by Thomas E. Bowman and Les Watling

SMITHSONIAN CONTRIBUTIONS TO ZOOLOGY • NUMBER 302

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ABSTRACT

Zimmer, Carl (edited by Thomas E. Bowman and Les Watling). Cumaceans of the American Atlantic Boreal Coast Region (Crustacea: Peracarida). *Smithsonian Contributions to Zoology*, number 302, 29 pages, 78 figures, 1980.—Distributional records are given for 49 species (1 with 2 subspecies) of Cumacea, contained in 17 genera and 6 families, along the Atlantic coast of North America from the Strait of Belle Isle to northern Florida (30°N). The 6 species briefly diagnosed but not illustrated by Zimmer in 1943 are illustrated and described in detail. Seven other species are illustrated and described in more or less detail.

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Foreword

Although cumaceans are often important constituents of bottom communities, American zoologists have given them little attention. In the early 1930s, being aware of this neglect, the late Dr. Waldo L. Schmitt, then curator of the Division of Marine Invertebrates, Smithsonian Institution, persuaded Carl Zimmer, director of the Zoological Museum, University of Berlin (now Humboldt University) to undertake the study of the Division's collection of unidentified Cumacea. The specimens were sent to Berlin, and Zimmer's study of them resulted in his authorship of three papers on American Pacific and tropical Atlantic cumaceans:

1936. California Crustacea of the Order Cumacea. *Proceedings of the United States National Museum*, 83(2992): 423-439.
1943. Cumaceen des Stillen Ozeans. *Archiv für Naturgeschichte*, 12:130-174.
1944. Cumaceen des tropischen Westatlantiks. *Zoologischer Anzeiger*, 144:148-167.

The North American boreal Atlantic Cumacea remained largely unstudied, and in 1936 and 1938 Dr. Schmitt sent large collections from this region to Professor Zimmer. In late 1938 a manuscript with unmounted illustrations on this material, together with about half the borrowed specimens, was received from Zimmer. The manuscript, in German, had been typed personally by Zimmer, who explained that his emeritus status did not entitle him to the services of a typist. Dr. Schmitt arranged to have the manuscript translated into English by Coates W. Shoemaker, who had also translated Zimmer's 1936 paper on California Cumacea, but by the time the translation was completed, World War II was under way, and it was necessary to postpone publication of the manuscript until it was again possible to communicate with Zimmer.

Evidently believing that his manuscript would not be published in Washington, Zimmer extracted from it and published the accounts of the one genus and six species that were described as new:

1943. Über neue und weniger bekannte Cumaceen. *Zoologischer Anzeiger*, 141(7-8):148-167.

In this paper only a single illustration was given, no types were designated, and the extensive locality records in the 1938 manuscript were not included. The 1943 publication, however, made the need to publish the longer manuscript less pressing, and after Zimmer's death in November 1950 no further action was taken.

In 1975, when I was beginning to study cumaceans of the northeastern United States, Zimmer's unpublished manuscript was brought to my attention by Dr. Thomas E. Bowman, and we agreed that publication of this unabbreviated and illustrated version in English was highly desirable. I undertook the editing of the text and arranged for it to be typed, while Dr. Bowman arranged to have Zimmer's drawings refurbished and assembled by Ms. Maura McManus (Smithsonian Institution).

The following new genus and species, described by Zimmer in his 1943 paper, are included in the present manuscript: *Mancocuma*, including the species *M. stellifera* and *M. altera*, *Cyclaspis pustulata*, *Leucon americanus*, *Cumella micruropus*, and *Platycuma marginalis*. Of these, specimens were returned to Washington only for *Mancocuma altera*, *Cyclaspis pustulata*, and *Leucon americanus*; no specimens are now available of *M. stellifera*, *C. micruropus*, or *P. marginalis*.

An obituary of Carl Zimmer, by Prof. B. Rensch, was published in 1952 (*Zoologischer Anzeiger*, supplement, 16:454-456).

LES WATLING

Cumaceans of the American Atlantic Boreal Coast Region (Crustacea: Peracarida)

Carl Zimmer

Edited by Thomas E. Bowman and Les Watling

Introduction

In the large collection of cumaceans that the United States National Museum [now the National Museum of Natural History] entrusted to me for examination and report, there were a great number of specimens from the Atlantic boreal coast of America. In this report I take the opportunity to bring together here all that is known of the cumacean fauna in this region.

In delimiting the region dealt with, I take as the northern boundary the latitude of the outlet of the Strait of Belle Isle (approximately 52.5° N) and as the southern boundary 30° N off northern Florida. These limits are chosen arbitrarily and in no way bear any relation to the natural hydrographic climatic or faunal boundaries.

In addition to the descriptions of the species, I wish to make the following remarks regarding the terminology of the developmental stages of cumaceans: In earlier cumacean literature, females with a fully developed marsupium and males with fully developed and setose antennae, as well as with all pereopod exopodites and pleopods, were designated as "adult." In 1926 I pointed out that the stage of development that precedes the above

stage often is called "subadult" but that, for various reasons, it also merits the term "adult." I suggested that, the females, after hatching of the young, and the males, after copulation, perhaps again assumed more or less the "dress" preceding the "Brutkleid" (broodclothing) and the "Hochzeitskleid" (nuptial dress). B. Forsman (1938a,b) changed my terminology because the females in "Brutkleid" and the males in "Hochzeitskleid" must be termed "adult." The stage I had simply called "adult," he designated "Bereitungsstadium" (preparatory stage), a term he later changed to "Vorbereitungsstadium" (prepreparatory stage). I adopt Forsman's terminology in this report.

[In the remainder of this paper, "Vorbereitungsstadium" will be translated as "subadult," and Zimmer's reference to females in "Brutkleid" and males in "Hochzeitskleid" will be translated as adult.—LW]

In the following species accounts I include references to the original descriptions and to other papers with more precise descriptions or additions to the original descriptions. In addition to references in the monographs, I refer to Stebbing's (1913) work on cumaceans in *Das Tierreich* for descriptions and synonyms.

[Only a part of the material examined by Zimmer was returned. That material now in the USNM collection of the National Museum of Natural History will be indicated by an asterisk.—LW]

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Family BODOTRIIDAE

1. *Pseudoleptocuma minor* (Calman)

Leptocuma minor Calman, 1912:616-619, figs. 14-20.

Pseudoleptocuma minor.—Watling, 1977:594

MATERIAL EXAMINED.—Gloucester Harbor, Mass., 8.5 fm, 1 Aug 1878. Steamer *Speedwell* Sta 141, numerous females and males. 36°46'N, 75°38'W, 18 m, 20 Jan 1914, Steamer *Bache* Sta 10157, 4 females (1 adult) and 2 males (1 adult). Chesapeake Bay, Steamer *Fish Hawk* Sta 8829, 24 m, 9 Jul 1920, 30.39‰, various young. Chesapeake Bay, Steamer *Fish Hawk* Sta 8835*, 20 m, 21 Aug 1920, 33.58‰, 1 female, 4 male adults. Chesapeake Bay, Steamer *Fish Hawk* Sta 8931*, 16 m, 22 Jan 1921, 1 female adult and 1 male adult.

EARLIER RECORDS IN THE REGION.—Gloucester Harbor, 8 and 8.5 fm, and vicinity of Woods Hole (Calman, 1912). Woods Hole region (Fish, 1925). Not previously known from other regions.

Mancocuma Zimmer

DIAGNOSIS.—Five free thoracic somites. Exopodites well developed on maxillipeds 1-3 and pereopods 1-3 of female; exopodite rudimentary on female pereopod 4. Male pereopod 4 with well-developed exopodite. Male with 2 pairs of very small pleopods.

TYPE-SPECIES.—*Mancocuma stellifera* Zimmer. Gender feminine.

2. *Mancocuma stellifera* Zimmer

FIGURES 1-19

Mancocuma stellifera Zimmer, 1943:154-156.

DESCRIPTION OF ADULT FEMALE.—Length 4 mm. Body with pigment spots, mostly stellate but many punctate, especially dense on anterior part of carapace; also dense on free thorax, sparsely scattered on abdomen.

Thorax about 2½ times as long as its greatest width, considerably longer than abdomen, almost as long as abdomen and uropod combined (Figure 1). Viewed from above (Figure 2), it tapers evenly anteriorly and posteriorly, and is widest at about its midlength.

Carapace almost as long as free thorax. Pseudorostrum short; viewed from above it rounds off bluntly; viewed laterally upper and anterior margins meet at right angle. Subrostral notch only faintly indicated. Under ocellar lobe is pigment,

but no evidence of lenses. First free thoracic tergite short, covered on sides by more extended adjoining tergite. Second free tergite long in median line; third still longer. Fourth about as long as second; fifth short. Lateral margins of tergites shaped somewhat epimere-like and cover attachment sites of pereopods. Abdomen comparatively short and wide.

Antennula (Figure 3) relatively short; 3 articles of peduncle subequal in length. Primary flagellum biarticulate, with 2 esthetascs at apex of second article. Accessory flagellum uniaarticulate, extending somewhat beyond middle of first article of primary flagellum.

Antenna (Figure 4) better developed than usual within the Bodotriidae. Peduncle with 5 articles; terminal article relatively long.

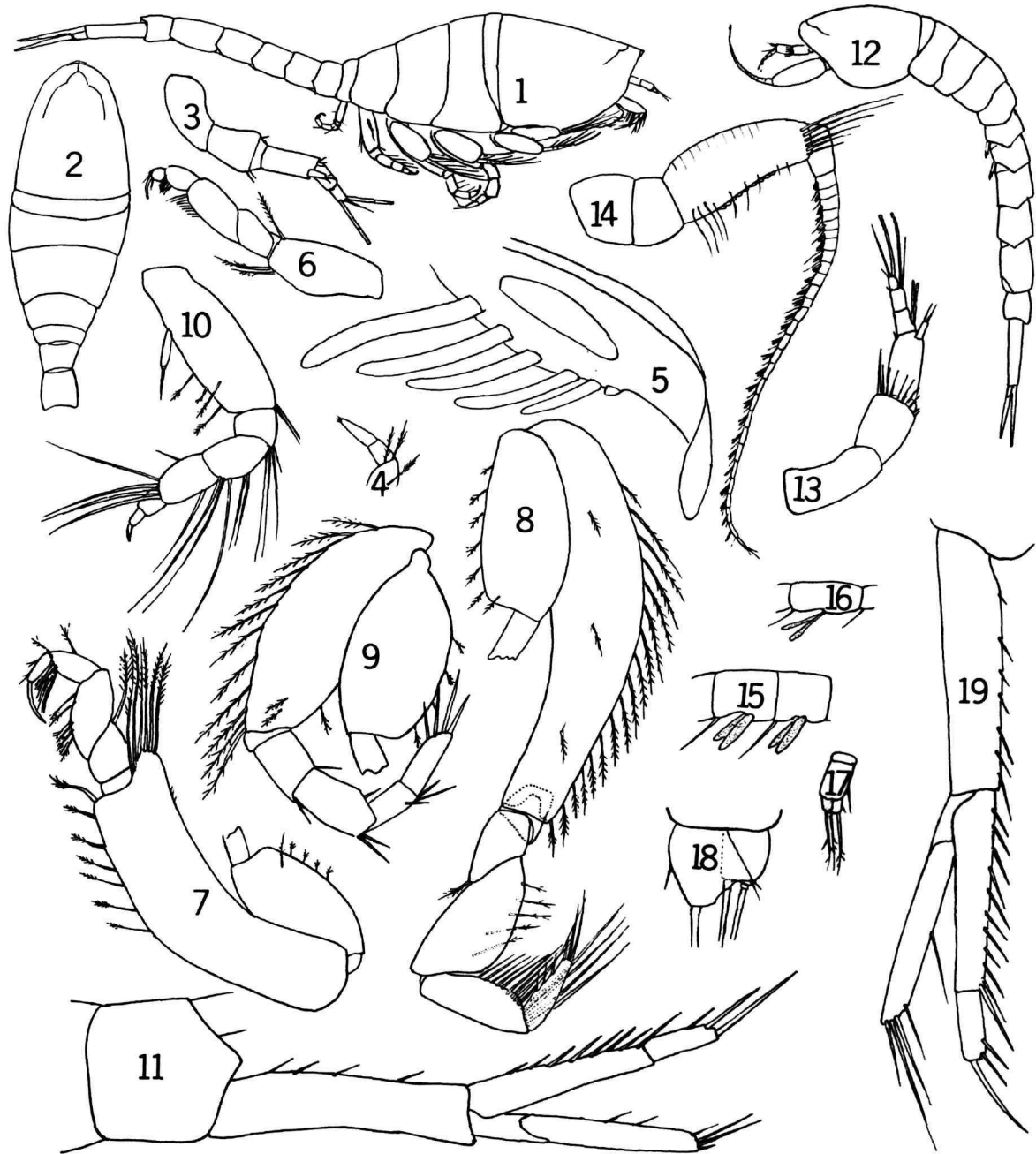
Maxillula with 2 about equally long setae on palp.

Gill part of first maxilliped (Figure 5) with 5 gill elements on margin; the first quite long, following ones decreasing in length. Behind them is a small button-shaped element. There is also an accessory element of considerable length and strength pointing backward.

Second maxillipeds (Figure 6) with rather short but distinct ischium. Inner margins of the pair are inserted in juxtaposition and run parallel toward a curve of basal inner margin.

Third maxillipeds (Figure 7) with basis about half as long again as distal part of limb; distal end produced somewhat outward and somewhat inward over insertion of ischium.

First pereopod (Figure 8) with propodus projecting slightly beyond tip of pseudorostrum. Basis somewhat longer than distal articles combined; projecting at distal end and surrounding ischium in collar-like fashion. On underside (side turned away from trunk) this collar reaches end of ischium and ends gradually. Upper side of collar serrate. Inner margin of ischium produced into obliquely blunt lamella extending over upper side of merus. Carpus longest of terminal segments and dactylus shortest; carpus markedly broadened; terminal margin obliquely rounded, extending inward considerably over insertion of propodus. Surface of carpus with a few inward and somewhat backward pointing pinnulate setae. Inner margin of propodus with row of stronger setae that increase in length distally and continue on the terminal margin, extending dorsally and reaching far beyond dactylus.



FIGURES 1-19.—*Mancocuma stellifera*, female: 1, lateral view; 2, anterior end of body from above; 3, antennula; 4, antenna; 5, gillplate; 6, second maxilliped; 7, third maxilliped; 8, first pereopod; 9, second pereopod; 10, fourth pereopod; 11, last abdominal segment and uropod. Male in breeding stage: 12, lateral view omitting thoracic extremities; 13, antennula; 14, antenna; 15, 2 joints from proximal part of antenna flagellum; 16, joint from distal part of the antenna flagellum; 17, first pleopod; 18, protuberances of first pleopods; 19, uropod.

Dactylus with a few setae on inner margin and a few terminal setae.

Second pereopod (Figure 9) relatively short and thick. Basis about as long as distal segments combined. Ischium outer margin longer than fairly short inner margin. Carpus longer than either propodus or dactylus; latter subequal.

Pereopods 3-5 short, thick, with short terminal claws. Pereopods 1-3 with unusually broad, strong exopodites.

Fourth pereopod (Figure 10) with biarticulate exopodite with long basipodite and very short terminal joint.

Uropod peduncle (Figure 11) longer than fifth abdominal segment, but not as long as fifth and sixth abdominal segments combined; inner margin with a few spines. Endopodite about as long as peduncle and longer than exopodite; proximal article about $2\frac{1}{2}$ times as long as terminal article, inner margin with 8 spines; terminal article with 2 spines on inner margin and a terminal spine. Spines on inner margin of peduncle and endopodite with extraordinarily fine bilaterally plumose setae (not included in the drawing).

A female dissected had 12 embryos in the marsupium.

DESCRIPTION OF ADULT MALE.—Length 3-3.5 mm, thus somewhat smaller than female. Carapace broader and somewhat flattened (Figure 12). Subrostral notch present in form of flat, but relatively wide, backward pointing protrusion of carapace margin.

Antennula (Figure 13) larger and stronger than in female. Primary flagellum 3-jointed. Lateral margin of basipodite bears 2 juxtaposed esthetascs, and each terminal joint has, as usual, 1 at apex.

Antenna (Figure 14) with short flagellum, which when laid backward does not reach end of thorax. I could not come to a clear decision about the articulation of the peduncle on the dissected specimen and did not want to subject another specimen to dissection. I therefore submit the drawing (Figure 14) with reservations. While the terminal joint of the antennal peduncle usually carries a dense covering of fine, long bristles, the setae here are sparse. The joint carries on its terminal margin, however, a row of strong setae. Anterior margin of terminal joint somewhat concave with row of low, wide denticles. Proximal part of flagellum formed somewhat different than distal part. Comparatively

long basipodite followed by about 12 articles firmly articulated to one another. Each (Figure 15) article carries on anterior margin terminal spine and in middle of joint 2 juxtaposed digitate appendages with finely granulated surfaces. Distal part of flagellum formed by about 16 articles that are less rigidly articulated and more slender; digitate appendages (Figure 16) resemble very slender clubs. The antenna is quite evidently a clasping organ used during copulation. The extensive dilation of the subrostral notch, which allows a far-reaching free movement of the limb, is probably connected with this function.

First 4 pereopods with well-developed exopodites, as usual stronger than in females.

Pleopods (Figures 17, 18) consist of only 2 very small pairs. Peduncle biarticulate; rami uniarticulate. Endopodite with angular process on inner margin that extends behind exopodite.

Uropods (Figure 19) slender, more spinose than in female.

OCCURRENCE.—Northern bank of Matamec River, Province of Quebec, Canada, summer of 1927, Amory and Bowman, USNM 95922, 11 adult females and 7 adult males.

The Matamec River empties into Moisie Bay (about $50\frac{1}{3}^{\circ}$ N, 66° W). Unfortunately, I have no information on the salinity at the type-locality.

3. *Mancocuma altera* Zimmer

FIGURES 20-27

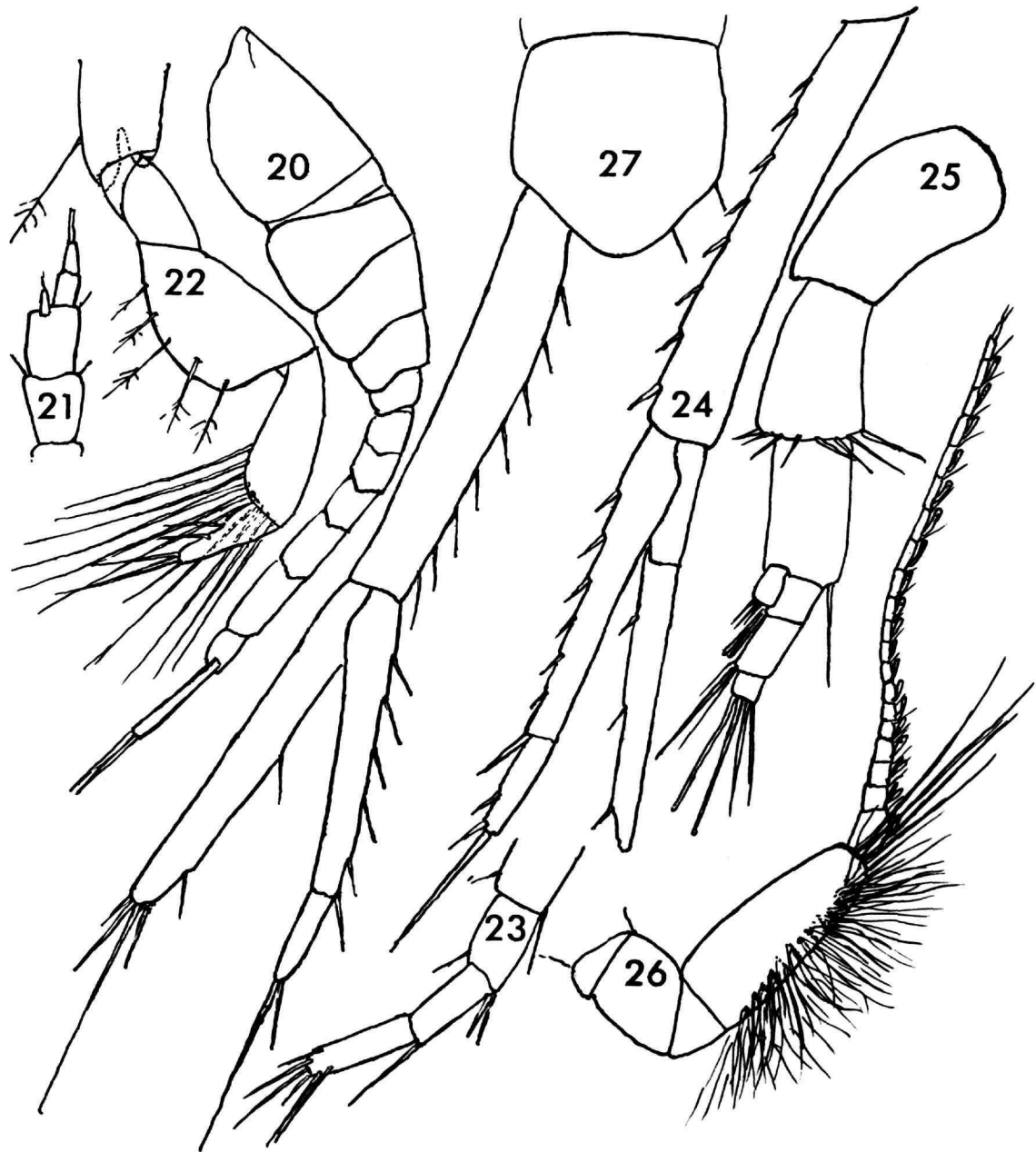
Mancocuma altera Zimmer, 1943:156-159, fig. 1.

DESCRIPTION.—The description is given mainly in the form of a comparison with *M. stellifera*. Smaller, more slender. Length of adult females 2.5-2.75 mm; that of males in the breeding stage 2-2.75 mm. Integument punctate.

Thorax (Figure 20) about as long as abdomen and uropod peduncle combined, thus somewhat shorter than that of *M. stellifera*. Difference between carapace and free thorax is greater, since carapace is not as long as first 4 free thoracic segments combined.

Antennula (Figure 21, 25) more compressed in both sexes.

Antenna (Figure 26) of adult male differs considerably from that of *M. stellifera*. Last peduncle article with thick border of rows of sensory setae on outer margin; each seta has a somewhat stronger,



FIGURES 20-27.—*Mancocuma altera*, female: 20, lateral view omitting extremities; 21, antennula; 22, terminal part of first pereopod; 23, terminal part of second pereopod; 24, uropod. Male in breeding stage: 25, antennula; 26, antenna; 27, terminal abdominal segment and uropod.

but short, basic part bearing a long transparent tubular terminal filament. Distal end of peduncle also armed with a number of robust setae. Flagellum consisting of about 20–21 articles, becoming longer and more slender distally, each with a pair of digitate appendages that become gradually more slender and longer distally.

Carpus of first pereopod not much broadened (Figure 22). Second pereopod (Figure 23) with dactylus decidedly longer than either of the 2 preceding articles; of these, propodus somewhat longer than carpus.

Abdomen and uropods decidedly more slender than in *M. stellifera* (Figure 24, 27). Uropod peduncle not as long as last 2 abdominal segments combined, but slightly longer than endopodite. Exopodite of adult male about as long as endopodite, but somewhat shorter in female. Proximal article of endopodite about 3 times as long as distal article. Inner margin of peduncle in both sexes with 7–8 spines; inner margin of endopodite basal segment with 7 spines in female, 6 in male. Terminal segment of endopodite without marginal spines or with only 1; with 1 larger and 1 smaller terminal spine. The fine plumose setae could not be seen on our dissected specimen even under high magnification.

OCCURRENCE.—The material was derived almost entirely from dredgings by the Steamer *Fish Hawk* in Chesapeake Bay. Sta 8827, 18.3 m, 25.40‰, 9 Jul 1920, 1 adult female, 4 adult males. Sta 8895*, 16.47 m, 29.31‰, 21 Oct 1920, 1 adult female, Sta 8901*, 16.1 m, 27.78‰, 4 Dec 1920, 1 adult female (type), 1 adult male. Sta 8931*, 15.99 m, 22 Jan 1921, 1 adult male (type). Sta 8934*, 12.81 m, 24.53‰, 23 Jan 1921, 1 female. Also one specimen from Fort Macon Canal, Beaufort, North Carolina (shallow, 6 Jun 1930).

RELATIONSHIPS OF *Mancocuma*.—The main characteristic is the reduction of the pleopods to 2 pairs. The family classification of the cumaceans is based primarily on the number and development of pleopods and pereopodal exopodites. Two pleopods are characteristic of the Leuconidae, Diastylidae, and Pseudocumidae. The first 2 of these families differ from the Pseudocumidae as well as from the Bodotriidae in having a free telson. With the discovery of *Mancocuma*, the Leuconidae and Bodotriidae cannot now always be distinguished by the number of pleopods. With respect to the numbers of exopodites, in the Leuconidae only the last 2 pairs of pereopods in the female and only the last pair of

pereopods in the male lack exopodites. We find this also to be the case with *Vaunthompsonia* of the Bodotriidae. Therefore, these 2 families cannot be differentiated by means of the pleopods and pereopodal exopodites.

It cannot be said, however, that the distinction between the 2 families is obliterated. *Mancocuma* remains a genuine bodotriid despite its two pairs of pleopods, and *Vaunthompsonia* likewise despite the number of exopodites. Reliable differentiating characters between the 2 families are found primarily in the characteristic development of the Leuconidae mandible and in the structure of the pleopods. In the Bodotriidae the endopodite of the pleopod carries on its inner margin behind the exopodite a finger-shaped or angular process that is altogether lacking in the Leuconidae. Besides this, there are also differences in habitus that are difficult to express in words.

The first pereopods of *Mancocuma* are similar to those of *Gephyrocuma* Hale. In the latter genus, I include besides the type-species, *G. pala* Hale 1936, *G. australiae*, which I described in 1921 and placed with a “?” in the genus *Vaunthompsonia*. The first pereopod of all 3 species has a lamellate distal process on the basis, a process on the inner margin of the ischium, a broadening of the carpus, and a dense border of setae on the dorsal terminal margin of the propodus.

The structure of the third maxillipeds is also very characteristic for *Gephyrocuma*. It is usually the rule among the cumaceans that when a narrowed tip of the maxillipeds is attached to a widened basal end, the basal end extends outward over the ischium. The case in *Gephyrocuma* is quite the opposite. In *Mancocuma* the basal end projects outward and is here even somewhat more extended. There is also a small process pointing inward, but it is not longer than usual among cumaceans.

Noteworthy is the relatively well-developed female antenna of *Mancocuma*. It is 5-articled in contrast to the 1- or 2-articulate antennae usually found in this family. Only in *Leptocuma*, *Pseudoleptocuma*, and *Vaunthompsonia* do we find a 3-articled antenna (the female antenna of *Gephyrocuma* is so far unknown).

A shortening of the male antennal flagella, but not their development as grasping organs, occurs in this family among species of *Iphinoe* and *Vaun-*

thompsonia. [But we find them developed to this perfection in isolated cases among *Lamprops fuscata* (G. O. Sars)].

The development of the exopodites varies much within this family as the following chart shows. In both sexes the third maxilliped and the first pereopod generally have an exopodite and usually, as throughout the order, the last pereopod lacks the exopodite. The condition of the exopodite in the second to fourth pereopods (P2-P4) is indicated on the chart. (Pluses indicate that a well-developed exopodite is present; r, that the exopodite is rudimentary; 0, no exopodite).

	females			males		
	P2	P3	P4	P2	P3	P4
<i>Leptocuma, Mancocuma,</i>						
<i>Pseudoleptocuma</i>	+	+	r	+	+	+
<i>Vaunthompsonia</i>	+	+	0	+	+	+
<i>Gaussicuma</i>	+	+	0	unknown		
<i>Gephyrocuma</i>	r	r	r	+	+	r
<i>Symphodomma</i>	r	r	0	+	+	0
<i>Pirocuma</i>	unknown			+	+	0
<i>Heterocuma, Cumopsis</i>	r	r	0	r	r	0
Remaining six genera	0	0	0	0	0	0

This shows that *Mancocuma* and *Leptocuma* have equally developed exopodites. These 2 genera also are the only ones in the family that have less than 5 pleopods. *Gephyrocuma* differs from the above 2 genera in that the female P3 has only 1 rudimentary exopodite, which, however, is better developed than rudimentary exopodites in general. In both known species of *Gephyrocuma*, P4 of the male is equipped with a rudimentary exopodite, and while the exopodite of P3 is well developed in one of the species, it is rudimentary in the other. It must, to be sure, be pointed out that in neither species is the male-breeding stage known in which full development of the exopodite is present. We can, however, draw the conclusion that the condition of the male in the breeding stage is correctly indicated on the chart by the young male and the subadult male.

If we sum up these facts, it follows that *Mancocuma* is related to *Leptocuma* and to *Gephyrocuma* and that these 3 genera form a subgroup within the family [This subgroup has been described as the subfamily *Mancocuminae* by Watling (1977).]

4. *Cyclaspis longicaudata* G. O. Sars

Cyclaspis longicaudata G. O. Sars, 1865:207, 208; 1900:16, 17, pls. 7, 8.

REMARKS.—This species was not represented among the submitted material.

EARLIER RECORDS IN THE REGION.—39°54'00"N, 67°05'30"W, 1813 fm; 39°05'30"N, 70°44'30"W, 1525 fm; 38°59'00"N, 70°07'00"W, 1554 fm; 38°22'00"N, 70°17'30"W, 1825 fm (Calman, 1912).

OTHER LOCALITIES.—Norwegian coast northward to Lofoten Islands; northern section of the North Sea, west of Ireland; Gulf of Biscay, Spanish-Portuguese coasts; Mediterranean off Capri and Sardinia; Azores; North Atlantic (56°11'N, 37°41'W); south of Iceland, great depth.

5. *Cyclaspis varians* Calman

Cyclaspis varians Calman, 1912:610-612, figs. 1-5.

MATERIAL EXAMINED.—Woods Hole, Mass., 21 Aug 1881, U.S. Fish. Comm., 1 female, 8 males, most in breeding stage; 5 Sept 1881, U.S. Fish. Comm., 3 females, 2 males; 2 Oct 1882, 8 PM, surface, U.S. Fish. Comm., 1 female.

Chesapeake Bay, Steamer *Fish Hawk* Sta 8856*, 7.32 m, 25 Aug 1920, 13.63‰, 1 female; Sta 8858, 7.32 m, 25 Aug 1920, 12.64‰, 1 specimen; Sta 8925*, 10.06 m, 9 Dec 1920, 1 male; Sta 8961*, 18 m, 28 Mar 1921, 12.99‰, 1 male; Sta 8964*, 14 m, 28 Mar 1921, 11.36‰, 1 female.

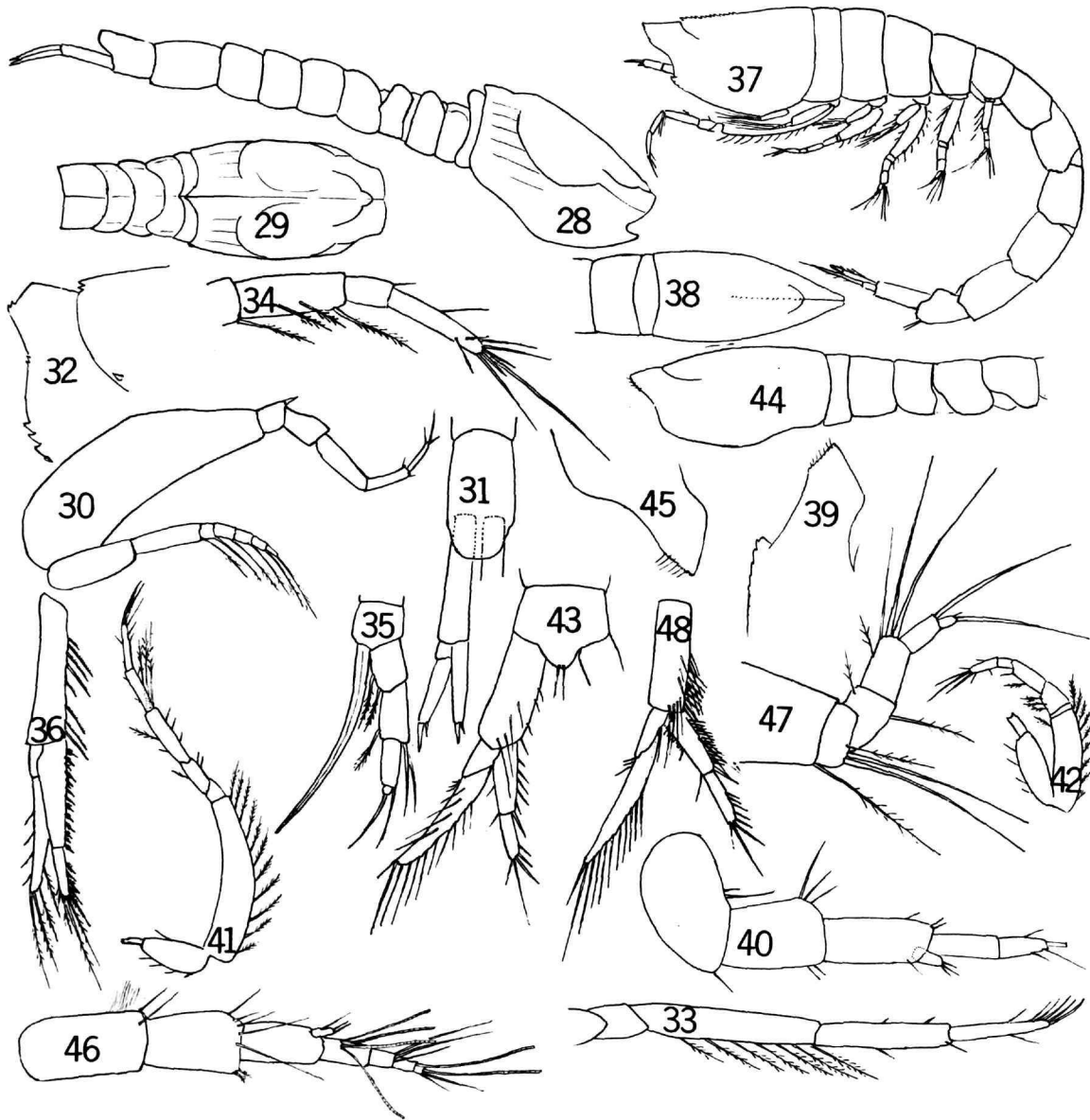
EARLIER RECORDS IN THE REGION.—Vineyard Sound, surface; Woods Hole, surface (Calman, 1912). Woods Hole region (Fish, 1925). Not recorded from other regions.

6. *Cyclaspis pustulata* Zimmer

FIGURES 28-31

Cyclaspis pustulata Zimmer, 1943:157-159.

DESCRIPTION OF SUBADULT MALES.—Length slightly over 2 mm. Thorax and abdomen about equal in length. Carapace as long as the free thorax and the first 2 abdominal segments combined. Subrostral notch very well developed. Subrostral angle tooth-shaped, somewhat obtuse at tip. Pseudorostral lobes confluent for short distance in front of ocellar lobes. Ocellar lobe with dark pigmentation, but no trace of lenses perceptible. Pseudorostral lobe with fine longitudinal fold, beginning above subrostral notch, extending posteriorly in a curved fold and turning backward toward median line, without reaching it, however. Behind and outside of fold in posterior part of carapace are 6 very fine longitudinal lines, sometimes not



FIGURES 28-48.—*Cyclops pustulata*, subadult male: 28, lateral view omitting extremities; 29, anterior part of body from above; 30, first pereopod; 31, last abdominal segment and uropod. *Leucon nathorsti*, male in breeding stage: 32, anterior part of body, lateral view; 33, terminal part of first pereopod; 34, terminal part of second pereopod; 35, terminal part of third pereopod; 36, uropod. *L. americanus*, subadult female: 37, lateral view; 38, anterior part of body from above; 39, pseudorostral lobe from the side; 40, antennula; 41, first pereopod; 42, second pereopod; 43, final abdominal segment and uropod. Male in breeding stage: 44, lateral view of thoracic part omitting extremities; 45, pseudorostral lobe from the side; 46, antennula; 47, terminal part of third pereopod; 48, uropod.

at all visible. Carapace indented on all sides in front of curved fold; fold forms boundary for indentation in anterior, but not in posterior part. Across carapace runs a median ridge that is only slightly developed on ocellar lobe and frontal lobe, and even less so in middle section, but which, however, increases in acuteness toward carapace margin. It has a considerable height at posterior end of carapace.

First free thoracic segment completely absent; only 4 segments visible. First segment with very distinct median ridge, second segment with only slightly developed ridge. Last 3 thoracic segments with lateral ridges; especially well developed on last 2 segments.

Fifth abdominal segment markedly longer than last. First 5 abdominal segments with distinct median crest. Articulations usually found between abdominal segments in species of this genus are not perceptible.

First pereopod (Figure 30) with a tooth at the distal end of ischium; last 3 articles successively decrease in length.

Last abdominal segment considerably overlapping dorsally insertion of uropod (Figure 31). Uropod peduncle about as long as last abdominal segment; rami shorter, only about as long as part of peduncle beyond abdominal end; exopod somewhat longer than endopod. Each ramus armed apically with 1 strong and 1 or 2 more slender and shorter spines. Uropods otherwise unarmed.

Entire body surface covered with numerous round to oval pustules, slightly lighter in color, more opaque than the brownish body. Pustules form distinct longitudinal rows on carapace and rows between fine longitudinal lines on posterior part of carapace.

In addition to 2 adult males, there were 3 young females that did not vary from the adult males except in the sex characters.

LOCALITY.—Chesapeake Bay, Steamer *Fish Hawk* Sta 8827*, 18.3 m, 9 Jul 1920, 25.40‰.

REMARKS.—The deep indentation on each side of the carapace is very characteristic. There is a similar indentation in *Cyclaspis glacialis* Hansen, which, however, lacks the curved ridge and the longitudinal lines on the carapace. The latter lines occur on *Cyclaspis costata* Calman but are here longer and much more numerous.

Family LEUCONIDAE

7. *Leucon nasica* (Krøyer)

Cuma nasica Krøyer, 1841:524-527, pl. 6: figs. 31-33.
Leucon nasicus.—G. O. Sars, 1900:30, 31, pls. 21, 22.

REMARKS.—This species was not represented in the material at hand.

EARLIER RECORDS IN THE REGION.—Off Cap d'Espoir, Quebec, Canada, 70 fms (Whiteaves, 1874). Outside northern entrance to Baie des Chaleurs (Whiteaves, 1874). Between Cap d'Espoir and S side of Ile Bonaventure, 70 fms (Whiteaves, 1901). 49°41'N, 52°9'W, 335 fms, green mud (Zimmer, 1926).

OTHER LOCALITIES.—European coasts from the Baltic Sea to the Kara Sea, Spitzbergen, Iceland, eastern and western Greenland, Labrador, southern coast of Alaska; shallow water to 350 fms.

8. *Leucon nasicooides* Lilljeborg

Leucon nasicooides Lilljeborg, 1855:122, 123.—G. O. Sars, 1900:31, 32, pl. 23.

MATERIAL EXAMINED.—45°29'00"N, 55°24'00"W (S of Newfoundland) 67 fms, 3 Jul 1885 (*Albatross* Sta 2466), 12, females and males.

EARLIER RECORDS IN THE REGION.—Same locality as above (Calman, 1912). Eastport, Maine; Bay of Fundy; Gulf of St. Lawrence (Smith, 1879); Gulf of St. Lawrence (Whiteaves, 1901). Mount Desert region, Maine, blue clay, 37 fms (Proctor, 1933).

OTHER LOCALITIES.—Baltic Sea, Skagerrak, Norwegian coasts, Novaya Zemlya, Spitzbergen, Iceland, eastern and western Greenland, Kamchatka; shallow water to 125 fms.

9. *Leucon nathorsti* Ohlin

FIGURES 32-36

Leucon nathorsti Ohlin, 1901:41-43, fig. 9.—Hansen, 1920: 14, 15, pl. 1: fig. 5.

REMARKS.—The male in the breeding stage has not heretofore been described.

DESCRIPTION OF ADULT MALE.—Length about 5.5 mm. The anterior part of body (Figure 32) resembles very much that of *L. nasicooides* described by Sars (1900) in that pseudorostrum is short and, when viewed laterally, bluntly truncated. Truncation with 2 denticles at base; smooth subrostral notch also with 2 denticles. Frontal lobe with 2 median denticles in series on anterior part and a denticle on each side close to lateral margin. [Sars does not mention this denticle, but Stappers (1911) does.]

Third pereopod (Figure 35) with only a single modified seta at end of ischium (other known males have 2 or 3). This seta very long and strong, slightly arched, exceeding somewhat terminal spine of dactylus; fine median line runs along entire length of its surface.

MATERIAL EXAMINED.—45°29'N, 55°24'W, 67 fm (S of Newfoundland), 3 Jul 1885, (*Albatross* Sta 2466), 8 females and males (1 adult male). 39°54'30"N, 70°20'00"W, 390 fm, 8 Aug 1885 (*Albatross* Sta 2547), 1 male. The species had not previously been found in the region examined.

OTHER LOCALITIES.—Novaya Zemlya, Spitzbergen, Jan Mayen, Iceland, eastern Greenland, Davis Straits. Shallow water to 530 fms.

10. *Leucon acutirostris* G. O. Sars

Leucon acutirostris G. O. Sars, 1865:181, 182; 1900:34, 35, pl. 26.

REMARKS.—This species was not represented in the material examined.

EARLIER RECORDS IN THE REGION.—51°20'N, 52°25'W (E of northern tip of Newfoundland), 424 m, mud (Zimmer, 1926).

OTHER LOCALITIES.—Kattegat, Skagerrak, Norwegian coast, Novaya Zemlya, Davis Straits. Shallow water to 582 fms.

11. *Leucon americanus* Zimmer

FIGURES 37-48

Leucon americanus Zimmer, 1943:159-160.

DESCRIPTION OF ADULT FEMALE.—Length of largest specimen about 5 mm.

Thorax (Figure 37) somewhat longer than abdomen including its last segment. Carapace about as long as first 4 abdominal segments combined, sharply pointed in dorsal view (Figure 38). Pseudorostrum relatively long, almost $\frac{1}{3}$ length of carapace from anterior margin of frontal lobe to posterior margin. Viewed laterally, it runs almost horizontally. A denticled median dorsal ridge extends to about middle of carapace and often even somewhat beyond it. Anterior lobe without denticles. Margin of the pseudorostral lobe (Figure 39) finely denticled. Above subrostral angle, which is only slightly extended and not pointed, is a row of small denticles rapidly becoming indistinct toward posterior part.

At posterior margin of last abdominal segment, somewhat on the dorsal side (Figure 43), are 2 spines.

Last article of antennula peduncle (Figure 40) longer than penultimate. Accessory flagellum very short and not reaching much less than midlength of first article of biarticulate main flagellum. Antennula reaches only slightly beyond tip of pseudorostrum.

First pereopod (Figure 41) long. Basis about as long as distal articles combined, excluding dactylus. Carpus is longest of 3 distal articles and propodus is shortest.

Second pereopod (Figure 42) basis somewhat shorter than distal part. Carpus as long as propodus and dactylus combined; propodus somewhat shorter than dactylus.

Uropods (Figure 43) compact. Peduncle about as long as last 2 abdominal segments combined. Endopod about as long as peduncle; distal segment slightly more than $\frac{2}{3}$ length of proximal joint. Exopod distinctly longer than endopod. Inner margin of peduncle with a few fine spines, dorsal side with a row of long spines; inner margin of first and second joints of endopod with 6 and 2 spines, respectively.

DESCRIPTION OF ADULT MALE.—Length about 5.5 mm. Pseudorostrum (Figure 44) somewhat shorter and more truncate than in female, but quite long for a male of this genus. Dorsal median row of denticles on carapace completely lacking. Anterior margin of pseudorostrum (Figure 45) slightly denticled above subrostral notch. Subrostral notch broadly rounded; subrostral angle and margin of carapace behind it completely lack denticles.

Main flagellum of antennula (Figure 46) 4-articled; proximal article with group of esthetascs.

Ischium of third pereopod (Figure 47) with 2 long spines close to inner margin, neither particularly stout nor modified in form, and without conspicuous differences from spines on carpus or propodus.

Uropod peduncle (Figure 48) about half as long as last 2 abdominal segments combined. Endopod distinctly longer than peduncle; distal segment only slightly shorter than basipodite. Exopod considerably longer than endopod. Inner margins of peduncle and endopod with abundant and complex armature of fine plumose setae and spines.

REMARKS.—The three following characters are shared by *L. americanus* and *L. acutirostris* G. O. Sars: endopod of uropod shorter than exopod; median row of denticles not reaching end of the

carapace; accessory flagellum of antennula short. There is also a similarity in habitat with this species, but the body of *L. acutirostris* is distinctly smaller (3–3.5 mm) and differs in the relative lengths of the joints of the pereopods and the uropod. Also, the adult male has 3 modified spines on the ischium of the third pereopod.

MATERIAL EXAMINED.—Woods Hole, Mass., surface, in the evening, 2 May 1888, U.S. Fish. Comm., 1 female, 1 male.

Amityville, Long Island, N.Y., 6 Jul 1938. H. K. Townes, 1 female, 1 male in breeding stage.

Moriches Bay, Long Island, N.Y., H. K. Townes, 42 females and males, among them females in "Brutkleid" and males in breeding stage.

Steamer *Fish Hawk* Stations in Chesapeake Bay: Sta 8800*, 12.5 m, 3–4, Jul 1920, 2 males; Sta 8803, 10 m, 4 Jul 1920, 10.08%₀₀, 6 females and males; Sta 8804, 12.5 m, 5 Jul 1920, 16.22%₀₀, 2 pulli; Sta 8812*, 12.81 m, 7 Jul 1920, 17.27%₀₀, 1 female, 4 males; Sta 8826*, 45.75 m, 8 Jul 1920, 25.23%₀₀, 5 females (1 adult), 2 males; Sta 8907*, 14.64 m, 6 Dec 1920, 1 male; Sta 8926*, 12.81 m, 9 Dec 1920, salinity 16.78%₀₀, 9 females, 2 males; Sta 8940*, 12.81 m, 24 Jan 1921, 14.72%₀₀, 1 female, 1 male; Sta 8950*, 47.58 m, 26 Jan 1921, 17.70%₀₀, 1 male; Sta 8955*, 12.81 m, 27 Jan 1921, 11.39%₀₀, 1 adult male; Sta 8957, 12.81 m, 27 Jan 1921, 14.25%₀₀, 2 females; Sta 8958*, 20.13 m, 27 Jan 1921, 14.46%₀₀, 1 male; Sta 8961*, 18 m, 28 Mar 1921, 12.99%₀₀, 5 females, 4 males; Sta 8962*, 15 m, 28 Mar 1921, 12.41%₀₀, 1 female, 5 males; Sta 8963*, 9 m, 28 Mar 1921, 9.16%₀₀, numerous specimens, among them adult males, but no adult females; Sta 8968*, 7 m, 29 Mar 1921, 11.84%₀₀, 4 males.

Potomac River at Tall Timbers, Md., 28 Mar 1928. J. E. Benedict, coll., numerous specimens—female and male.

Beaufort, N.C.*, 23 May 1935, from stomach of *Penaeus setiferus* female, G. Gubsell, coll., 1 male.

One mile inside of May River, S.C.*, 17 Jan 1891, Steamer *Fish Hawk*, 1 female, 1 male.

12. *Leucon longirostris* G. O. Sars

Leucon longirostris G. O. Sars, 1871a:78–79; 1871b:42–43, fig. 75.—Calman, 1906:414–416, pl. 27: figs. 1–8.

REMARKS.—This species was not represented in the material examined.

EARLIER RECORDS IN THE REGION.—40°16'50"N, 67°5'15"W, 1290 fms (Calman, 1912).

OTHER RECORDS.—Mediterranean off Capri, Monaco; Bay of Biscay, Portugal; Davis Straits; great depth.

13. *Eudorella emarginata* (Krøyer)

Leucon emarginatus Krøyer, 1846:209, pl. 1: fig. 7, pl. 2: fig. 3.

Eudorella emarginata.—G. O. Sars, 1900:36, 37, pls. 27, 28.

MATERIAL EXAMINED.—Off Halifax, U.S. Fish. Comm., 1877, 1 female.

EARLIER RECORDS IN THE REGION.—Off Halifax, 52 fms, fine sandy mud; entrance of Gaspé Bay, Gulf of St. Lawrence, 30 fms (Smith, 1879); Twenty miles ESE of Cape Sable, 70 fms; 45°4'00"N, 59°36'45"W (off Nova Scotia), 57 fms; off Cape Cod, 16 fms; off Martha's Vineyard, 36 fms (Calman, 1912). 49°41'N, 52°9'W (E of Newfoundland), green mud (Zimmer, 1926).

OTHER LOCALITIES.—Baltic Sea, Kattegat, entire Norwegian coast, British coasts, Novaya Zemlya, Kara Sea, western Siberian Polar Seas, Spitzbergen, Iceland, E and W Greenland, Davis Straits, Labrador, Vancouver; shallow water to 420 fms.

14. *Eudorella pusilla* G. O. Sars

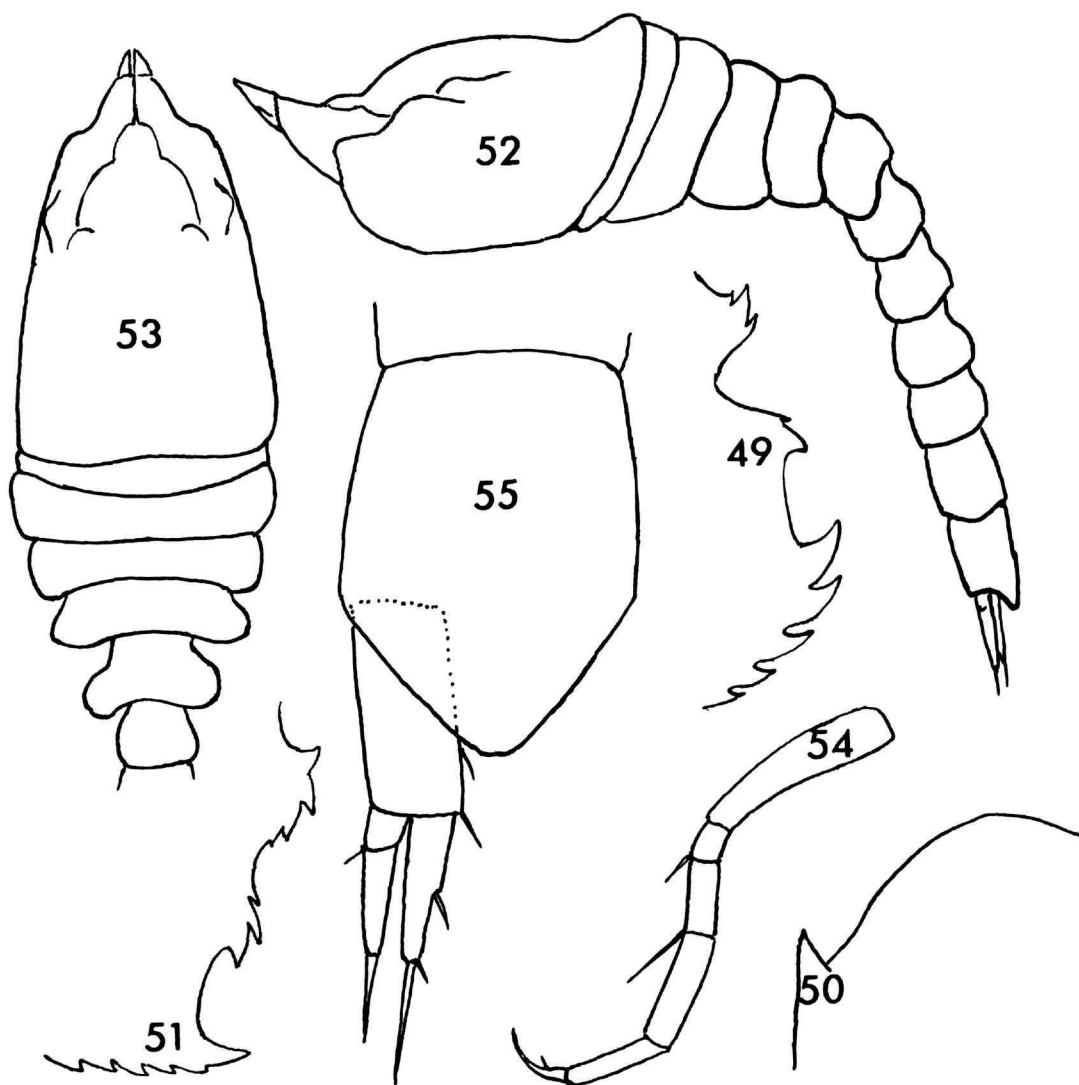
FIGURES 49–50

Eudorella pusilla G. O. Sars, 1871a:79–80; 1871b:46–49, figs. 76–94.

REMARKS.—This is the common *Eudorella* species of the Atlantic-American coasts. Calman identified it in 1912 with the European *E. truncatula* (Spence Bate). I could not agree with Calman when I examined 2 of his specimens in 1921. My opinion is even more strengthened now that I have had the opportunity to study a number of American specimens. Not only are the relative lengths of the articles of the uropod different, but the structure of the border of the carapace also shows a constant difference. In *Eudorella pusilla* it has the following structure: anterior submargin of carapace distinctly curved upward toward subrostral angle (Figure 49). Subrostral angle with a stout oblique tooth pointing upward, the first and largest of a row of teeth on the anterior submargin of the carapace. Process at bottom of subrostral notch with 2 denticles pointing downward, a larger one and above it a smaller one that almost has appearance of secondary tip to larger. Subrostral notch defined above by 3 denticles pointing upward, middle one larger than other 2. Sars drawing (1871b, fig. 79) presents the proportions correctly, but the impression is somewhat obscured by his double outline. In a copy without the double outline the appearance is brought out more correctly.

The male (Figure 50) presents the following appearance: subrostral angle with a moderately stout tooth pointing somewhat upward. Submargin of carapace and anterior margin above it without any denticulation. Anterior margin forming anteriorly convex curve.

There occurred in a female a median denticle on the carapace behind the siphonal opening as described by Calman in 1912.



FIGURES 49-55.—*Eudorella pusilla*: 49, female, margin of pseudorostral lobe; 50, male in breeding stage, margin of pseudorostral lobe. *Eudorella hispida*: 51, male juvenile, margin of pseudorostral lobe. *Cumella micruropus*, female: 52, lateral view omitting extremities; 53, anterior part of body from above; 54, last pereopod; 55, last abdominal segment and uropod.

MATERIAL EXAMINED.—44°1'00"N, 59°2'30"W (E of Nova Scotia), 140 fms, 23 Aug 1926. *Albatross* Sta 2703, 2 females. Casco Bay, Maine, U.S. Fish. Comm., 1873, 2 females (1 adult). Gloucester Harbor, Mass., 85 fms, 1 Aug 1878, Steamer *Fish Hawk* Sta 141, 2 females (1 adult), 1 adult male. Vineyard Sound, Mass., 13 fms, 3 Sep 1880, Steamer *Fish Hawk* Sta 863, 1 female. Vineyard, Mass., 16 fms, 29 Aug 1887, Steamer *Fish Hawk* Sta 1231, 3 females (1 adult), 1 male. Off Martha's Vineyard, Mass., 39 fms, taken in

trawl wings 7 Sep 1881, Steamer *Fish Hawk* Sta 993, 1 adult male. Block Island Sound, R.I., 30 Aug 1887, 18.5 fms, Steamer *Fish Hawk*, Sta 1240, numerous specimens, mostly pulli. 40°13'15"N, 69°29'15"W, 46 fms, 28 Sep 1884, *Albatross* Sta 2260, 1 adult female.

EARLIER RECORDS IN THE REGION.—Shinnicock Bay, 18 fms, mud (Sars, 1871a,b); Block Island Sound, 17 fms, sand and mud; Massachusetts Bay, off Gloucester, 25 fms, sand and gravel; Casco Bay, 3-17 fms, mud, 9 fms, sand and mud;

Bay of Fundy, 1-4 fms, very soft mud, 5-10 fms, mud; Gulf of St. Lawrence (Smith, 1879). Gulf of St. Lawrence (Whiteaves, 1901); Massachusetts Bay, 26-54 fms; off Plymouth, 16 fms; off Martha's Vineyard, 30 fms; Vineyard Sound, 16 fms; off Block Island, 19.5 fms; Block Island Sound, 18.5 fms (Calman, 1912). Not recorded from other regions.

15. *Eudorella hispida* G. O. Sars

FIGURE 51

Eudorella hispida G. O. Sars, 1871a:80-81; 1971b:49-50, figs. 95-97.

REMARKS.—I include in this species, but not without some hesitation, a young male of about 5 mm in length. On the whole it agrees well with Sars' description and illustrations. A not unimportant difference lies in the fact that the carpus of the second pereopod, according to Sars, should be almost twice as long as the merus. It is true that it is longer, but not nearly twice as long. The setation on the carapace is not as thick as Sars pictures it for his specimen.

The anterior margin of the carapace presents the following structure (Figure 51): subrostral tooth rising horizontally forward, quite long. Subrostral notch moderately shallow; process at bottom with 3 denticles, topmost very small, lowest one the largest. Notch defined dorsally by group of 4 denticles, of which topmost one points dorsally and others ventrally. Most ventral denticle minute, only barely distinguishable as a denticle. Sars' drawing shows the same horizontal position of the subrostral tooth. The fact that Sars shows only 2 denticles on the bottom of the notch and only 3 above it is of little importance, since 2 of the denticles are very small and easily overlooked. Sars does not mention anything about the direction of the denticles, but his drawing can easily be interpreted so that the topmost tooth points upward, and the 2 following downward.

Considerably different, however, is the anterior carapace margin of the species that Hansen in 1920 referred to as *E. hispida*: the subrostral tooth and the group of teeth at the bottom of the notch agree well with my specimen. But the upper part of the notch is deeper and above it are, according to Hansen's illustration, 5 upward pointing teeth (I cannot quite make Hansen's description agree with his illustration). Hansen's specimens were obtained

from very great depths (318-582 fms), whereas the species otherwise has been found only in shallow waters (see below). It is therefore possible that Hansen's specimens belong to a different species or to a distinct geographic race.

MATERIAL EXAMINED.—40°4'00"N, 69°29'30"W, 58 fms, 28 Sep 1884, *Albatross* Sta 2261*.

EARLIER RECORDS IN THE REGION.—39°54'N, 73°15'W, 30-35 fms (Sars, 1871a, b). Casco Bay, muddy bottom (Verrill, 1874a); Salem Harbor, Mass., 5 fms; off Cape Ann, 35 fms, sand; 54 fms, sand and mud; Casco Bay, 3 fms, mud, surface, evening; off Casco Bay, about 20 miles SE from Cape Elizabeth, 50 fms, mud; Bay of Fundy, 1-4 fms, very soft mud (Smith, 1879). Twenty miles ESE of Cape Sable, Nova Scotia, 70 fms; Massachusetts Bay, 45 fms; Casco Bay; off Cape Cod, 16-31 fms; Martha's Vineyard, 39 fms (Calman, 1912). Mount Desert region, similar in habitat to *E. difficilis*, but seems to prefer sheltered bays, 30-38 fms (Proctor, 1933).

OTHER RECORDS.—Calman reported the species from waters W of Ireland, 200-300 fms.

16. *Eudorella abyssi* G. O. Sars

Eudorella abyssi G. O. Sars, 1887:41-43, pl. 5: figs. 5-12.

REMARKS.—The *Challenger* took the species at 38°34'N, 72°10'W, 1240 fms, blue mud. The species has not been taken since.

17. *Eudorella difficilis* Blake

Eudorella difficilis Blake, 1929:28, 29, fig. 14.

REMARKS.—This species was not represented in the material examined.

EARLIER RECORDS IN THE REGION.—Mount Desert region, Eastport, Maine (Blake, 1929). Mount Desert region, found on muddy bottoms in 30-38 ft of water (Proctor, 1933). This species has not been recorded from other regions.

18. *Eudorellopsis deformis* (Krøyer)

Leucon deformis Krøyer, 1846:209, pl. 2: fig. 4.

Eudorellopsis deformis.—G. O. Sars, 1900:40, 41, pls. 31, 32.

MATERIAL EXAMINED.—45°11'30"N, 55°51'30"W, 42 fms, 3 Jul 1885, *Albatross* Sta 2468, 1 male. Probably Nova Scotia, Jul 1885, *Albatross*, 1 female. Gloucester Harbor, Mass., 8.5 fms, 1 Aug 1878, *Speedwell* Sta 141, 9 females and males.

EARLIER RECORDS IN THE REGION.—Outside Shinnecock Bay, 18 fms (G. O. Sars, 1871a, b). Massachusetts Bay, off Gloucester 25 fms, sand and gravel (Smith, 1879). Off Nova Scotia, 45°04'00"N, 59°36'45"W, 57 fms; Gloucester Harbor, 8 fms; Vineyard Sound, Lightship, 16 fms (Calman, 1912).

OTHER RECORDS.—Baltic Sea, Kattegat, southern Norway's W coast, North Sea, British coasts, Iceland, West Greenland, shallow water.

19. *Eudorellopsis biphlicata* Calman

Eudorellopsis biphlicata Calman, 1912:625, 626, figs. 25, 26.

MATERIAL EXAMINED.—45°29'N, 55°24'W, 67 fms, 3 Jul 1885, *Albatross* Sta 2466, 1 female, 1 male. 45°27'30"N, 58°27'45"W, 50 fms, 6 Jul 1885, *Albatross* Sta 2490, 1 male. 45°04'00"N, 59°36'45"W, 57 fms, 6 Jul 1885, *Albatross* Sta 2497, 1 pullus. 44°46'30"N, 59°55'45"W, 130 fms, 6 Jul 1885, *Albatross* Sta 2499, 1 female. Probably Nova Scotia, Jul 1885, *Albatross*, 1 female, 1 pullus. 40°16'30"N, 67°26'15"W, 828 fms, 15 Jul 1885, *Albatross* Sta 2533, 1 male.

EARLIER RECORDS IN THE REGION.—45°29'00"N, 55°24'00"W, 67 fms; 45°04'00"N, 59°36'45"W, 57 fms (Calman, 1912).

OTHER LOCALITIES.—Hart (1930) mentions the species from Vancouver.

20. *Eudorellopsis integra* (Smith)

Eudorella integra Smith, 1879:116–118.

MATERIAL EXAMINED.—45°04'00"N, 59°36'45"W, 57 fms, 6 Jul 1885, *Albatross* Sta 2497, 1 female, 3 males. Off Halifax, U.S. Fish. Comm., 1877, 3 adult females. Off Nova Scotia?, 4 females, 5 males. Probably Nova Scotia, Jul 1885, *Albatross*, 10 females and males. 40°16'30"N, 67°26'15"W, 838 fms, 15 Jul 1885, *Albatross* Sta 2533, USNM 38205, 1 male.

EARLIER RECORDS IN THE REGION.—Off Halifax, 42 fms, fine sand; 52 fms, sandy mud; 57 fms, stones; sponges and red algae, about 30 mi S of Halifax, 110 fms; fine sandy mud, Gulf of St. Lawrence; S of eastern part of Prince Edward Island; off Baie de Chaleurs, 70 fms (Smith, 1879); 46°48'30"N, 52°34'00"W, 89 fms; 45°04'00"N, 59°36'45"W, 57 fms; off Halifax, 42–110 fms; Gulf of Maine, 42°44'00"N, 66°27'00"W, 75 fms (Calman, 1912).

OTHER LOCALITIES.—Western Greenland, Davis Straits, Bering Sea, shallow water to 828 fms.

Family NANNASTACIDAE

21. *Cumella carinata* (Hansen)

Campylaspis carinata Hansen, 1887:207–209, pl. 7: fig. 4.
Cumella(?) *carinata*.—Calman, 1912:626, 627.

MATERIAL EXAMINED.—45°29'00"N, 55°24'00"W, 67 fms, 3 Jul 1885, *Albatross* Sta 2466, 11 females and males.

EARLIER RECORDS IN THE REGION.—Same locality as above; 46°48'30"N, 52°34'00"W, 89 fms (Calman, 1912).

OTHER LOCALITIES.—Eastern and western Greenland, Labrador, 79°30'N, 106°W (Ellesmere Land), shallow water.

22. *Cumella micruropus* Zimmer

FIGURES 52–55

Cumella micruropus Zimmer, 1943:161, 162.

DESCRIPTION OF ADULT FEMALE.—Length about 2 mm. Carapace somewhat longer than free thoracic part plus first abdominal segment. Ocellar lobe about as long as broad and about as long as pseudorostrum. Pseudorostral lobes raised humplike somewhat above slightly developed subrostral angle. Viewed from above (Figure 53), lateral contour does not become gradually slender anteriorly but does so in steps. Viewed laterally (Figure 52), contour of protuberance distends lateral edge of carapace. Behind this protuberance is a second protuberance on the pseudorostral lobe, and behind and within this second protuberance a third smaller one behind posterior angle of frontal lobe. Carapace raised into ridge along posterior margin. Abdomen about as long as carapace plus first 2 thoracic segments. Last abdominal segment (Figure 55) broadened medially backward into a 3-cornered plate with blunt apex that extends over insertion of uropod. Penultimate abdominal segment not quite as long as last segment.

Third maxilliped and pereopods without exopodites.

Last pereopod (Figure 54) about $\frac{2}{3}$ as long as carapace; carpus twice as long as merus and much shorter than basis.

Uropods (Figure 55) very short. Peduncle only half as long as last abdominal segment; peduncle plus rami (excluding terminal spines) about as long as penultimate abdominal segment. Endopod only slightly longer than exopod, about $\frac{3}{5}$ as long as peduncle. Each ramus with a long stout terminal spine; endopod with another smaller terminal spine and a spine at midlength of inner margin. Inner edge of peduncle with weak lateral seta and weak terminal seta.

LOCALITY.—30°44'N, 79°26'W (off E coast of Florida), 1 Apr 1885, from hydroids, *Albatross* Sta 2415, 1 adult female.

REMARKS.—The above description had to be fairly short because I did not wish to dissect the single specimen, and without dissection many features are very difficult to recognize in this minute animal. The form of this species with its humpy bulged carapace is, however, so characteristic that it will always be easily recognized, since similar

humpy protuberances do not exist in any other species of this genus. Furthermore, only *Cumella forficula* Calman and *Cumella clavicauda* Calman have such short uropods. In both these species the last abdominal segment is not only elongate but also directed upward, which is not the case in the present species.

This species is unique in this genus because of the complete absence of exopodites on the thoracopods. The close relationship between *Cumella* and *Nannastacus* becomes still closer, since in some species of *Nannastacus* the females also lack all exopodites.

23. *Cumella* sp.

REMARKS.—In the collection are two specimens of *Cumella* that belong to a new species. Both specimens are very imperfect and not adequate for a description of a new species. A brief description of the characteristics of the specimens follows: Anterior third of carapace of female with 3 median denticles, first directly behind ocellar lobe; first 2 stout, third weaker; male with only a single tooth directly behind ocellar lobe. Subrostral notch very distinct; subrostral angle produced anteriorly, acute. Penultimate abdominal segment much longer than last. Carpus of last pereopod not quite twice as long as penultimate abdominal segment. Endopod of uropod about $\frac{3}{4}$ as long as peduncle; exopod about $\frac{5}{6}$ as long as endopod. Length of male about 4 mm.

LOCALITY.—40°29'00"N, 66°04'00"W, 1769 fms, 2 Sep 1885, Albatross Sta 2572.

24. *Campylaspis rubicunda* (Lilljeborg)

Cuma rubicunda Lilljeborg, 1855:121.

Campylaspis rubicunda.—G. O. Sars, 1900:84, 85, 108.

MATERIAL EXAMINED.—Casco Bay, U.S. Fish. Comm., 1873, USNM 34887, 1 female, 1 male; USNM 34888, 1 male.

EARLIER RECORDS IN THE REGION.—Off Cape Ann, 35 fms, sand; Casco Bay, stomach of *Pseudopleuronectes americanus* (Smith, 1879). Gulf of Maine, 35 fms; off Martha's Vineyard, 36 fms (Calman, 1912). Mount Desert region, Maine, mud and shell bottom, 70 ft (Proctor, 1933).

OTHER LOCALITIES.—Baltic Sea, the entire Norwegian coast, British coasts, Novaya Zemlya, Spitzbergen, Iceland, western Greenland, shallow water to 350 fms.

25. ?*Campylaspis horrida* G. O. Sars

Campylaspis horrida G. O. Sars, 1870:162; 1900:115.—Calman, 1912:627, 628.

REMARKS.—Not represented in the material examined.

The specimen that Calman assigned with a question mark to *C. horrida* was found at 39°59'30"N, 70°30'45"W, 428 fms, Albatross Sta 2212.

OTHER LOCALITIES.—Norwegian coasts, SW of the Faroe Islands, Iceland, Japan (?), 30–180 fms.

26. *Campylaspis* sp.

FIGURES 56–58

REMARKS.—Two specimens of *Campylaspis* from Chesapeake Bay, one subadult female and one adult male, evidently belong to a new species. There can be no doubt but that they belong to the same species as the specimens from the region of Martha's Vineyard (36–39 fms), which Calman assigns with a question mark to *C. affinis* G. O. Sars. There is some similarity with *C. affinis*, but the tubercles in the anterior part of the carapace mentioned by Sars are lacking.

The groove on the carapace that Calman found in his specimens is present. It is in about the same position as in *C. sulcata* G. O. Sars but is not so deep. In the male, it is well developed in its entire length; in the female, only in the anterior part. Maxillipeds 2 and 3 (Figures 56–58) show some resemblance to *C. affinis*, but the club-shaped seta at the end of the basis of the second maxilliped is lacking and is replaced by a normal plumose seta. The serration of the margin of the third maxilliped that is present, although weak, in *C. affinis* is completely lacking in these specimens.

On the second maxilliped the ischium is distinctly separated from the basis, while these 2 joints are fused in other species of this genus.

As these specimens come from a region easily accessible to research, I consider it advisable to await more abundant material and with it the possibility of a more detailed description before naming the species.

LOCALITY.—Chesapeake Bay, Steamer *Fish Hawk*, Sta 8834*, 43 fms, 21 Aug 1920, 33.29‰.

27. ?*Campylaspis vitrea* Calman

Campylaspis vitrea Calman, 1906:425, 426, pl. 28: figs. 28–34. ?*Campylaspis vitrea*.—Calman, 1912:628.

REMARKS.—The specimen that Calman included here with a question mark comes from 40°02'00"N, 68°50'30"W, 547 fms.

Campylaspis vitrea has been recorded heretofore only from off Capri, in the Mediterranean, from a depth of 950–1100 m.

28. *Platycuma marginalis* Zimmer

FIGURES 59–61

Platycuma marginalis Zimmer, 1943:162–164.

DESCRIPTION OF YOUNG MALE.—Viewed from above (Figure 59), general form resembles that of the female which Fage (1929) regarded as the female of *P. holti*, but greatest width of the carapace not as far posterior, and sides therefore more evenly curved. Anterior lateral angles also less acute. Ocellar lobe present, although very minute, but is, however, distinctly set off as small point against frontal lobe (as figured but not described by Calman and Fage). Characteristic for this genus is the somewhat dorsoventrally flattened carapace with a sharp lateral margin. Lateral margin with very thin and brittle lamella, incompletely preserved. Lamella with irregular and not very distinctly developed serration on anterior margin of the "lateral horns" of carapace. Similar lamella found also on lateral parts of last thoracic segment and appears to have been present also on the abdominal segments; at least the remains of one are present on one side of fifth abdominal segment (Figure 61). The 2 longitudinal ridges on last thoracic segments and first 5 abdominal segments are present. They also have appearance of thin, brittle, more or less distinctly serrated lamellas that are splintered in places. Last abdominal segment truncated transversally as figured by Calman and not drawn upward triangularly as shown by Fage.

Dactylus of first pereopod (Figure 60) about half as long as propodus; latter somewhat shorter than carpus. Second pereopod with dactylus about as long as 2 preceding articles combined; propodus considerably shorter than carpus.

Uropod peduncle (Figure 61) shorter than last 2 abdominal segments combined; lateral margin with thin lamella with irregular serration. Inner ramus of uropod about $\frac{3}{4}$ as long as peduncle; margins with indistinctly serrated lamella. Exopodite much

more slender, about $\frac{3}{4}$ as long as endopodite. Uropod without spines or setae or perhaps these were broken off.

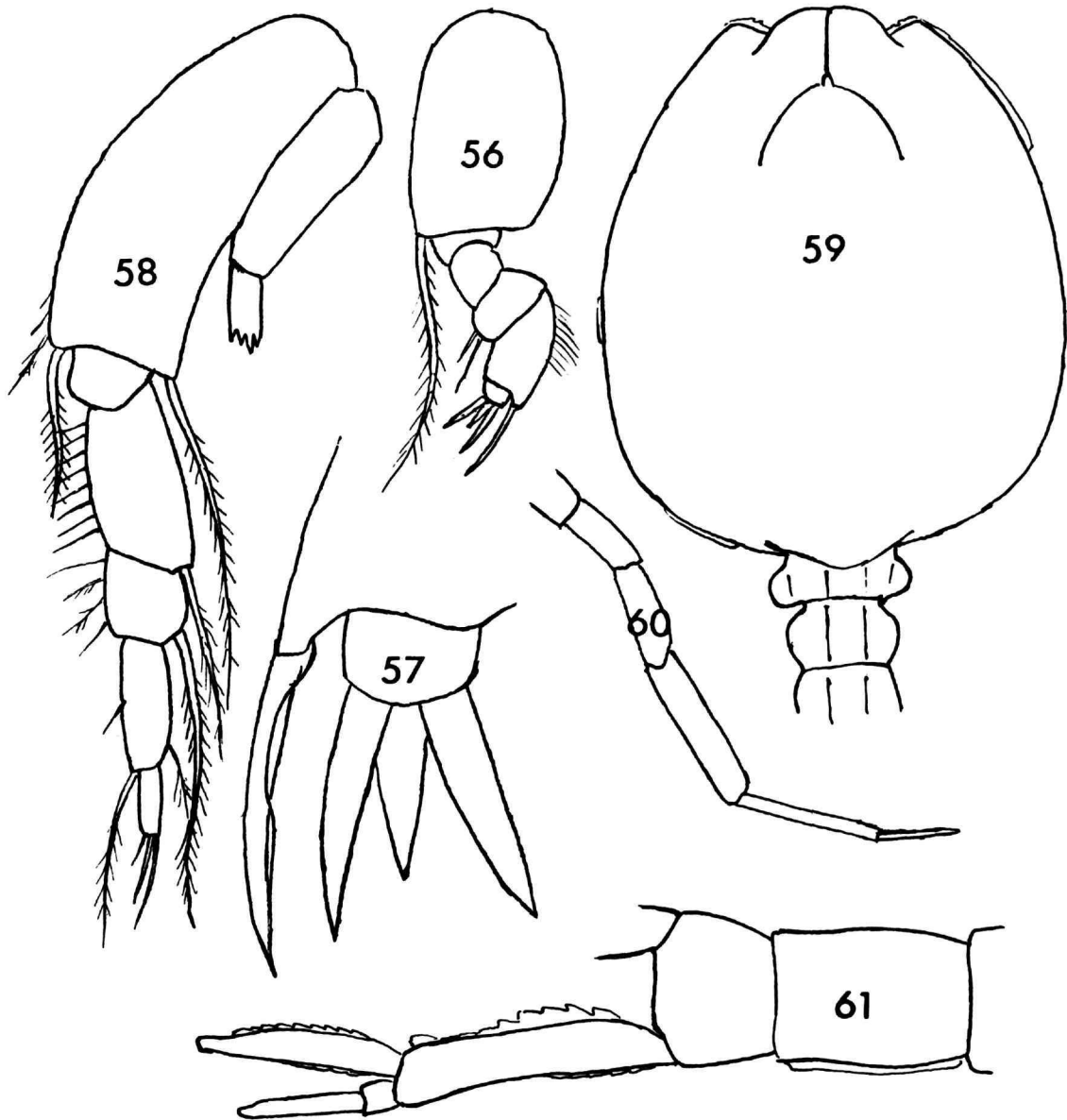
Length about 3.5 mm.

LOCATION OF SINGLE EXISTING SPECIMEN.—39°03'15"N, 70°50'45"W, 2795 m (1537 fms), 6 Sep 1884, *Albatross* Sta 2222.

REMARKS.—The very characteristic genus *Platycuma*, with its spiral intestine, has been known hitherto from only a few specimens. Calman described the type-species, *P. holti*, from 2 males in the breeding stage from 699 m depth in Irish waters. Fage later found 2 specimens of this genus in the Prince of Monaco collection, an adult male and a subadult female, which had been dredged from a depth of 4380 m in the Gulf of Gascony. He described them in 1924 and assigned them to *P. holti*. His male differs from the *P. holti* male markedly, however, in the form of the carapace. Fage tried to explain the difference by assuming that Calman's males must have been immature. There can be no doubt, however, that Calman's specimens were adult males because of their fine plumose setae on the antenna and the pereopod exopodites. Some dissimilarities that Fage mentions, such as the denticulation of the anterior lateral margins of the carapace and the lack of denticulation on the uropods, may perhaps be explained by the suggestion that both Calman's and Fage's specimens possessed a fragile thin lamella on the lateral margins of the body and the uropod, which was splintered off in various degrees. Also, the dissimilarity in the form of the posterior margin of the last abdominal segment is perhaps not of very great importance, because when the anal flaps are open and extend over the posterior margin of the segment, they can easily be mistaken for an angular margin. But the completely dissimilar form of the carapace remains. We must consequently assume either that the range of variation in *P. holti* is very great or that Fage's Monaco specimens do not belong to *P. holti*. I am inclined to the latter opinion.

The dissimilarity between male and female that Fage has described is quite obvious. Since both specimens come from the same sample, it stands to reason that they belong to the same species and that sexual dimorphism is very great, a common occurrence in cumaceans.

The male before me is still adolescent, which is



FIGURES 56-61.—*Campylaspis* sp., female: 56, second maxilliped; 57, terminal part of second maxilliped; 58, third maxilliped. *Platycuma marginalis*, juvenile male: 59, anterior part of body from above; 60, terminal part of first pereopod; 61, last abdominal segment and uropod.

evident from the incompletely developed exopodites on the third and fourth pereopods. Young males still have entirely female characters. We must, therefore, compare the male at hand with Fage's female. The dissimilarity in the structure of the carpus has already been pointed out. Fage does not describe the

first pereopods and says only that they resemble those of the male *P. holti*. In the first pereopod of the present form, the propodus is almost three times as long as the dactylus and about as long as the carpus, proportions different from those of the adult male. Dissimilarities are furthermore seen in the

uropods. The peduncle is longer in Fage's female: as long as last 2 abdominal segments combined and almost twice as long as endopod.

Even though the new species is very close to Fage's female, there are dissimilarities that do not make it seem advisable to regard these 2 forms as identical at present.

Family LAMPROPIDAE

29. *Lamprops fuscata* G. O. Sars

Lamprops fuscata G. O. Sars, 1865:192, 193; 1900:20, 21, pl. 11.

MATERIAL EXAMINED.—45°11'30"N, 55°51'30"W (S of Newfoundland), 42 fms, 3 Jul 1885, *Albatross* Sta 2468, several females and males.

EARLIER RECORDS IN THE REGION.—Off Newfoundland, 67 fms (Calman, 1912).

OTHER LOCALITIES.—Norwegian coasts north from the Lofoten Islands, Kolabucht, Novaya Zemlya, Franz-Josef Land, western Greenland, Alaska, Vancouver; shallow water.

30. *Lamprops quadriplicata* Smith

Lamprops quadriplicata Smith, 1879:118–120.

REMARKS.—Calman (1912) doubted whether this species was distinct from the European *L. fasciata* G. O. Sars. He pointed out that the first 4 folds on the carapace were not always developed and that there could also be 4 folds in *L. fasciata*. I was able to confirm these facts in 1921, and in 1926 I found that in *L. fasciata* there are often 2 lateral spines on the telson; consequently it is in this respect also closer to *L. quadriplicata*, which has 2–3 lateral spines.

The color of the 2 forms was described, however, as being quite different. In 1900, G. O. Sars wrote about *L. fasciata*: "Body ornamented with a very conspicuous dark brownish violet pigment forming more or less distinct transversal bands across the segments, and in the carapace occupying the greater part of the branchial region behind the anterior fold." Procter (1933) described the color of *L. quadriplicata* as follows:

The carapace shows a dividing line passing diagonally forward from just in front of the postdorsal angle to just behind the anteroventral notch. The area in front of the line is greenish white and behind it deep brown. The general surface of the rest of the animal is without color ex-

cept that the first free thoracic segment is yellowish white, the next two or three have brown mid-dorsal spots and the epimera of the next to last thoracic segments are brown. The abdominal segments have postdorsal brown bands. The telson is yellow, due to the color of the rectum. The distal portion of the basis of the uropods is brown.

We still know very little about the color of cumaceans because it fades in preserving fluids, and neither do we know to what extent color is constant within a species. Since there are also some dissimilarities in the relative lengths of some articles of the appendages and in the armature of the telson and uropods, however, it is best to consider the 2 species as distinct, particularly since their distributions are widely separated. *Lamprops fasciata* occurs off the Norwegian coast up to Vadso, but both it and *L. quadriplicata* are absent from Spitzbergen, western and eastern Greenland, the Davis Straits, and Labrador.

Hart (1930), however, reported *L. quadriplicata* from Vancouver, British Columbia. According to her, the spines on the telson and on the uropod are stronger than in *L. quadriplicata* from the American east coast. She wrote about the color, "Light brown with dark brown chromatophores scattered over the carapace." Consequently, the identity of the Vancouver form with *L. quadriplicata* is not certain.

MATERIAL EXAMINED.—Gloucester Harbor, Mass., 8.5 fms, 1 Aug 1878, Steamer *Speedwell* Sta 141, 9 females and males.

EARLIER RECORDS IN THE REGION.—Gloucester Harbor, Mass., 7–10 fms, sand and red algae; Casco Bay, surface, evening (Smith, 1879). Off Newfoundland, 43°36'00"N, 50°03'30"W, 37 fms; Casco Bay, Maine; Gloucester Harbor, Mass., 8.5 fms; Cape Cod Bay, Mass., 10.5–16 fms (Calman, 1912). Mount Desert region, Maine, sand bottom, 8 ft (Proctor, 1933).

OTHER LOCALITIES.—Vancouver, 13–67 m (Hart, 1930).

31. *Platytyphlops orbicularis* (Calman)

Platytyphlops orbicularis Calman, 1905:43, pl. 5: figs. 77–81.

Paralamprops orbicularis.—Calman, 1912:631–634, figs. 29–39.

Platytyphlops orbicularis.—Stebbing, 1912:161.

REMARKS.—This species was not represented in the material examined.

EARLIER RECORDS IN THE REGION.—39°54'30"N, 70°20'00"W, 390 fms; 39°50'00"N, 70°26'00"W, 555 fms; 39°46'00"N, 71°10'00"W, 480 fms; 39°42'00"N, 71°32'00"W, 335 fms (Calman, 1912).

OTHER LOCALITIES.—West of Ireland, SW of Faroe Islands; all from great depths.

Family PSEUDOCUMIDAE

32. *Petalosarsia declivis* (G. O. Sars)

Petalopus declivis G. O. Sars, 1865:197, 198.

Petalosarsia declivis.—G. O. Sars, 1900:77–79, 108, pl. 54.

MATERIAL EXAMINED.—45°29'N, 55°24'W, 67 fms, 3 Jul 1885, *Albatross* Sta 2466, 1 male. 45°04'00"N, 59°36'45"W, 57 fms, 6 Jul 1885, *Albatross* Sta 2497, 1 adult female. Probably Nova Scotia, Jul 1885, *Albatross*, 4 females and males.

EARLIER RECORDS IN THE REGION.—Off Newfoundland, 89 fms; off Martha's Vineyard, 39 fms (Calman, 1912).

OTHER LOCALITIES.—Norwegian coasts north of Lofoten Islands, Novaya Zemlya, North Sea, British coasts, Franz-Josef Land, Spitzbergen, Iceland, Davis Straits; shallow water to 142 fms.

Family DIASTYLIDAE

33. *Diastylis rathkei sarsi* Norman

Cuma rathkii Krøyer, 1841:513–524, pls. 5, 6: figs. 17–30.

Diastylis rathkii var. *sarsi* A. M. Norman, 1902:478.

Diastylis rathei sarsi.—Zimmer, 1926:50–52.

REMARKS.—I will make the following introductory remarks about this and the following 2 species: In 1926 I showed that *Diastylis rathkii* includes species and races all formerly known as *Diastylis (Cuma) rathkii* (Krøyer). The first original reports, therefore, can be used now. I rely upon the specimens that I am able to reexamine for comparison with the previously recorded specimens and for distribution.

MATERIAL EXAMINED.—Off Halifax, U.S. Fish. Comm., 1877, 2 females (1 adult).

EARLIER RECORDS IN THE REGION.—45°04'00"N, 59°36'45"W (Misaine Bank), 57 fms; off Halifax, 42 fms (Calman, 1912; cf. Zimmer, 1930); Gulf of St. Lawrence; off Chebucto Head, 95–104 m; off Halifax, 42 fms; Bedford Basin, Halifax, 68 m (Zimmer, 1930).

OTHER LOCALITIES.—Northern coasts of Norway, Russian coasts as far as Novaya Zemlya, western Greenland, Davis Straits, Labrador; shallow water to 800 m.

34. *Diastylis glabra nearctica* (Zimmer)

Diastylis rathkei nearctica Zimmer, 1926:52–54, figs. 33–39.

Diastylis glabra nearctica Zimmer, 1930:612–615, figs. 10–13.

MATERIAL EXAMINED.—Probably Nova Scotia, Jul 1885, *Albatross*, 1 pullus. 45°11'30"N, 55°51'30"W (S of Newfoundland), 42 fms, 3 Jul 1885, *Albatross* Sta 2468, 1 female. 45°04'00"N, 59°36'45"W (Misaine Bank), 57 fms, 6 Jul 1885, 19 females and males.

EARLIER RECORDS IN THE REGION.—46°48'30"N, 52°34'00"W,

89 fms; 45°29'00"N, 55°24'00"W, 67 fms; 45°04'00"N, 59°36'45"W, 57 fms (Calman, 1912; cf. Zimmer, 1930); Newfoundland Bank, 46°5'N, 51°44'W, 100 m, sand and shells; 46°13'N, 51°46'W, 105 m, stones and shells (Zimmer, 1926). Greenbank, 123 fms; between Misaine Bank and Middle Ground, 237 m (Zimmer, 1930). The subspecies is not recorded from other regions.

35. *Diastylis glabra labradorensis* Zimmer

Diastylis glabra labradorensis Zimmer, 1930:615–617, figs. 14–17.

REMARKS.—This subspecies was not represented in the material examined.

In 1867, Packard identified his specimens as *Alauna* (now *Diastylis*) *goodsiri* Bell, unquestionably an error. For verification Smith sent some of Packard's specimens to G. O. Sars, who held them to be representatives of a new species. Smith (1879), nevertheless, classified them with *D. rathkii*, writing that "most of the specimens from Labrador have the sides of the anterior part of the carapace a little smoother than usual in the species." That description agrees wholly with that of *D. g. labradorensis* (Zimmer, 1930). There is therefore hardly any doubt that Packard's specimens, most if not all, belong to *D. g. labradorensis*.

EARLIER RECORDS IN THE REGION.—Belles Amours, 6 fms (Packard, 1867).

OTHER LOCALITIES.—East coast of Labrador; shallow water to 92 m.

36. *Diastylis oxyrhyncha* Zimmer

Diastylis oxyrhyncha Zimmer, 1926:55–57, figs. 40–43, pl. 3.

REMARKS.—The species is not represented in the material examined.

EARLIER RECORDS IN THE REGION.—41°11'30"N, 66°12'20"W (George's Bank), 499 fms (Calman, 1912; cf. Zimmer, 1930).

OTHER LOCALITIES.—Norwegian coasts of Florø, Kara Sea, Far Islands, Spitzbergen, Iceland, E and W Greenland, Davis Straits; shallow water to 1000 m.

37. *Diastylis lucifera* (Krøyer)

Cuma lucifera Krøyer, 1841:527–530, pl. 6: figs. 34, 35.

Diastylis lucifera.—G. O. Sars, 1900:49, 50, pl. 38.

REMARKS.—This species is not represented in the material examined.

EARLIER RECORDS IN THE REGION.—About 10 miles N of Shediac, 10 fms, sand (Whiteaves, 1874). Northumberland Bank, more than 4 fms (Whiteaves, 1874). Bay of Fundy off Head Harbor, 60–77 fms, mud (Smith, 1879). Off Newfoundland, 206 fms; Gulf of Maine, 54 fms (Calman, 1912). Mount Desert region, Maine, taken by towing at night (Procter, 1933).

OTHER LOCALITIES.—Baltic Sea, Kattegat, the whole Norwegian coast, British coasts, Davis Straits; shallow water to 420 fms.

38. *Diastylis goodsiri* (Bell)

Alauna goodsiri Bell, 1855:403, 404, pl. 34: fig. 2.

Diastylis goodsiri.—G. O. Sars, 1900:54, 55, pl. 41.

REMARKS.—This species was not present in the material examined.

EARLIER RECORDS IN THE REGION.—47°40'00"N, 47°35'30"W, 206 fms; 44°35'00"N, 57°13'30"W, 150 fms; 44°34'00"N, 56°41'45"W, 218 fms; 44°05'30"N, 63°31'30"W, 84 fms; 20 mi ESE of Cape Sable, Nova Scotia, 70 fms (Calman, 1912).

OTHER LOCALITIES.—Northern Norway, Barents Sea, Kara Sea, Novaya Zemlya, Siberian Polar Sea to 116°E, Spitzbergen, Jan Mayen, Iceland, E and W Greenland, Wellington Strait, Baffin Island, Davis Straits; shallow water to 362 fms.

39. *Diastylis stygia* G. O. Sars

Diastylis stygia G. O. Sars, 1872:798–800; 1873:6, 7, pl. 2: figs. 4–7.

REMARKS.—Following Ohlin (1901), the 2 species, *D. stygia* G. O. Sars and *D. polaris* G. O. Sars, have often been considered conspecific. An examination of that material from the Russian Sadko Expedition (Zimmer, 1943) led me to the conviction that 2 different species are involved. It cannot always be determined which of the 2 species has been at the disposal of the authors. There is, therefore, an element of uncertainty in the following summary of distribution.

MATERIAL EXAMINED.—40°53'30"N, 66°24'00"W, 956 fms, 14 Jul 1885, *Albatross* Sta 2530, 1 juvenile. 40°29'00"N, 66°04'00"W, 1769 fms, 2 Sep 1885, *Albatross* Sta 2572, 10 females and males. 40°16'30"N, 67°26'15"W, 828 fms, 15 Jul 1885, *Albatross* Sta 2533, 11 juveniles.

EARLIER RECORDS IN THE REGION.—41°14'N, 65°45'W (off Nova Scotia), 1340 fms, blue mud (Sars, 1886). Numerous specimens between 41°28'30"N and 37°25'00"N, 65°36'30"W and 73°06'00"W, 1149–1813 fms (Calman, 1912).

OTHER LOCALITIES.—Waters between Norway and Spitzbergen, between Norway and Iceland, between Spitzbergen and Greenland, Davis Straits; great depth.

40. *Diastylis edwardsii* (Krøyer)

Cuma edwardsii Krøyer, 1841:504–513, pl. 5, figs. 1–16.

Diastylis edwardsii.—Zimmer, 1926:35, 36, figs. 22–26, pl. 1: fig. 3, pl. 2: fig. 4.

REMARKS.—In 1926, I showed *Diastylis scorpioides* (Lepechin) and *Diastylis edwardsii* to be 2 different species that heretofore had always been confused and that still another closely related third species, *Diastylis lepechini* Zimmer, could be distinguished. None of the 3 species is represented in the material examined. Calman, however, reported 6 specimens under the name *Diastylis scorpioides* (Lepechin) from the following locality within the region: 47°40'00"N, 47°35'30"W, 206 fms.

The distribution of these 3 closely related species is as follows: *D. lepechini* is absent from western Greenland and Baffin Bay, and *D. edwardsii* is represented 96.15% of the time as compared to 3.85% for *D. scorpioides*. It may be assumed that *D. edwardsii* predominates considerably also farther south. The probability is therefore very great, even though there is no absolute certainty that Calman's specimens belong to *D. edwardsii*, although some may possibly also belong to *D. scorpioides*.

OTHER LOCALITIES.—Novaya Zemlya, Kara Sea, Dickson Harbor, Spitzbergen, E and W Greenland, Baffin Island; shallow water to 500 m.

41. *Diastylis sculpta* G. O. Sars

Diastylis sculpta G. O. Sars, 1871a:71–72; 1871b:24–28, figs. 1–49, pls. 1–9.

REMARKS.—The last curved fold on the carapace is not always distinctly developed and can even be completely lacking.

MATERIAL EXAMINED.—Casco Bay, Maine, U.S. Fish. Comm., 1873, 1 adult female. Gloucester Harbor, Mass., 8.5 fms, 1 Aug 1878, Steamer *Speedwell* Sta 141, many females and males; 43°22'N, 68°17'W, 50–60 m, 2 Sep 1915, *Grampus* Sta 10311, 1 male. Vineyard Sound, Mass., 13 fms, 3 Sep 1880, *Fish Hawk* Sta 863, 2 females. Off Martha's Vineyard, Mass., 40°54'00"N, 70°48'30"W, 7 Sep 1881, *Fish Hawk* Sta 987, 1 female, 1 male. Off Newport, R.I., 19.5 fms, 17 Aug 1880, *Fish Hawk* Sta 811, 2 adult females, 1 male. Block Island Sound, R.I., 18.5 fms, 30 Aug 1887, *Fish Hawk* Sta 1240, 3 juveniles. Off Block Island, 29 fms, 18 Aug 1880, *Fish Hawk* Sta 815, 2 adult males. North of Block Island, 22 fms, 24 Aug 1880, *Fish Hawk* Sta 826, 2 females.

EARLIER RECORDS IN THE REGION.—Shinnecock Bay, 18 fms, mud (Sars, 1871a, b). About 10 miles N of Shediac, 10 fms, sand; Northumberland Straits, more than 4 fms (Whiteaves,

1874). Casco Bay, muddy bottoms (Verrill, 1874a). Bay of Fundy, off Chebucto Head, 20 fms, soft mud and fine sand with decaying seaweed (Smith and Harger, 1874). Block Island Sound, 17 fms; sand, off Watch Hill, R.I., 18 fms; Vineyard Sound, surface; Gloucester Harbor, Mass., 7–10 fms; sand and red algae off Gloucester; off Cape Ann, 26 fms, sand, gravel, and stones, 35 fms, sand, 33 fms sand and gravel; Casco Bay, surface evening, among *Laminaria*, 9 fms, sand and mud, 17 fms, mud, 27–34 fms, hard bottom; Bay of Fundy, low-water mark, sandy mud, surface, 4 fms, very soft mud; Head Harbor, 60 fms, mud; near Halifax, 20 fms, soft mud and fine sand; Halifax Harbor, 16–21 fms, fine sand, stones, and red algae; about 120 miles S of Halifax, 190 fms, gravel and pebbles; Northumberland Straits, Gulf of St. Lawrence, 10 fms, sand (Smith, 1879). Off Halifax, 21 fms; about 120 miles S of Halifax, 190 fms; Massachusetts Bay, 26–33 fms; Nahant, Mass., mouth of Cape Cod Bay, 29 fms; off Cape Cod Bay, 34 fms; off Martha's Vineyard, 28–30 fms, 216 fms; Woods Hole, surface; off Newport, R.I., 19.5 fms; Block Island Sound, 18.5 fms (Calman, 1912). Woods Hole region, plankton (Fish, 1925). Mount Desert region, Maine, 20–220 fms, mud (Procter, 1933). Not recorded from other regions.

42. *Diastylis polita* Smith

Diastylis polita Smith, 1879:108–111.—Calman, 1912:655–657, figs. 79, 80.

REMARKS.—The variation in size is very marked. The sizes of 12–14 mm given by Smith and Calman are probably attained, but smaller specimens are much more frequent. The smallest sexually mature female and male specimens were only 6.5–7 mm.

The strength of the fold on the carapace is variable. Larger individuals have stronger folds, but the strength varies also in animals of the same size.

MATERIAL EXAMINED.—St. Johns, Newfoundland, 1885, electric light, 1 adult female, 7 adult males. Gloucester, 8 fms, 1 Aug 1878, Steamer *Speedwell* Sta 145, 3 adult males. Gloucester, 1878, U.S. Fish. Comm., 1 female. Gloucester Harbor, Mass., 8.5 fms, 1 Aug 1878, *Speedwell* Sta 141, 1 female and 1 male. Vineyard Sound, Mass., surface, 28 Jan 1876, V. N. Edwards, 1 male. Vineyard Sound, Mass. 13 fms, 3 Sep 1880, *Fish Hawk* Sta 863, 2 adult females, 1 adult male. Vineyard Sound, Mass., 16 fms, 29 Aug 1887, *Fish Hawk* Sta 1231, 2 females, 2 males. Narragansett Bay, R.I., 9.5 fms, 23 Aug 1880, *Fish Hawk* Sta 818, 12 females, 10 adults; 3 males, 2 adults. 36°46'N, 75°38'W, 18 m, 20 Jan 1914, *Bache* Sta 10157, 11 females, 1 adult; 1 male.

EARLIER RECORDS IN THE REGION.—Vineyard Sound, surface; Gloucester, Mass., 7–10 fms, sand and red algae; Casco Bay, 9 fms, sand and mud, also at other depths; surface, evening, Trenton Bay, Maine; Halifax, 18–20 fms, fine sand, stones, and red algae; 120 miles S of Halifax, 190 fms, gravel and pebbles; Northumberland Straits, Gulf of St. Lawrence (Smith, 1879). Off Halifax, 6.5 fms; Halifax Har-

bor, 18 fms; La Have Islands, Nova Scotia, 6 fms, fine mud; Gloucester Harbor, 8–9 fms; off Plymouth, 7 fms; Woods Hole, Mass. surface; Narragansett Bay, 8.5–10 fms; Block Island Sound, 18.5 fms (Calman, 1912). Woods Hole region, plankton (Fish, 1925) Woods Hole, surface (Zimmer, 1930). Not recorded from other regions.

43. *Diastylis quadrispinosa* G. O. Sars

Cuma bispinosa Stimpson, 1853:39.

Diastylis quadrispinosa G. O. Sars, 1871a:72, 73; 1871b:28–30, figs. 50–6, pls. 10, 11.

REMARKS.—There can hardly be much doubt that *Cuma bispinosa* Stimpson, inadequately described, is identical with Sars' species. The small doubt that still remains prevents me, however, from using Stimpson's name.

MATERIAL EXAMINED.—44°26'00"N, 57°11'15"W, 190 fms, 5 Jul 1885, *Albatross* Sta 2486, 1 male. 44°01'00"N, 59°02'30"W, 140 fms, 23 Aug 1886, *Albatross* Sta 2703, 1 female, 1 male. Casco Bay, Maine, U.S. Fish. Comm., 1873, 3 females, 2 males. Off Cape Ann, Mass., 60 fms, 17 Sep 1878, *Speedwell* Sta 210, 5 females, 2 males. Gloucester Harbor, Mass., 8.5 fms, 1 Aug 1878, *Speedwell* Sta 141, 1 female. Vineyard Sound, Mass., 13 fms, 3 Sep 1880, *Fish Hawk* Sta 863, numerous females and males. Vineyard Sound, Mass., 16 fms, 29 Aug 1887, *Fish Hawk* Sta 1231, 2 females. Vineyard Sound, Mass., 17.5 fms, 3 Sep 1880, *Fish Hawk* Sta 860, 4 females, 2 males. Off Martha's Vineyard, Mass., 40°54'00"N, 70°48'30"W, 7 Sep 1881, *Fish Hawk* Sta 897, 1 female. Off Gay Head, Mass., 18 Aug 1888, V. N. Edwards, 1 male. Off Newport, R.I., 13 fms, 14 Aug 1880, *Fish Hawk* Sta 799, 2 females, 1 male. Off Newport, R.I., 18 fms, 14 Aug 1880, *Fish Hawk* Sta 788, 4 females, 3 males. Off Newport, R.I., 19 fms, 14 Aug 1880, *Fish Hawk* Sta 795, 4 females. Off Newport, R.I., 19.5 fms, 17 Aug 1880, *Fish Hawk* Sta 811, 4 females, 6 males. Off Newport, R.I., 20 fms, 12 Aug 1880, *Fish Hawk* Sta 784, 2 females, 3 males. North of Block Island, R.I., 20.5 fms, 24 Aug 1880, *Fish Hawk* Sta 827, 4 females, 1 male. North of Block Island, R.I., 22 fms, 24 Aug 1880, *Fish Hawk* Sta 826, numerous females and males. Off Block Island, R.I., 29 fms, 18 Aug 1880, *Fish Hawk* Sta 815, 2 females. Off Rhode Island, U.S. Fish. Comm., 1880, 2 females. 40°00'15"N, 70°42'20"W, 129 fms, 7 Aug 1885, *Albatross* Sta 2542, 1 specimen. 35°44'N, 74°51'W, 132 fms, 21 Oct 1884, *Albatross* Sta 2310, numerous females and males.

EARLIER RECORDS IN THE REGION.—Grand Manan, 35 fms, gravel (Stimpson, 1853). Shinnecock Bay, 18 fms, mud; 39°54'N, 73°15'W, 30–35 fms, mud (Sars, 1871a, b). Martha's Vineyard, 23 fms, soft muddy bottoms; Buzzard's Bay, 29 fms, soft muddy bottoms (Verrill and Smith, 1873). Eight mi NE of Cape George, Nova Scotia, 22 fms, red mud; off Picton Island (Gulf of St. Lawrence) (Whiteaves, 1874). Casco Bay, muddy bottoms; about 5 mi SW from Seguin Island, 45 fms (Verrill, 1874a). Gulf of Maine, 60–68 fms (Verrill, 1874b). Off Chebucto Head, 20 fms, soft mud and

fine sand with decaying seaweed; region of St. George's Banks (Smith and Harger, 1874). Block Island Sound, 17 fms, sand and mud; off Watch Hill, R.I., 18 fms; off Buzzard's Bay, 29 fms, fine sandy mud; off Martha's Vineyard, 23 fms; SW Ledge, off Martha's Vineyard, 18 fms; Vineyard Sound, off Tarpaulin Cove, 10–12 fms; Massachusetts Bay, off Salem, 20 fms, gravel and stones; off Cape Ann, Massachusetts, 26–33 fms, sand, gravel, and stones, 35 fms, sand; between Cape Ann and the Isles of Shoals, 43–68 fms, mud; Jeffrey's Ledge, Gulf of Maine, 51 fms, hard sandy mud; Casco Bay, 16–17 fms, mud; off Half Way Rock, 27 fms; off Seguin Island, 45 fms; taken in 2 fms, muddy bottom, in a small trap baited with pieces of fish, Bay of Fundy; Eel Cove, Grand Manan, 8–10 fms, sand; off Cape Sable, Nova Scotia, 75 fms, fine sand and mud; in and near Halifax Harbor, 20 fms, soft mud and sand, 16–18 fms, fine sand and red algae, 21 fms, sand, stones, and algae, 42 fms, fine sand, 52 fms, fine sandy mud; 120 mi S of Halifax, 190 fms, gravel and pebbles (Smith, 1879). Off Grand Manan, 8–10 fms (Verrill and Rathbun, 1880). Northumberland Straits, 8 mi NE of Cape George, Nova Scotia, 10 fms, sand (Whiteaves, 1901). Off E end of Long Island (Block Island Sound), 39°55'00"–40°02'54"N, 70°23'40"–70°57'00"W, 100–142.5 fms, fine sand and mud (Smith, 1881). Off Nova Scotia, 45°04'00"N, 59°36'45"W, 57 fms; *Albatross* Sta 2497, off Nova Scotia, lat. 45°04'00"N. long. 59°36'45"W, 57 fms, 1 female; USFC Sta 72–73 (1877), Halifax Harbor, Nova Scotia, 18 fms, 1 male; USFC Sta 87 (1877), Halifax Harbor, Nova Scotia, 21 fms, 6 male and female; USFC Sta 101 (1877), off Halifax, Nova Scotia, 42 fms, 1 female; off Nova Scotia, USFC, 1877, 1 female; Seal Cove, Grand Manan, 8–10 fms; USFC, 1872, many, male and female; USFC Sta 160 (1878), Gulf of Maine, 54 fms, 1 female; USFC Sta 166 (1878), Gulf of Maine, 35 fms, many, male and female; USFC Sta 134 (1878), Massachusetts Bay, 26 fms, 1 female; USFC Sta 133–134 (1878), Massachusetts Bay, 26–33 fms, 7 females; USFC Sta 135–136 (1878), Massachusetts Bay, 25–26 fms, 5 females; USFC Sta 206, Massachusetts Bay, 42 fms, 4, male and female; USFC Sta 215, Massachusetts Bay, 35 fms, 1 male (adult); USFC Sta 222, Massachusetts Bay, 40 fms, 1 female; Nahant, Massachusetts, S. D. Judd, 1893, 6, male and female; USFC Sta 283, off Cape Cod (Massachusetts Bay), 31 fms, 11 females; USFC Sta 322, off Cape Cod, 67 fms, 2 females; USFC Sta 321, Cape Cod Bay, 29½ fms, 2 females; USFC Sta 337, Cape Cod Bay, 16 fms, many females; USFC Sta 784, off Newport, R.I., 20 fms, 9 females; USFC Sta 786, off Newport, R.I., 19 fms, 1 female; USFC Sta 788, off Newport, R.I., 18 fms, 3, male and female; USFC Sta 793, off Newport, R.I., 19 fms, 7, male and female; USFC Sta 795, off Newport, R.I., 19 fms, about 17, male and female; USFC Sta 811, off Newport, R.I., 19½ fms, many, male and female; USFC Sta 812, off Block Island, 28½ fms, 1 female; USFC Sta 860, Vineyard Sound, 17½ fms, 1 male, 1 female; USFC Sta 863, Vineyard Sound, 18 fms, 1 male, 1 female; USFC Sta 871, off Martha's Vineyard, 115 fms, 1 female; USFC Sta 873, off Martha's Vineyard, 100 fms, 1 male; USFC Sta 878, off Martha's Vineyard, 142½ fms, 1 male; USFC Sta 987, off Martha's Vineyard, 28 fms, 6, male and female; USFC Sta 987–989, off Martha's Vineyard, 28–30 fms, 6 females; USFC Sta 992, off Martha's Vineyard,

36 fms, 1 female; USFC Sta 993, off Martha's Vineyard, 39 fms, 1 female; USFC Sta 2746, 38°46'00"N, 73°5'45"W, 102 fms, 1 male, 1 female; *Albatross* Sta 2307, near Cape Hatteras, 35°42'00"N, 74°54'30"W, 43 fms, 6 females; near Cape Hatteras, 38°42'00"N, 74°54'30"W, 43 fms (Calman, 1912). Off Halifax, 6 fms (Zimmer, 1930). Mount Desert region, Maine, usually on muddy bottom, from low water to 220 ft (Procter, 1933).

OTHER LOCALITIES.—2 specimens (1 female) from Florida Keys in USNM collection (coll., J. B. Henderson).

44. *Diastylis abbreviata* G. O. Sars

FIGURES 62–72

Diastylis abbreviata G. O. Sars, 1871a:74; 1871b:30–32, figs. 62–64, pl. 12.

REMARKS.—This hitherto little-known species is present in numbers, but, unfortunately, the specimens are all more or less damaged. It is possible, though, to give a description of the male in the breeding stage, supplementing it somewhat with Sars' description.

DESCRIPTION OF MALE.—Integument conspicuously thin and flexible; dorsal side in both sexes completely covered with fine, dense denticles or thorns, much denser than indicated in Figures 62, 63, 70, and 71. Among the denticles are a varying number of somewhat larger denticles or lamellate formations, extraordinarily brittle and often broken off. Conspicuous also are comparatively long, delicate hairs spread over the surface. These hairs are too delicate to be drawn as thin as necessary in Figures 62, 63, 70, and 71, and they are, therefore, omitted. They are particularly numerous in the adult males, in which they form a thick pubescence. Fine hairs, often especially long, are also present on the extremities.

DESCRIPTION OF ADULT MALE.—Thorax slightly longer than abdomen, excluding telson. Armature that females (described below) have on lateral margin is absent. Between tiny denticles on surface are somewhat larger ones that appear sporadically and irregularly and that are somewhat thicker on the pseudorostral lobes. "Lateral line" of carapace, as typical in most males, formed by lamellate denticles placed somewhat closer together in posterior than in anterior part of line. Lateral line disappears gradually anteriorly on pseudorostral lobes.

Ventral margins of free thoracic tergites with border of lamellate denticles which, however, were

frequently broken off. Each segment also with dorsal pair of teeth arranged in 2 longitudinal lines. Posterior angles of last thoracic segments not extended into points; they carry, however, a stout thorn pointing posteriorly. Abdominal segments also with denticles, very fragile and often broken off.

Telson (Figure 69) approximately as long as last 3 abdominal segments combined. Preanal part fairly long, with approximately parallel lateral margins. Postanal part about $1\frac{1}{2}$ times as long as preanal part, with some spines on lateral margins. It lacks terminal spines, but has, somewhat dorsally, 2 small bristles on truncate apex.

Last article of antennula (Figure 64) extends past tip of pseudorostrum. First article of peduncle longer than other 2 combined. Main flagellum, 6-articled; accessory flagellum, 4-articled. Basipodite of main flagellum semicircular, with thick border of long sense organs.

Antenna (Figure 65) projecting backward, with end of flagellum reaching somewhat beyond third abdominal segment. Last peduncle article and articles of flagellum with diagonal rows of sense organs consisting of more rigid basal part carrying a thinner flexible terminal part. Transition between 2 parts is abrupt.

Basis of third maxilliped (Figure 66) broadened laterally but not much produced anteriorly.

First pereopod (Figure 67) exceeds tip of pseudorostrum by last and part of penultimate articles. Basis about as long as distal articles combined, excluding dactylus. Carpus and dactylus subequal; propodus somewhat longer.

Second pereopod (Figure 68) with basis somewhat shorter than distal articles combined. Carpus considerably longer than propodus and dactylus, the latter 2 being subequal.

There had evidently been denticles on the margins of both pereopods; however, these were mostly broken off.

Uropod peduncle (Figure 69) does not reach apex of telson. Endopod about $\frac{2}{3}$ as long as peduncle, somewhat shorter than exopod, biarticulate; distal article about $\frac{2}{3}$ as long as proximal. Apex with spine that is not distinctly articulated. Inner margin of peduncle and endopod with border of plumose spines and setae.

Length not quite 6.5 mm.

The females (Figure 70, 71) agree in the main with Sars' description; but I will, however, add a few

points. A marginal border of spatulate denticles begins at subrostral angle, extending over whole submargin of carapace and even running up on posterior margin for a short distance, then disappearing gradually through reduction of the denticles. As the posterior end of the body was damaged in both females, the telson and the uropod of a subadult male will be described and figured (Figure 72). Preanal part of telson about as long as postanal part, with approximately parallel lateral margins. Margins of postanal part with fairly long setiform spines. Apex of telson with the usual 2 well-developed terminal spines. The same is also the case with the female. Telson extends beyond uropod peduncle but not so much as in adult male; in females telson extends even less beyond peduncle. Proximal article of endopod about a fourth longer than distal. Armature on inner margin of peduncle and endopod is insignificant.

Length of larger female almost 7 mm.

REMARKS.—*Diastylis abbreviata* is the only species of the genus that possesses both a biarticulate endopod on the uropod and a thick border of fine spinules or denticles on the carapace. There are certain similarities with *Diastylis horrida* G. O. Sars, but here the spines on the border are much larger. In *D. aspera* Calman as well, the carapace is thickly furnished with very fine, small spinules, and the abdomen is short (as in *D. abbreviata*) as compared to the thoracic part (the structure of the uropod of *D. aspera* is unknown). *Diastylis aspera* has an arcuate diagonal line on the carapace that is lacking in *D. abbreviata*.

The sexual dimorphism in the telson is interesting and might even justify creating a new genus.

MATERIAL EXAMINED.—Off Martha's Vineyard, Mass., 39 fms, taken in trawl wings, 7 Sep 1881. *Fish Hawk* Sta 993, 2 females, 8 males (6 adults).

EARLIER RECORDS IN THE REGION.— $39^{\circ}54'N$, $73^{\circ}15'W$, 30–35 fms, mud (Sars, 1871a, b). Off Cape Ann, 35 fms, sand, Casco Bay 17 fms, mud (Smith, 1879). Not recorded from other regions.

45. *Diastylis cornuifer* (Blake)

Ekdiastylis cornuifer Blake, 1929:30, 31, fig. 15.

Diastylis cornuifer.—Zimmer, 1930:649, 650, fig. 47.

MATERIAL EXAMINED.—Off Martha's Vineyard, Mass., 349 fms, 11 Aug 1882, *Fish Hawk* Sta 1093, 2 females. Cape Cod Bay, $42^{\circ}01'N$, $70^{\circ}11'W$, 21 fms, 29 Aug 1879, *Speedwell* Sta 310, 3 adult females.

EARLIER RECORDS IN THE REGION.—Mount Desert region (Blake, 1929). Casco Bay, Maine, mud (Zimmer, 1930). Mount Desert region, 70 fms, mud and shells (Procter, 1933). Not recorded from other regions.

46. *Makrokyllindrus* sp.

FIGURE 73

DESCRIPTION OF SUBADULT FEMALE.—The subadult female of a *Makrokyllindrus* definitely represents a new species. The carapace is much damaged, however, and the specimen shows various other imperfections. Therefore, I would not like to make it the basis for a description of a new species and will confine myself to a short characterization.

Viewed laterally, thoracic part is very much arched and backward slope of free thoracic segment is abrupt. There is only an indication of a subrostral notch. Denticulation of carapace margin begins from subrostral angle. First denticles long and linear; they become shorter posteriorly and finally disappear altogether. Surface of thoracic part thickly covered with tiny denticles; such denticles also occur in smaller numbers on dorsum of first abdominal segment. The fifth abdominal segment has on its upper posterior lateral angles a stout spine bent backward. Telson (Figure 73) somewhat longer than fifth abdominal segment. Postanal part about half as long as preanal; distal end with 2 quite stout terminal spines, lateral margins with 4–5 fine setae. Second article of antennula extends partly over the pseudorostrum; 2 distal articles of peduncle slender compared with first. Antenna lacking on both sides. Uropod peduncle (Figure 73) extends somewhat beyond apex of telson but not to ends of terminal spines. Exopodite somewhat longer than endopodite including its terminal spine. First of 3 articles of endopodite somewhat longer than both the others combined. Last article about $\frac{2}{3}$ as long as second. Inner margins of 3 endopodite articles with 7, 3, and 1 spines. Distal article of exopod with 2 apical spines, 1 stout, and 1 fairly long and not distinctly articulated with the article.

Length about 7 mm.

LOCALITY.—38°15'00"N, 72°03'00"W, 1594 fms, 21 Jun 1884. *Albatross* Sta 2174, 1 subadult female.

47. *Brachydiastylis resima* (Krøyer)

Cuma resima Krøyer, 1846:206, 207, pl. 2: fig. 2.

Diastylopsis resima.—G. O. Sars, 1900:65–67, pl. 47.

Brachydiastylis resimus.—Stebbing, 1912:107–109, figs. 62–65.

MATERIAL EXAMINED.—Off Nova Scotia (?); one specimen in early adolescence that may, but not with certainty, belong to this species.

EARLIER RECORDS IN THE REGION.—Off Nova Scotia, 45°04'00"N, 59°36'45"W, 57 fms (Calman, 1912).

OTHER LOCALITIES.—Coasts of Norway, Barents Sea, Kara Sea, Baltic Sea, Kattegat, Skagerrak, E coast of Scotland, Spitzbergen, Iceland, E and W Greenland, Baffin Island; shallow water to 110 fms.

48. *Leptostylis longimana* (G. O. Sars)

Diastylis longimana G. O. Sars, 1865:173–175.

Leptostylis longimana.—G. O. Sars, 1900:68, 69, pl. 48.

REMARKS.—An adolescent specimen present in the material shows the considerable elongation of the pereopods and otherwise resembles this species, but it varies in the following respects: Uropod peduncle only as long as fifth abdominal segment plus half the sixth and only $2\frac{1}{2}$ times the length of the telson. Exopodite of uropod reaches only to half the length of third article of endopod, not to end of second article. In endopod of uropod, first article is indeed longest but not as long as second and third combined. Second article is not longer, but shorter, than third. These differences are perhaps due only to the adolescent stage of the specimen. At any rate, I assign it with a question to *L. longimana*.

MATERIAL EXAMINED.—Off Gay Head, Mass., surface, 8 Aug 1888, V. N. Edwards, 1 male. 40°04'00"N, 69°29'30"W, 58 fms, 28 Sep 1884, *Albatross* Sta 2261, 1 juvenile.

EARLIER RECORDS IN THE REGION.—Casco Bay (Smith, 1879). Mount Desert region, Maine, mud, 20–70 fms (Procter, 1933).

OTHER LOCALITIES.—Kattegat, Norway's coast up to Lofoten Islands, W of Ireland, NW of Faroe Islands, Iceland, Danish Straits, Davis Straits; shallow water to 1236 fms.

49. *Leptostylis ampullacea* (Lilljeborg)

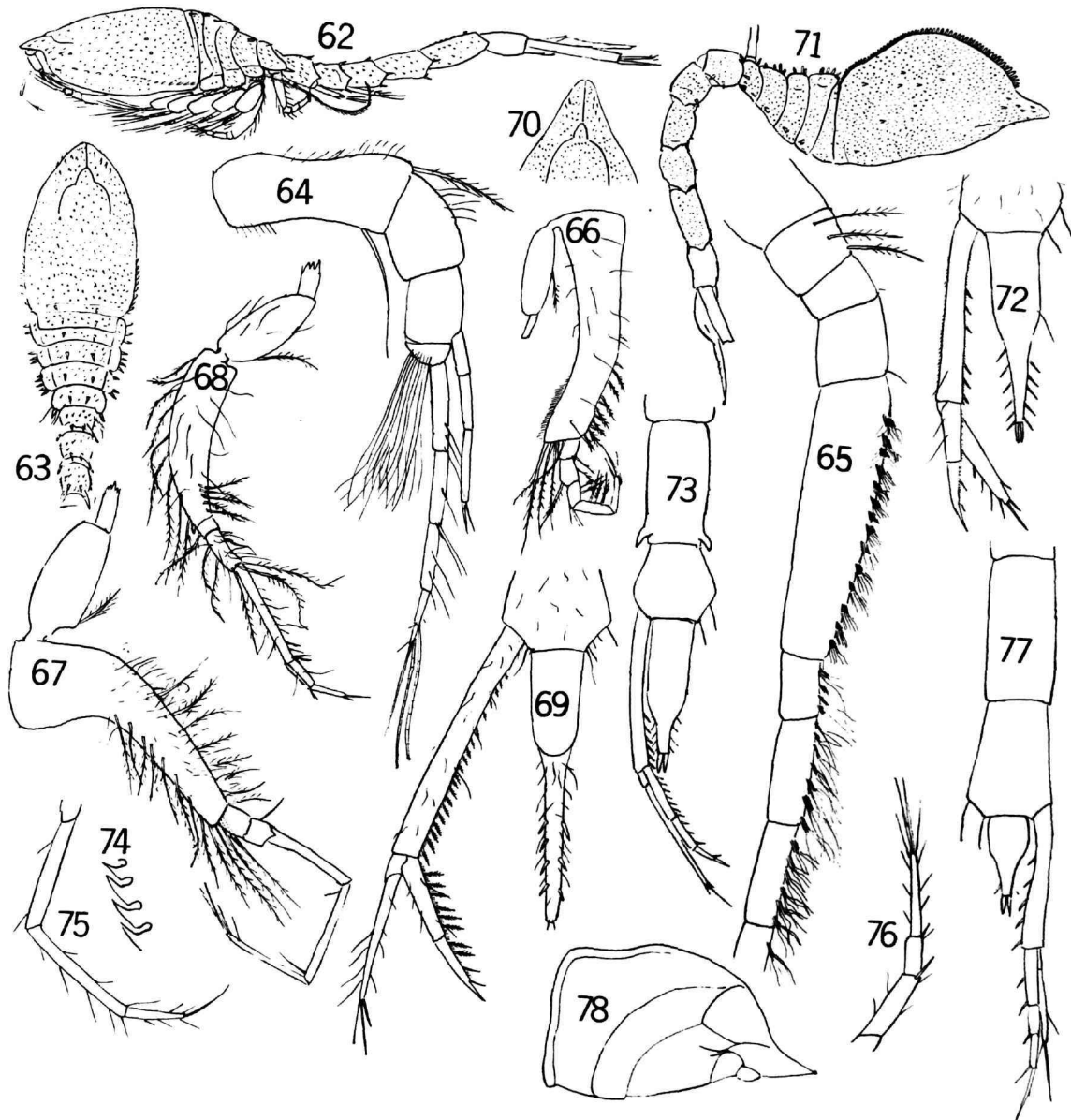
FIGURES 74–77

Cuma ampullacea W. Lilljeborg, 1855:120, 121.

Leptostylis ampullacea.—G. O. Sars, 1900:70, 71, pl. 50: fig. 1.

REMARKS.—The species is not represented in the material examined.

I have seen a number of specimens belonging to the USNM collections of the National Museum of Natural History that were from more northerly regions. One of them, a subadult female leads me to



FIGURES 62-78.—*Diastylis abbreviata*, male in breeding stage: 62, lateral view; 63, anterior part of body from above; 64, antennula; 65, peduncle and first joints of flagellum of antenna; 66, third maxilliped; 67, first pereopod; 68, second pereopod; 69, telson and uropod. Subadult female: 70, anterior part of body from above; 71, lateral view omitting extremities; 72, telson and uropods. *Makrokyllindrus* sp.: 73, terminal abdominal segment, telson and uropod. *Leptostylis ampullacea*, female: 74, denticulation of carapace margin; 75, end part of first pereopod; 76, end part of second pereopod; 77, last abdominal segment, telson and uropods. *Oxyurostylis smithi*, female: 78, carapace from the side.

make some comments. It varies from Sars' figure and description in the following respects: Dorsum more hairy. Second pereopod (Figure 76) with dactylus somewhat longer than carpus. Telson (Figure 77) distinctly more than half as long as uropod peduncle; it is also more slender than usual. Endopod of uropod is not slightly but rather distinctly shorter than peduncle. The denticulation on carapace margin (Figure 74) is distinctive. Notches between denticles are rounded at bottom. Each denticle with approximately square basal part and triangular forward-pointing tip. I was able to compare a specimen from Bergen, which undoubtedly belongs to *L. ampullacea*. In the hairiness of the dorsum and the less slender telson, there is better agreement with Sars' description than with the USNM specimens. On the other hand, there are the following resemblances: Second pereopod with dactylus longer than carpus; telson more than half as long as uropod peduncle; uropod endopodite distinctly shorter than peduncle; and denticulation on carapace margin is exactly the same.

EARLIER RECORDS IN THE REGION.—Gulf of Maine, 52–90 fms (Smith, 1879).

OTHER LOCALITIES.—Baltic Sea, Kattegat, Skagerrak, entire Norwegian coast, Durham, Faroe Islands, Iceland, $66\frac{1}{4}^{\circ}30'N$, $80^{\circ}W$ (Fox Channel), 10 Aug 1927 and from $49\frac{1}{4}^{\circ}31'N$, $63^{\circ}50'W$ (off Labrador), Jul 1927, coll. Capt. R. A. Bartlett; shallow water to 300 fms.

50. *Oxyurostylis smithi* Calman

FIGURE 78

Oxyurostylis smithi Calman, 1912:667–670, figs. 91–99.

REMARKS.—The development of the curved lines on the carapace is somewhat variable. The lines are often sharply ridge shaped, but often slighter, indicated only as "lines." They are usually more developed in large than in small specimens. In smaller specimens connecting line between first and second curved lines is not visible. The relations were as follows in larger specimens: According to Calman there are 3 curved lines present. The first begins on the pseudorostral side, runs backward, turns toward the frontal lobe, then turns backward again shortly before reaching it, and soon ends. The terminal part that again bends backward can often be lacking. The next 2 curved lines run farther back on the carapace and all 3 lines converge generally concentrically.

I found this development in only a few specimens, all from Woods Hole. A connecting line was usually present between curved lines 1 and 2, and the second line may have a geniculation in its forward course. In extreme cases there is a development as shown in Figure 78. The connecting line begins where line 1 bends posterior to the margin on the frontal lobe, and it terminates in an angular projection on the second line. This extreme condition appeared in some specimens from Woods Hole, in one specimen from *Albatross* Sta 2283, and in some specimens from Chesapeake Bay and from the May River, South Carolina.

The majority of the specimens from Chesapeake Bay showed the following distinctions: line 2 was not geniculate, and the connecting line between 1 and 2, present only in the anterior part, does not reach line 2. I examined a similar specimen from Woods Hole and one also from *Fish Hawk* Sta 818. The specimen that Calman used for his figure 92 shows a similar development.

The specimens from Skull Creek, South Carolina, generally have a geniculation in line 2, but to a different degree. The connecting line is often altogether lacking or only faintly indicated. In other instances only the posterior part is present and not the anterior part as in the cases described above. All the specimens from the May River show likewise a geniculation in line 2, but frequently hardly perceptible. The connecting line is frequently completely lacking, but is also frequently present in the form of stout ridges as already mentioned.

More about the adult males: I examined specimens from Woods Hole, the region of Cape Hatteras, and Chesapeake Bay. In both specimens from Cape Hatteras line 3 was lacking altogether, and line 2 was geniculate but not distinctly developed. In one specimen from Chesapeake Bay line 3 was present only in the median part and even here only indistinctly.

The "lateral line" that plays such an important part in the adult male in the family Diastylidae (Zimmer, 1930) terminates anteriorly in Calman's picture, where it meets line 3. I did not see such a specimen; moreover, in the specimen before me the lateral line extends anteriorly over line 3 to line 2. The part lying between lines 2 and 3 is sometimes only faintly visible, but sometimes very distinct, particularly in the specimens from Chesapeake Bay. In males, as well as in females, line 3 is sometimes

inclined to a more or less undulated course. In some specimens, I find a very faint, hardly visible, connecting line between lines 2 and 3. Its position is somewhat more toward the dorsal margin of the carapace than the connecting line between 1 and 2.

The above indicates that the different development of the system of lines shows a certain geographical variation, which, however, is not sufficiently pronounced for the establishment of a geographic race, at least not on the basis of the material examined. About 40 young were counted in the marsupium of an adult female.

MATERIAL EXAMINED.—Vineyard Sound, 5 Sep 1881, U.S. Fish. Comm., 4 females (1 adult); 1 male. Woods Hole, Mass., 21 Aug 1881, U.S. Fish. Comm., 3 females. Woods Hole, Mass., evening, surface, 2 May 1888, U.S. Fish. Comm., 1 male. Woods Hole, Mass., surface, evening, 2 May 1888, V. N. Edwards, U.S. Fish. Comm., 3 females (1 adult); 2 males (1 adult). Woods Hole, Mass., evening, 8 Jul 1901, 4 days of W wind, S. J. Holmes, 1 female, 1 juvenile. Narragansett Bay, R.I., 9.5 fms, 23 Aug 1880, *Fish Hawk* Sta 818, 1 female. Newport, R.I., Jul 1894, S. D. Judd, 1 female. Amityville, Long Island, N.Y., 6 Jul 1938, H. N. Townes, 45 females and males (1 adult female and 1 adult male).

LOCALITIES IN CHESAPEAKE BAY OF THE STEAMER FISH HAWK.—Sta 8347*, 37°54'03"N, 76°06'70"W, 24 Oct 1915, 1 female, 1 adult male. Sta 8351, 38°09'20"N, 76°09'06"W, 25 Oct 1915, from bottom, a number of females and males. Sta 8353, 38°20'25"N, 76°18'15"W, 25 fms, 25 Oct 1915, 1 adult male. Sta 8506*, 37°16'50"N, 76°14'27"W, 5.5 fms, Apr 1916, 1 female. Sta 8610*, 37°52'24"N, 76°04'59"W, 3

fms, 27 Jul 1916, 1 female. Sta 8790, Point to Point Light, W $\frac{7}{8}$ N Holland Bar Light, SE $\frac{1}{2}$ S, 7.27 fms, 6 May 1920, 1 female. Sta 8822*, 23.79 m, 8 Jul 1920, 1 female. Sta 8826*, 45.75 m, 8 Jul 1920, 1 adult male. Sta 8828*, 16.47 m, 9 Jul 1920, 1 adult male. Sta 8829*, 23.79 m, 9 Jul 1920, 9 females and males. Sta 8844*, 8.23 m, 23 Aug 1920, 1 young. Sta 8856*, 7.32 m, 25 Aug 1920, 11 females and males. Sta 8878*, 7.76 m, 19 Oct 1920, 2 females. Sta 8879*, 12.81 m, 19 Oct 1920, 1 female. Sta 8883*, 10.06 m, 20 Oct 1920, 1 male, 1 young. Sta 8884*, 12.81 m, 20 Oct 1920, 1 female. Sta 8887, 12.81 m, 20 Oct 1920, 3 females and males. Sta 8888*, 7.78 m, 20 Oct 1920, 18 females and males. Sta 8889, 14.64 m, 20 Oct 1920, 3 females and males. Sta 8893*, 44.83 m, 21 Oct 1920, 6 females and males. Sta 8896, 22.87 m, 21 Oct 1920, 4 females and males. Sta 8898*, 28.08 m, 4 Dec 1920, 6 females and males. Sta 8899*, 11.44 m, 4 Dec 1920, 1 male. Sta 8900*, 22.87 m, 4 Dec 1920, 1 female. Sta 8909*, 12.81 m, 6 Dec 1920, 1 adult male. Sta 8932*, 18.30 m, 22 Jan 1921, 1 adult female. Sta 8936*, 10.07 m, 23 Jan 1921, 4 males. Sta 8938*, 14.64 m, 23 Jan 1921, 1 female. Sta 8970*, 24 m, 30 Mar 1921, 1 female.

35°21'15"N, 75°23'15"W (off Cape Hatteras), 14 fms, 19 Oct 1884, *Albatross* Sta 2283*, 1 adult female. 34°38'00"N, 76°12'00"W, surface, 19 Oct 1885, *Albatross* Sta 2607, 2 adult males. One mi inside of May R, S.C.*, 17 Jan 1891, *Fish Hawk*, 7 females, 9 males. West end of Skull R, S.C.*, *Fish Hawk*, a number of females and males.

EARLIER RECORDS IN THE REGION.—Casco Bay, Vineyard Sound, surface (Calman, 1912). Woods Hole region, plankton (Fish, 1925).

OTHER LOCALITIES.—Gulf of Mexico (Punta Rassa, Fla, 1 fm, Calcasieu Pass, La, tow, wharf).

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