

CERIANTHARIA, ZOANTHIDEA, CORALLIMORPHARIA, AND ACTINIARIA FROM THE CONTINENTAL SHELF AND SLOPE OFF THE EASTERN COAST OF THE UNITED STATES

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ABSTRACT

Specimens were examined from 95 stations located between lat. 37°49'N, long. 75°25'W and lat. 44°41'N, long. 66°14'W and from depths between 9 and 366 m. The material was collected by the Bureau of Commercial Fisheries, Biological Laboratory, Woods Hole, Mass., in the years 1955-68. The collection, which will be deposited in the Northeast Fisheries Center, National Marine Fisheries Service, Woods Hole, comprises two ceriantharian species, *Cerianthus borealis* and *Ceriantheopsis americanus*; one zoanthid species, *Epizoanthus incrustatus*; one species of *Corallimorpharia*, *Corynactis delawarei* n. sp., and 19 species of Actiniaria, *Edwardsia sulcata*, *Halcampa duodecimcirrata*, *Haloclava producta*, *Peachia parasitica*, *Bolcera tuediae*, *Tealia crassicornis*, *Actinostola callosa*, *Stomphia coccinea*, *Paranthus rapiformis*, *Antholoba perdix*, *Metridium senile fimbriatum*, *Haliplanella luciae*, *Sagartiogeton verrilli*, *Hormathia nodosa*, *Actinauge verrilli*, *Phelliactis americana* n. sp., *Amphianthus nitidus*, *Stephenauge nezilis*, and *Stephenauge* (?) *spongicola*.

The following description of the anthozoan species from the western North Atlantic is based on material collected by the Bureau of Commercial Fisheries, Biological Laboratory, Woods Hole, Mass., during 1955-68. The collection will be deposited in the Northeast Fisheries Center, National Marine Fisheries Service, Woods Hole.

Besides the morphological descriptions of different species, much importance has been attributed to the cnidom of the studied specimens. The sizes of the nematocyst capsules mentioned in the description refer to unexploded capsules.

While the fixation and preserving of the material in Formalin² and alcohol had only slightly affected the sizes of the nematocysts, the measurements of the column, tentacles, pedal disc, and other organs are, naturally, not directly comparable with those in living specimens.

The terminology used in this paper follows that by Stephenson (1935) and Carlgren (1949). The nomenclature of the nematocysts is the classical one, founded by Weill (1934) and amplified by Carlgren (1940a, 1945, 1949).

The sectioned material was stained with Heidenhain's azan or iron hematoxylin-eosin.

All nematocyst measurements are given in microns.

A list of the stations with names of the species collected at each station and with ADP (automatic data processing) codes for latitude and longitude; time, day, month, year, and number of collection; vessel; cruise; station number; gear; water depth; water temperature; and sediment type is on file at the Northeast Fisheries Center, Woods Hole.

DESCRIPTIONS

Ceriantharia Cerianthidae

Cerianthus borealis Verrill 1873

OCCURRENCE.—40°10'N, 71°00'W, 146 m, silty sand, 1 specimen; 41°00'N, 70°48'W, ? m, 1 specimen; 41°50'N, 67°56'W, 51 m, sand, 2 specimens; 42°41'N, 70°05'W, 114 m, gravel, 2 specimens.

GENERAL CHARACTERISTICS.—The specimens were strongly damaged in their proximal parts. The morphology of the distal part of the body as well as the composition of the cnidom and the sizes of the nematocysts were typical of the species (cf. Carlgren 1940a). While the specimens from the two southernmost localities were young (diameter of the distal part of the body 4-8 mm), the other individuals were older, the largest of them being equipped with 150 labial as well as marginal tentacles.

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²Reference to trade names does not imply endorsement by the National Marine Fisheries Service, NOAA.

NEMATOCYSTS (those of the southernmost specimen within parentheses).—*Marginal tentacles*: microbasic *b*-mastigophors $21 \times 3.2-3.8 - 26 \times 3.8, 36 \times 4.4 - 41 \times 4.9, 54.5 \times 9.2 - 61 \times 7.1$ ($25.3 \times 3.8 - 28.3 \times 4.4$); atrichs $33 \times 4.4 - 36 \times 5.5$ ($9.8 \times 1.6 - 27.5 \times 2.7$); spirocysts $20 \times 3.3 - 56 \times 6.5$ ($22 \times 3.8 - 28 \times 3.8-4.9$). *Labial tentacles*: microbasic *b*-mastigophors (axial filament short and thin, less than half the length of the capsule) $37 \times 3.8-4.4 - 45 \times 5.5$ (ca. 18.5×2.7); microbasic *b*-mastigophors (axial filament = about half the length of the capsule) $20.7-35.4 \times 3.8$ ($19.1 \times 3.3 - 30.5 \times 4.9$); microbasic *b*-mastigophors (axial filament tall and coarse; more than half the length of the capsule) $57 \times 8.3 - 63.7 \times 7.1$ ($23.4-30 \times 4.9-6$); atrichs (not common) $55 \times 9.8 - 63.7 \times 28.3$ (ca. 18×3.3); spirocysts $18 \times 3.3 - 54 \times 6$ ($14.7-16.8 \times 2.7-3.3$) μm . Holotrichs were very rare (in the distal part of the column = $22.3 \times 14.7 - 43.6 \times 17.4$, and in the telocraspedon = $61 \times 13.6 \mu\text{m}$).

Ceriantheopsis americanus (Verrill 1864)

OCCURRENCE.— $42^{\circ}04'N$, $67^{\circ}30'W$, 40 m, gravelly sand, 1 specimen; $42^{\circ}25'N$, $70^{\circ}56'W$, 13 m, 1 specimen.

GENERAL CHARACTERISTICS.—The proximal parts of the two studied specimens were missing. The individuals were young; the only specimen, being preserved with a 12-mm-long column part, had a diameter of 6 mm. The marginal tentacles were equipped with stout basal parts and acute apices. The labial tentacles were about 70 (69 in one specimen).

NEMATOCYSTS.—*Column* (distal part): microbasic *b*-mastigophors (not common) $19.6 \times 3.8 - 32.7 \times 5.5$; atrichs (very common) $26 \times 6.5 - 50 \times 10.9-16.4$. *Marginal tentacles*: microbasic *b*-mastigophors $16.3 \times 3.8-4.4 - 19 \times 4.9$; atrichs (?) ca. $12 \times 2.7, 8.7-12.5 \times 4.9$; spirocysts $12 \times 2.7 - 27.3 \times 4.9$. *Labial tentacles*: microbasic *b*-mastigophors $16.3 \times 3.8 - 32.7 \times 6.5$; spirocysts $13.6 \times 2.7 - 27.3 \times 4.9$. *Actinopharynx*: microbasic *b*-mastigophors (axial filament more than half the length of the capsule) $21 \times 4.9 - 32 \times 6$; microbasic *b*-mastigophors (axial filament less than half the length of the capsule) $13.6 \times 2.7 - 18 \times 3.3, 20.7 \times 3.8 - 23 \times 4.4$. *Filaments* (orthocraspedon):

microbasic *b*-mastigophors $19-21 \times 3.3, 26 \times 5.4 - 33 \times 6.5$; spirocysts (very rare) ca. $21 \times 3.8 \mu\text{m}$.

Zoanthidea Epizoanthidae

Epizoanthus incrustatus Düben and Koren 1847

OCCURRENCE.— $40^{\circ}03'N$, $71^{\circ}16'W$, 183 m, 4 specimens; $42^{\circ}10'N$, $65^{\circ}37'W$, 238 m, two colonies with 10 and 19 specimens respectively, and one solitary specimen, on a shell fragment.

GENERAL CHARACTERISTICS.—The color of the column and the coenenchyme is greyish brown; both are strongly encrusted with sand grains. The polyps were in the contracted state about 5 mm tall, with the column diameter about 4 mm. Most of the 17 capitular ridges as well as the insertions of the 36 mesenteries were indistinct (because it is heavily encrusted with sand). The tentacles numbered about 36.

NEMATOCYSTS.—*Column*: holotrichs $22 \times 7 - 24 \times 8.2$; spirocysts $22 \times 4.4 - 31 \times 5.4$. *Tentacles*: microbasic *p*-mastigophors $22-33 \times 3.3$ (35×6); microbasic *b*(?)-mastigophors $22-23.4 \times 4.4$; holotrichs $22-24 \times 7.6-8.2$ (common), $34 \times 15.3 - 40 \times 17.4$ (not common); spirocysts (very common) $10 \times 3.8 - 32 \times 4.9$. *Actinopharynx*: microbasic *p*-mastigophors (not common) ca. 22×6 ; holotrichs $21-25 \times 7.6, 38 \times 14.2 - 41 \times 14.7$. *Filaments*: microbasic *p*-mastigophors $20 \times 5.4 - 28 \times 6.5$; microbasic *b*(?)-mastigophors $11 \times 4.9 - 21 \times 6$; holotrichs $23 \times 7.6 - 26 \times 8.3 \mu\text{m}$.

Corallimorpharia Corallimorphidae

Corynactis delawarei n. sp.

HOLOTYPE.—Deposited as a series of sections in the Zoological Institute, Uppsala. Syntypes deposited in the U.S. National Museum, catalog number USNM 54322. Thirty-two specimens aggregated on a tube fragment of an onuphid polychaete, collected by the vessel *Delaware* from the type-locality on 14 June 1962, with a 1-m Naturalist dredge, in station number 9.

TYPE-LOCALITY.— $39^{\circ}56'N$, $69^{\circ}45'W$, 201 m,

sandy bottom, on a tube fragment of an onuphid polychaete.

DIAGNOSIS.—Column rather firm, smooth, 15 mm tall, bright red (sometimes whitish) to reddish brown in color. Tentacles rather short, with well-limited acrospheres; two or three per endocoele, the total number being 90. Sphincter long, entodermal to ento-mesogloal. Maximum number of mesenteries 60. At least six pairs of mesenteries perfect. Retractors diffuse. Cnidom: *column*—holotrichs and spirocysts; *tentacles* (acrospheres)—holotrichs and microbasic *b*- and *p*-mastigophors; *tentacles* (peduncles)—microbasic *b*- and *p*-mastigophors, atrichs (?), and spirocysts; *actinopharynx*—holotrichs, atrichs, microbasic *p*-mastigophors, and spirocysts; *filaments*—holotrichs, microbasic *p*-mastigophors, atrichs (?), and spirocysts.

GENERAL CHARACTERISTICS.—The column is smooth and rather firm. In the contracted state there are distally a number of transverse as well as a few longitudinal furrows. The shape of the column is proximally dependent on the shape of the substrate. The color of the column and the pedal disc is bright red to reddish brown. (There are also, however, some whitish individuals in the collection, with red mesenterial insertions shimmering through the ectoderm.) The longitudinal muscle sheet of the ectoderm forms a thin, but distinct layer in the column. The tentacles are rather short, with cylindrical peduncles and well-limited, white acrospheres. The entodermal as well as the ectodermal muscle sheets of the peduncles are well developed. The inner tentacles are shorter than the outer ones; the exocoelic tentacles are the largest. The stichodactylid arrangement of the tentacles is rather indistinct in the often strongly contracted specimens of the collection. There are, however, two or three tentacles per endocoele, the total number being 90. The sphincter is long, entodermal to entomesogloal (Figure 1A), and is only occasionally capable of covering all the tentacles. The actinopharynx is short, in the contracted state, with longitudinal as well as transverse folds. There is only one indistinct siphonoglyph. The retractors of the maximum 60 mesenteries are diffuse, forming an insignificant sheet over the edge of the mesentery (Figure 1B). At least six pairs (including the directive pair) of the mesenteries are perfect. Reproduction is probably asexual by longitudinal fission. The size

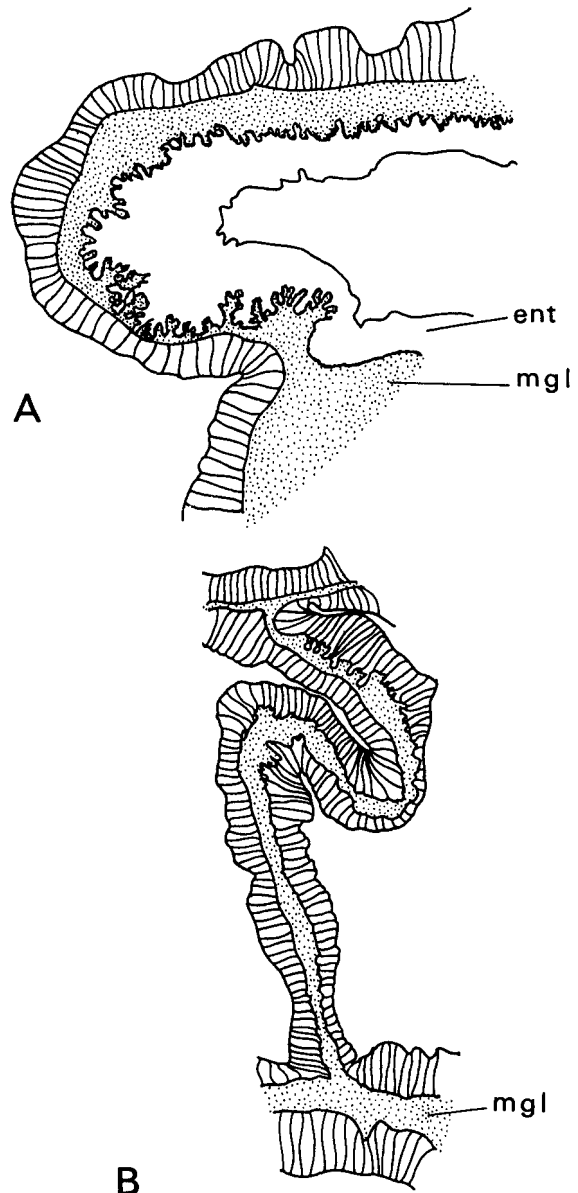


FIGURE 1.—*Corynactis delawarei* n. sp. A. Section through the sphincter region of the column. B. Cross section of a perfect mesentery. ent—entoderm, mgl—mesogloea.

of the normally cylindrical column is of a maximum 15 mm, with a proximal diameter of 8 mm.

NEMATOCYSTS.—*Column*: holotrichs $38 \times 8.7 - 53.4 \times 10.9$; spirocysts $18.5 \times 3.3 - 27 \times 4.4$. *Tentacles* (acrospheres): holotrichs $69 \times 21.8 - 85 \times 10.9-16.4$; hoplotelous microbasic *p*-mastigophors $33 \times 5.5 - 82 \times 8.8-9.7$; hoplotelous

microbasic *b*-mastigophors 31-34 × 4.4-4.9; 69-72 × 5.5 *Tentacles* (peduncles): microbasic *b*-mastigophors 19-24 × 3.8-4.9; microbasic *p*-mastigophors (very rare) ca. 36 × 7.6; atrichs (?) ca. 15 × 5.5; spirocysts 19 × 3.8 - 38 × 5.5. *Actinopharynx*: holotrichs 28 × 5.5 - 46 × 12; atrichs (rare) ca. 12 × 4.9; microbasic *p*-mastigophors (rare) ca. 22 × 6; spirocysts 17-23 × 3.8-4.4. *Filaments*: holotrichs 37 × 12 - 78 × 32.7; hoplotelous microbasic *p*-mastigophors 24 × 5.5 - 44 × 10.9-12; atrichs (?) 34 × 3.8-35 × 4.4; spirocysts (rare) ca. 31 × 3.8 μm.

The three individuals in the collection having a whitish color of the column (see above) deviate from the combination of the cnidom and the frequency of the nematocysts in some organs. *Tentacles* (acrospheres): holotrichs 49 × 16.4 - 65.4 × 35.4; atrichs (?) 22 × 5.5 - 41 × 10.4; microbasic *p*-mastigophors 19 × 4.9 - 46 × 6.5. *Tentacles* (peduncles): holotrichs ca. 66.5 × 19.6; hoplotelous microbasic *p*-mastigophors 37 × 7.1 - 64 × 8.7; microbasic *b*(?)-mastigophors 61 × 6.5 - 88 × 8.7; spirocysts 23 × 2.7 - 52 × 4.4 μm.

It is probable that the nematocysts characterized as atrichs in the tentacles of the whitish variety actually are holotrichs, the structure of which was made unobservable by the fixing agent. Difficulties in distinguishing between the two nematocyst types has been pointed out by Carlgren (1945) with concern to corallimorpharians.

Until studies on vital material of the whitish color form have been undertaken, which will possibly confirm the presence of atrichs in the acrospheres, I am inclined to consider it as a member of the species *Corynactis delawarei*. [In *Corynactis annulata* (Swedish Museum of Natural History, reference number 1244) collected off Tristan da Cunha, there is, however, a nematocyst equipment in the acrospheres suggestive of that described in the whitish color variety: holotrichs 46 × 12.5 - 60 × 9.3; microbasic *p*-mastigophors (rare) ca. 20 × 4.9; atrichs (?) 19 × 5.4 - 25 × 6.5 μm; microbasic *b*-mastigophors were not found in the specimen studied by me.]

Actiniaria Edwardsiidae

Edwardsia sulcata (Verrill 1864)

OCCURRENCE.—44°00'N, 68°15'W, 110 m, silt-

clay, 6 specimens, collected from three dredges.

GENERAL CHARACTERISTICS.—The physa is well developed. The scapus is divided into longitudinal compartments separated by the mesenterial insertions of the macrocnemes. The color of the scapus is yellowish grey. The nemathybomes are numerous and often closely aggregated (Figure 2A). The periderm is strong, but easily falls off; its color is yellowish brown. The scapulus is provided with high, longitudinally oriented ridges in the strongly contracted material. The maximum length of the scapus and scapulus is 40 mm, whilst the largest diameter is 4 mm. The 16 tentacles are conical, without ridges or nematocyst concentrations. The yellowish-white actinopharynx has one distinct siphonoglyph. The retractors of the eight macrocnemes are circumscribed and more or less reniform (Figure 2B). The parietal muscles are strongly developed with 10-12 partly branched muscle (lamellae on each side of the lamella of the septum (Figure 2C, D). The mesogloea of the mesentery is much thinner in the vicinity of the retractor portion than was described by Carlgren (1931) in *Edwardsia elegans* (Figure 2B).

NEMATOCYSTS.—*Scapus* (nemathybomes): microbasic *b*-mastigophors 90 × 5.4 - 110 × 6, 49 × 3.8 - 71 × 4.4 (the smaller nematocyst type has reached a considerable less degree of specialization than the larger type, the axial filament of which shows great conformity with that in *b*-mastigophors of *Edwardsia longicornis* Carlgren (cf. Carlgren 1940a). *Scapulus*: basitrichs 14 × 1.6 - 16 × 2.2. *Tentacles*: basitrichs 19-26 × 2.2-2.7; spirocysts 10 × 2.7 - 25 × 3.8. *Actinopharynx*: basitrichs 16-26 × 2.2; microbasic *p*-mastigophors (rare) ca. 24 × 4.4. *Filaments*: basitrichs 19 × 2.2 - 24 × 2.7; microbasic *p*-mastigophors (often with somewhat bent capsules; axial filament = one third to half the length of the capsule) 21-33 × 3.8-4.4; microbasic *p*-mastigophors (axial filament remarkably thin, and about three-fourths of the length of the capsule) 23-32 × 4.4-4.8 μm.

There are many morphological similarities between *E. sulcata* and *E. sipunculoides*. The *b*-mastigophors in the nemathybomes of the latter species are, however, always much smaller (in one specimen from the U.S. east coast, studied by me, they were 62 × 4.9 - 72.5 × 5.5, 42-44 × 4.4 μm; cf. also Carlgren 1931).

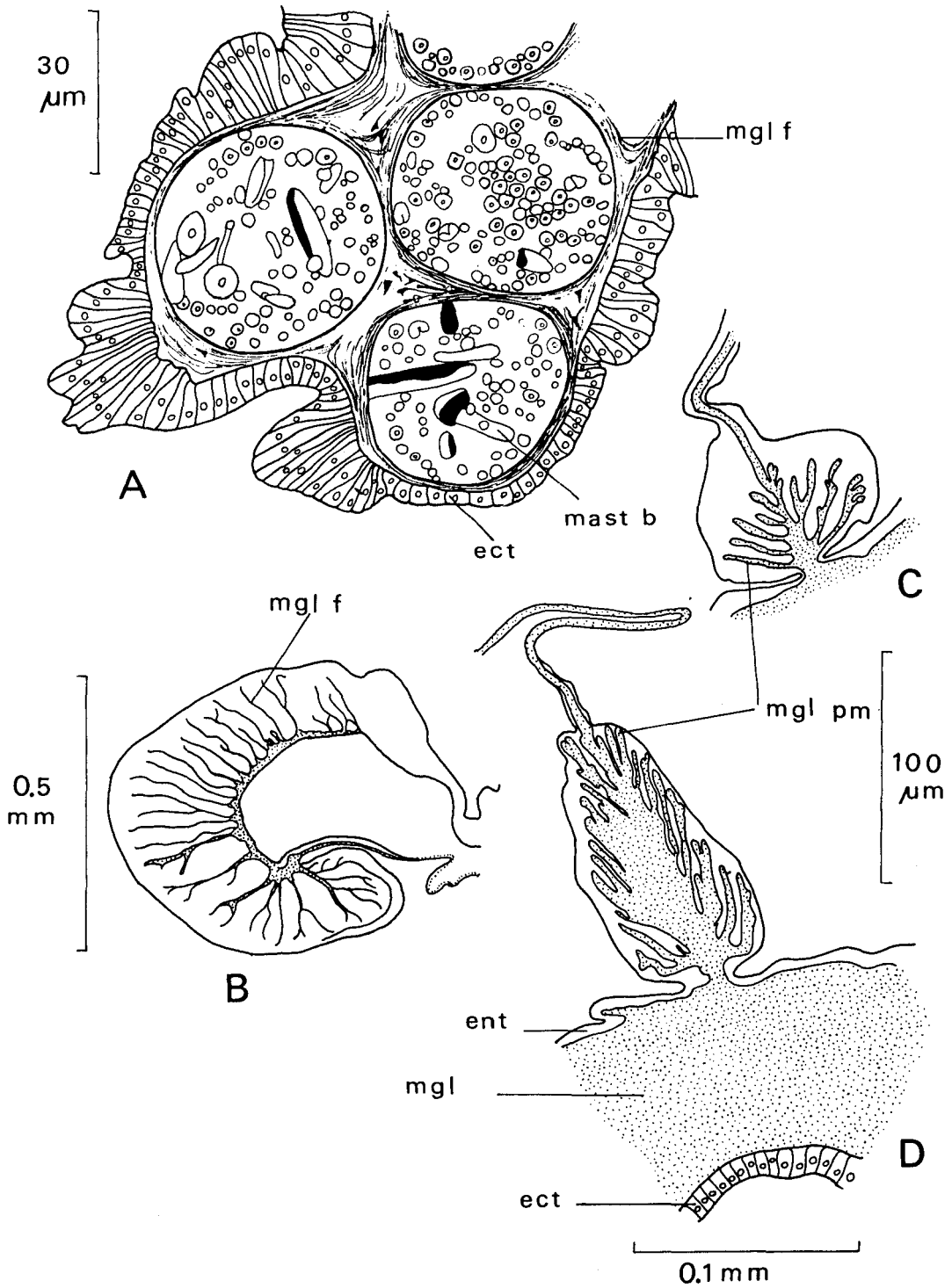


FIGURE 2.—*Edwardsia sulcata*. A. Section through three nemathybomes. B. Cross section through a retractor. C, D. Sections through two parietal muscles. ect—ectoderm, ent—entoderm, mast b—sectioned parts of microbasic b-mastigophors, mgl—mesogloea, mgl f—mesogloal fibril, mgl pm—mesogloal tract of parietal muscle.

Halcampa duodecimcirrata M. Sars 1851

OCCURRENCE.—43°10'N, 70°25'W, 64 m, till, 1 specimen.

GENERAL CHARACTERISTICS.—They agree with earlier descriptions of the species (cf. Carlgren 1893). The reddish scapus is provided with tenaculi and distinct mesenterial insertions shimmering through the ectoderm. The six pairs of macrocnemes (Figure 3A) (including two pairs of directives) have strongly developed, circumscribed, and reniform retractors (Figure 3B). The parietal muscles are provided with a rather small

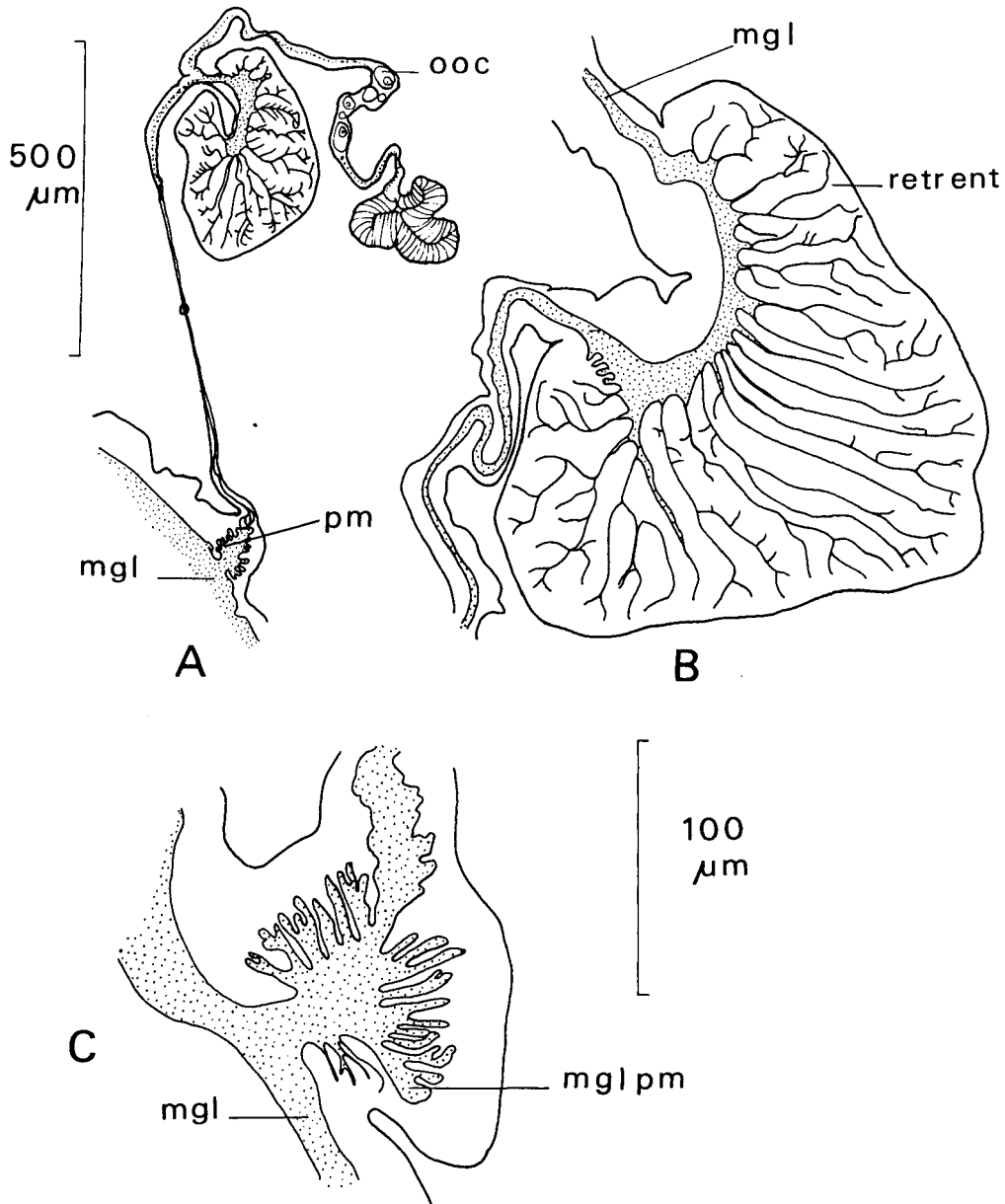


FIGURE 3.—*Halcampa duodecimcirrata*. A. Section through a macrocneme. B. Cross section of a retractor. C. Section through the peripheral part of a mesentery (the ectoderm is omitted in the figure). mgl—mesogloea, mgl pm—mesogloea lamella of parietal muscle, ooc—oocyte, pm—parietal muscle, retrans—entoderm of retractor muscle.

number of muscle lamellae (Figure 3C). The short, conical tentacles were 10 (12?) in number.

NEMATOCYSTS.—*Scapus*: basitrichs (rare) ca. 22×3.3 , spirocysts (rare) ca. 28×3.8 . *Scapulus*: spirocysts $25 \times 3.8 - 49 \times 4.4$; basitrichs were not found in the very damaged scapular ectoderm. *Tentacles*: basitrichs (rare) $11.5 \times 1.6-2.2 - 20 \times 2.7$; spirocysts $14 \times 2.7 - 25 \times 3.3$. *Actinopharynx*: microbasic *p*-mastigophors $24-32 \times 3.5$; spirocysts $17 \times 2.2 - 25 \times 4.9$. *Filaments*: microbasic *p*-mastigophors $22-23 \times 4.4-4.9$; basitrichs (?) $12-13.6 \times 3.8 \mu\text{m}$.

The alleged differences as to the form of the tentacles between *H. duodecimcirrata* and *H. chrysanthellum* would argue against my decision to refer the specimen to the former species. Considering the extensive contraction of the specimen, this characteristic must, however, be regarded as of minor importance. Of greater importance here is the conformity with *H. duodecimcirrata* of the sizes of the nematocysts in different organs (cf. Carlgren 1940a). The number of fertile mesenteries (eight in the studied specimen) is another argument for the individual being placed in *H. duodecimcirrata*.

Haloclavidae

Haloclava producta (Stimpson 1856)

OCCURRENCE.— $39^{\circ}00'N$, $74^{\circ}45'W$, 15 m, sandy bottom, 1 specimen.

GENERAL CHARACTERISTICS.—The column of the strongly contracted and partly damaged specimen is fusiform with the ectoderm in closely lying, transverse folds. The color is grey. The scapus has a few sand grains attached to the ectoderm. The length of the column is 16 mm, with the greatest diameter (at the middle of the body) about 8 mm. The retractors of the protomesenteries are very strong, circumscribed, and reniform (Figure 4A). The four pairs of metamesenteries are weaker than the protomesenteries. The parietal muscles are rather strong (Figure 4B). There is no sphincter. The actinopharynx is rather short with a very deep siphonoglyph. The number of tentacles was impossible to confirm; as there were only mesogloal fragments left of the tentacles, neither the nematocyst types nor their sizes can be treated. The location of the fragments of the tentacles favors the belief that there are 20 tentacles in the living animal.

NEMATOCYSTS.—*Column*: basitrichs $20 \times 2.7 - 24.5 \times 3.3$. *Actinopharynx*: basitrichs $14 \times 2.2 - 17.4 \times 2.7$, $38-57 \times 4.4-4.9$; spirocysts (only one found) 43.1×3.8 . *Filaments*: basitrichs $14 \times 2.7 - 25 \times 3.3$, $70-83 \times 4.4-5.5$, $54.5 \times 7 - 75 \times 6.5-7.1 \mu\text{m}$.

Peachia parasitica (Agassiz 1859)

OCCURRENCE.— $44^{\circ}16'N$, $67^{\circ}38'W$, 91 m, silt-clay, 1 specimen.

GENERAL CHARACTERISTICS.—The column of the specimen is strongly contracted, with the length 24 mm and the largest diameter (at the middle of the body) 15 mm. The proximal diameter of the column is 8 mm. The exact arrangement of the extended lobes of the conchula was not possible to observe in the specimen. There is no sphincter. The only siphonoglyph is thick-walled and of the typical *Peachia* appearance. The number of mesenteries are 20, six pairs being perfect, and supplied with strong, diffuse retractors with rather high muscle lamellae. The four pairs of imperfect mesenteries are equipped with rather small, diffuse retractors and are laterally and ventrolaterally located. The 10 conical tentacles have broad bases.

NEMATOCYSTS.—*Column*: basitrichs $27-34 \times 3.8-4.4$. *Tentacles*: basitrichs $27-39 \times 3.8-4.4$; spirocysts ca. 23×3.3 . *Actinopharynx*: basitrichs $40-46 \times 5.5$; spirocysts $19-23 \times 2.2-2.7$. *Filaments*: basitrichs $27 \times 3.8 - 38 \times 4.4$; basitrichs (?) $39 \times 6 - 45 \times 7.6$; microbasic *p*-mastigophors (rare) ca. $28 \times 3.8 \mu\text{m}$.

The filamental nematocysts named "basitrichs (?)" (above) might be *p*-mastigophors. As I have had no chance of observing the exploded capsules and as the axial filament does not show the typical *p*-mastigophor structure in the unexploded capsules, I am not now inclined to consider these nematocysts, which are probably homologous to the "penicilli-like mastigophors" found by Carlgren (1940b), as microbasic *p*-mastigophors.

Actiniidae

Bolocera tuediae (Johnston 1832)

OCCURRENCE.— $41^{\circ}27'N$, $69^{\circ}02'W$, 146 m, 1 specimen; $41^{\circ}50'N$, $69^{\circ}26'W$, 165 m, 1 specimen; $42^{\circ}15.5'N$, $69^{\circ}59.5'W$, ? m, 1 specimen; $42^{\circ}25'N$,

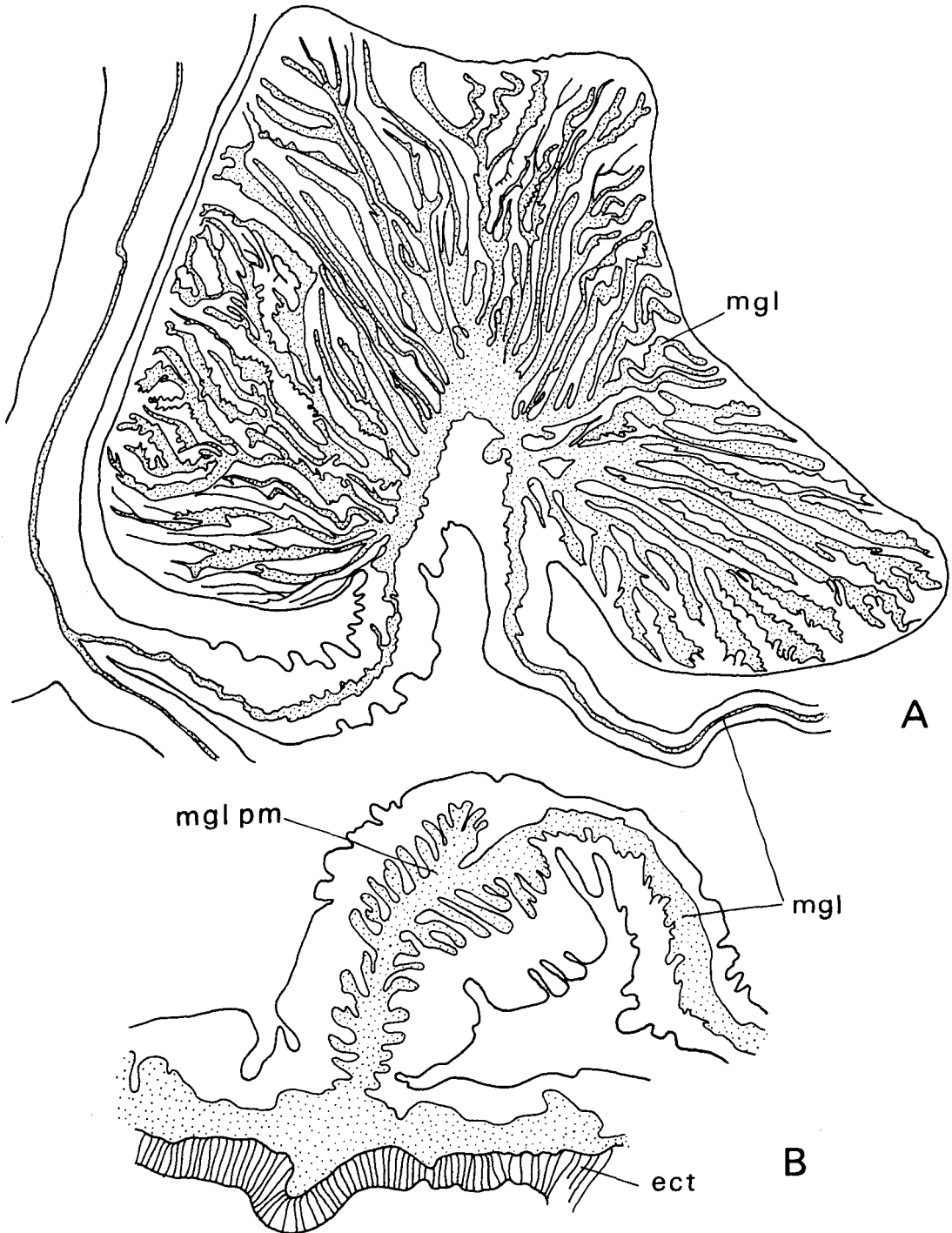


FIGURE 4.—*Haloclava producta*. A. Section through a retractor muscle. B. Section through the peripheral part of a mesentery and adjacent parts of the body wall. ect—ectoderm, mgl—mesogloea, mgl pm—mesogloea tract of parietal muscle.

67°06'W, 366 m, 3 specimens; 42°48'N, 69°39'W, 183 m, 1 specimen; 43°17'N, 70°24'W, 46 m, 1 specimen; 43°19'N, 67°16'W, 201 m, 1 specimen; 43°20'N, 68°45'W, 119 m, 1 specimen.

GENERAL CHARACTERISTICS.—The structure of the specimens agrees with earlier descriptions of the species (cf. Carlgren 1891:242, 1893:50; Stephenson 1935:130; Verrill 1922:G 115).

NEMATOCYSTS.—*Column*: basitrichs $16 \times 2.2 - 21 \times 2.7$, $33 \times 3.3 - 41 \times 3.8$ (-63×5.5). *Tentacles*: basitrichs $21 \times 2.7 - 36.5 \times 3.3-3.8$, $52 \times 3.8 - 87 \times 4.9-6.5$ (most often $60-70 \times 4.5-6$); spirocysts $31-74 \times 3.3-5.5$; *Actinopharynx*: basitrichs $50 \times 4.4 - 79 \times 5.5$; microbasic *p*-mastigophors $23-33 \times 5.5$. *Filaments*: basitrichs $20-22 \times 2.7-3.8$, $50 \times 3.8 - 74 \times 4.4-5.5$; microbasic *p*-mastigophors $19.6 \times 4.9 - 35.4 \times 5.5 \mu\text{m}$.

Tealia crassicornis (Müller 1776)

OCCURRENCE.—41°02'N, 69°00'W, 80 m, gravelly sand, 1 specimen; 41°13'N, 68°58'W, 102 m, gravelly sand, 3 specimens; 41°33'N, 69°47'W, 27 m, gravelly sand, 1 specimen; 41°50'N, 67°56'W, 51 m, sand, 3 specimens; 42°11'N, 65°56'W, 229 m, gravel, 1 specimen; 42°25'N, 66°05'W, 249 m, gravel, 1 specimen; 42°26'N, 67°02'W, 366 m, 2 specimens; 43°11'N, 66°31'W, 92 m, gravel, 3 specimens; 43°11'N, 67°05'W, 181 m, 1 specimen; 43°12'N, 65°33'W, 73 m, shelly sand, 1 specimen; 43°33'N, 69°35'W, 159 m, 1 specimen; 43°37'N, 68°12'W, 198 m, 1 specimen; 43°49'N, 68°31'W, 95 m, 2 specimens; 43°52'N, 66°42'W, 102 m, 2 specimens; 43°53'N, 68°38'W, 91 m, 1 specimen; 44°26'N, 67°28'W, 73 m, till, 1 specimen; 44°30'N, 66°30'W, 157 m, 1 specimen.

GENERAL CHARACTERISTICS.—The morphology of the studied specimens agrees with earlier descriptions of the species (cf. Verrill 1867; Carlgren 1893). The pedal disc is wide, circular (diameter = 16-114 mm) or oval ($16 \times 22 - 47 \times 63$ mm). The rather firm column is in the contracted state, cylindrical to semispherical, 14-38 mm high. In those cases where the column is provided with verrucae, these are chiefly spread over the distal parts of the column. In some specimens there is a distinct annulus with 48 marginal verrucae. The number of mesenteries is somewhat larger proximally than distally (in a specimen with 68 mesenteries only four were limited to the

proximal part of the column). The two outer of the four to five mesenterial cycles are often not quite completed. With the exception of the youngest, proximally located cycle, and the 10 oldest perfect pairs, the mesenteries are fertile. In the specimens coming from 43°11'N, 66°31'W, the entodermal and circumscribed sphincter is obviously asymmetric, with one half of it considerably more strongly developed than the other.

Many of the specimens in the collection are viviparous with larvae and young stages equipped with tentacles lying in the proximal part of the gastrocoele.

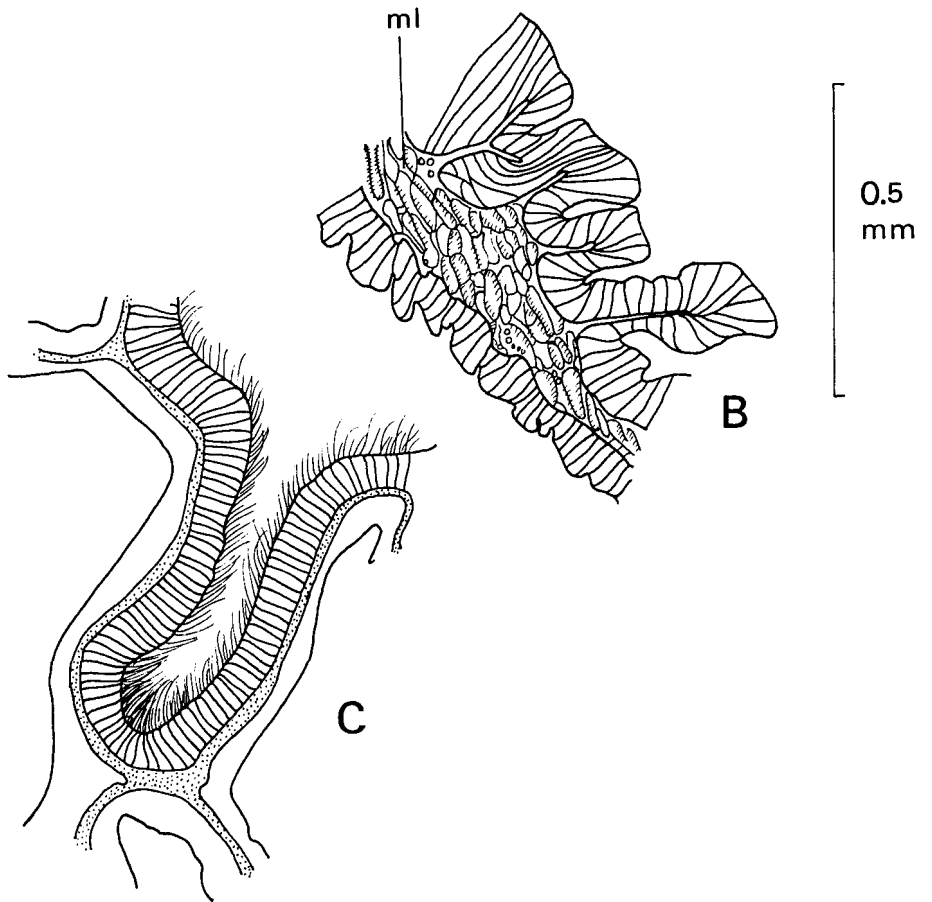
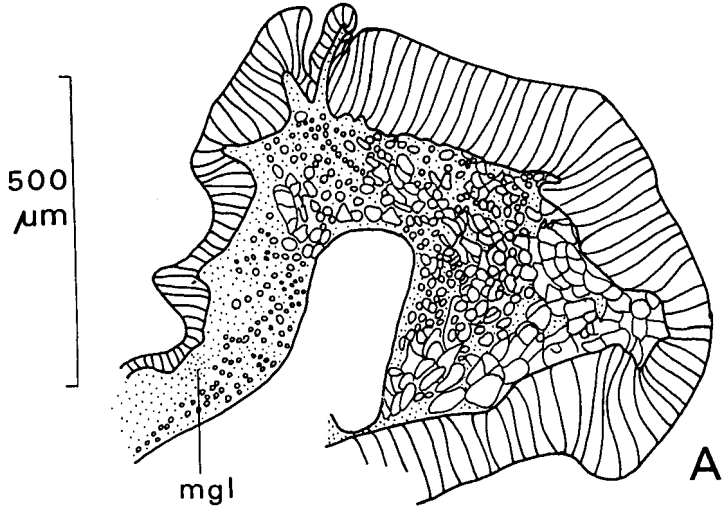
NEMATOCYSTS.—*Column*: basitrichs $5.5 \times 1.1 - 9 \times 2.7$, $18 \times 2.2 - 27 \times 2.7-3.3$; in larger specimens found in the deeper localities: $12.5-14 \times 2.7$, $23-37 \times 3.8$, $79 \times 5.5 - 83.4 \times 8.2$; spirocysts $22 \times 2.7 - 69 \times 4.4$. *Tentacles*: basitrichs $10-14 \times 2.2-2.7$, $20 \times 1.6 - 36.5 \times 2.7-3.8$; spirocysts $17.4 \times 2.7 - 71 \times 4.9-5.5$. *Actinopharynx*: basitrichs $49 \times 5.5-6 - 91 \times 6-7.1$, $12 \times 1.6 - 26 \times 2.7$; microbasic *p*-mastigophors $23 \times 4.9 - 30 \times 5.5-6.5$; spirocysts (rare) $28-41 \times 3.8$. *Filaments*: basitrichs $11 \times 2.2 - 34 \times 2.7$, $49 \times 5.5-6 - 68 \times 7.1$; microbasic *p*-mastigophors $20 \times 4.9 - 41 \times 6.5 \mu\text{m}$.

Actinostolidae

Actinostola callosa (Verrill 1882)

OCCURRENCE.—42°10'N, 69°57'W, 142 m, 1 specimen; 42°11'N, 68°16'W, 198 m, 1 specimen; 42°21'N, 68°02'W, 190 m, 3 specimens; 42°26'N, 66°35'W, 302 m, 1 specimen; 42°27'N, 66°08'W, 247 m, gravel, 1 specimen; 42°51'N, 65°12'W, 159 m, 1 specimen; 42°54'N, 69°35'W, 159 m, 2 specimens; 43°21'N, 69°57'W, 155 m, 1 specimen; 44°41'N, 66°14'W, 134 m, till, 1 specimen.

GENERAL CHARACTERISTICS.—The morphology of this species has been carefully described by Carlgren (1893:71). The length of the column varies between 13 and 196 mm, and the diameter of the pedal disc is 13-48 mm. The tentacles are arranged in six cycles ($6+6+12+24+48+96$). The mesenteries (in five or six cycles) are arranged according to the *Actinostola* rule. Twenty-four pairs of mesenteries are perfect, those of the two inner cycles (including the two directive pairs) being sterile, as well as those of the outer cycle.



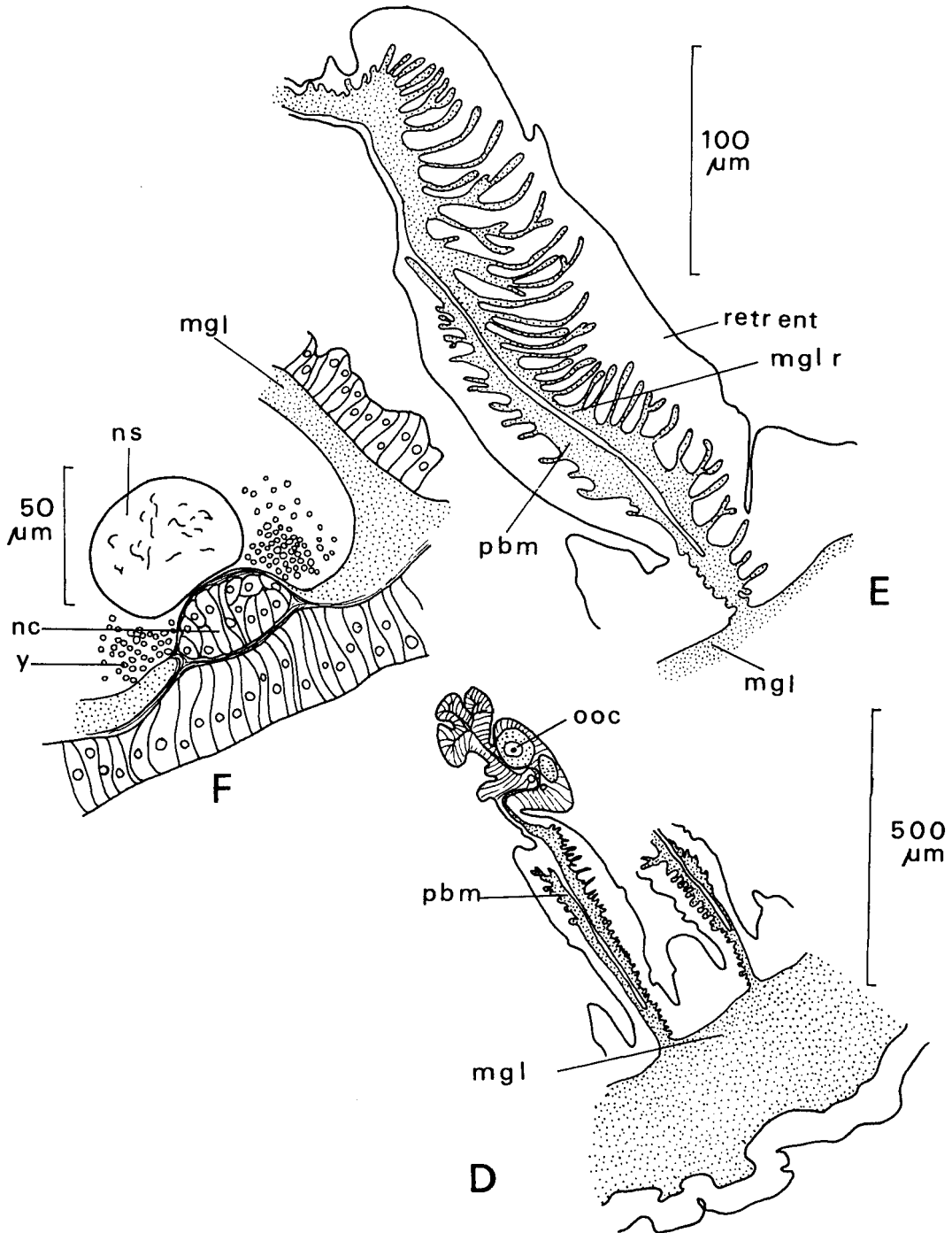


FIGURE 5.—*Stomphia coccinea*. A. Cross section of the sphincter in a young specimen. B. Section through part of a tentacle showing the arrangement of the muscle fibrils (ml) in a young specimen. C. Section through a siphonoglyph. D. Section through a mesentery in a young specimen. E. Section through a retractor and parietobasilar muscle of a young specimen. F. Section of an oocyte and nurse cells. mgl—mesogloea, mgl r—mesogloea of retractor, nc—nurse cell, ns—nucleus, ooc—oocyte, pbm—parietobasilar muscle, retr ent—entoderm of retractor muscle, y—yolk.

NEMATOCYSTS.—*Column*: basitrichs $19 \times 2.7 - 35.4 \times 2.7-3.3$; spirocysts $24.5 \times 3.3 - 57 \times 5.5-6$. *Tentacles*: basitrichs $26 \times 2.2 - 41 \times 2.7$ (most often $30-35 \times 2.7$); microbasal *b*-mastigophors (in the apex) $42.5 \times 7.1 - 56 \times 7.1-8.2$; spirocysts $27 \times 2.7 - 64 \times 7.6$. *Actinopharynx*: basitrichs $21-32 \times 2.7$; microbasal *p*-mastigophors $22-28 \times 4.9$. *Filaments*: microbasal *p*-mastigophors $21-28 \times 4.4, 20-29 \times 5.5 \mu\text{m}$. The cnidom in specimens from the eastern North Atlantic was described by Carlgren (1940a).

Stomphia coccinea (Müller 1776)

OCCURRENCE.— $41^{\circ}20'N, 69^{\circ}22'W, 49 \text{ m}, 3$ specimens; $41^{\circ}37'N, 66^{\circ}16'W, 91 \text{ m}, \text{ sand}, 4$ specimens; $42^{\circ}18'N, 65^{\circ}28'W, 113 \text{ m}, \text{ sandy gravel}, 1$ specimen; $42^{\circ}32'N, 65^{\circ}39'W, 95 \text{ m}, \text{ gravel}, 1$ specimen; $42^{\circ}40'N, 65^{\circ}56'W, 91 \text{ m}, \text{ sandy gravel}, 4$ specimens; $43^{\circ}10'N, 66^{\circ}04'W, 92 \text{ m}, \text{ gravel}, 1$ specimen; $43^{\circ}21'N, 66^{\circ}22'W, 60 \text{ m}, \text{ shelly gravel}, 2$ specimens; $44^{\circ}12'N, 66^{\circ}36'W, 91 \text{ m}, \text{ gravel}, 1$ specimen; $44^{\circ}16'N, 66^{\circ}28'W, 201 \text{ m}, \text{ gravel}, 1$ specimen; $44^{\circ}24'N, 67^{\circ}14'W, 90 \text{ m}, \text{ till}, 1$ specimen; $44^{\circ}25'N, 66^{\circ}25'W, 188 \text{ m}, \text{ till}, 3$ specimens; $44^{\circ}26'N, 66^{\circ}19'W, 174 \text{ m}, \text{ till}, 1$ specimen.

GENERAL CHARACTERISTICS.—The morphology of the studied specimens agrees with earlier descriptions made of the species (e.g., Carlgren 1893). The height of the contracted column is 3-28 mm. The pedal disc is wide with a distinct limbus. The relations between the length of the column and the diameter of the pedal disc is in the contracted state $14/23-7/17$. The mesogloal, diffuse sphincter is distally very strong (Figure 5A). The tentacles, conical and longitudinally furrowed with an apical pore, are arranged in four (sometimes five ?) cycles. The tentacular muscles are mesogloal (Figure 5B). The number of mesenteries varies (in one of the larger specimens it is equal to 120 in the proximal part of the body). Most often (with the exception of the southernmost specimens) there are 16 pairs of perfect and sterile mesenteries. (In the specimens from $41^{\circ}20'N$, the number of perfect and sterile mesenteries is approximately 24-29, with an organization reminiscent of that in, e.g., *Parasicyonis*.) The long, folded actinopharynx is equipped with two siphonoglyphs (Figure 5C). All the imperfect mesenteries excluding those of the last cycle are often fertile (Figure 5D), the oocytes being provided with well-developed nurse cells

(Figure 5F) during oogenesis. The parietobasilar muscles form even in very young individuals their own lobes high up in the column (Figure 5D, E).

NEMATOCYSTS.—*Column*: basitrichs $12-20 \times 2.2-2.7, 30.5-38 \times 4.4-5.5$. *Tentacles*: basitrichs $14 \times 2.2 - 24.5 \times 3.3$; microbasal *b*-mastigophors ($30.5 \times 6.5 -$) $39-53 \times 6.5-7.1$; spirocysts $19 \times 3.3 - 50 \times 4.4-5.5$ (in the young specimen from $44^{\circ}24'N$, the column of which was 3 mm high and the number of tentacles equal to 36, there was a somewhat different size for the tentacular nematocysts: basitrichs $15 \times 2.2 - 22 \times 2.7$, microbasal *b*-mastigophors $28 \times 5.3 - 33 \times 7.1$, spirocysts $14-22 \times 2.7-3.8 \mu\text{m}$). *Actinopharynx*: basitrichs $14 \times 2.2 - 23 \times 3.8$; microbasal *p*-mastigophors $18 \times 3.3 - 27 \times 4.9$; spirocysts $22 \times 3.8 - 57 \times 4.9-5.5$. *Filaments*: basitrichs $9.5 \times 2.2 - 22 \times 2.7$; microbasal *p*-mastigophors ($17 \times 3.8 -$) $19 \times 4.9 - 29 \times 5.5, 24 \times 3.3 - 29 \times 3.3-4.4 \mu\text{m}$.

My placing of the three specimens from the southernmost station within *S. coccinea* may be discussed. In some morphological characteristics, they resemble *Anthosactis* as well as *Parasicyonis*; apart from the development of the perfect mesenteries, the morphological differences between these, obviously young individuals, and the adult, typical *S. coccinea* are, however, not so comprehensive as to require description of a new subspecies.

Paranthus rapiformis (Lesueur 1817)

OCCURRENCE.— $37^{\circ}49'N, 75^{\circ}25'W, 12 \text{ m}, \text{ sand-silt-clay}, 1$ specimen.

GENERAL CHARACTERISTICS.—The column is smooth, much wider distally than proximally, and with a reddish brown color. The length of the column is 26 mm, with the proximal diameter 8 mm; the distal is 23 mm. The numerous tentacles are arranged in five (six ?) cycles. They are imperfectly retractile and acuminate. The sphincter is mesogloal, of diffuse type, and weak. The yellowish, longitudinally folded actinopharynx is provided with two siphonoglyphs. The mesenteries are proximally fewer than distally, where they are arranged in four cycles ($6+6+12+24$ pairs). Twelve pairs of mesenteries (including the two pairs of directives) are perfect. The mesenterial retractors are of diffuse-restricted type. The parietobasilar muscles are only

slightly developed. The pedal disc is well defined and excavated. The individual studied was sterile.

NEMATOCYSTS.—*Column* (distally): basitrichs 17×1.6 ; microbasic *p*-mastigophors (?) ca. 16×3.3 ; spirocysts $33-60 \times 3.8$. *Column* (proximally): basitrichs $21-26 \times 2.2$, $16 \times 2.7 - 26 \times 3.8$; microbasic *p*-mastigophors (rare) ca. 33×5.5 ; spirocysts $14 \times 2.7 - 53 \times 3.3$. *Tentacles*: basitrichs $22 \times 2.2 - 24.5 \times 2.7$; microbasic *p*-mastigophors $22 \times 3.8 - 27 \times 4.4$; spirocysts $15 \times 2.2 - 26 \times 3.3$. *Actinopharynx*: basitrichs $25 \times 2.7 - 30 \times 3.3$; microbasic *p*-mastigophors $18.5 \times 4.9 - 24.5 \times 6$; microbasic *p*(?)-mastigophors $27 \times 4.9 - 30 \times 5.5$. *Filaments*: basitrichs $22 \times 3.3 - 32 \times 3.8-4.9$; microbasic *p*-mastigophors (axial filament = about half the length of the capsule) $20 \times 4.4 - 26 \times 5.4$; microbasic *p*-mastigophors (axial filament = almost the length of the capsule) $12.5 \times 4.4 - 15 \times 4.9$; spirocysts $49-57 \times 3.8-5.5 \mu\text{m}$.

The most obvious difference between the above-mentioned specimen and the earlier description of the species (cf. Carlgren and Hedgpeth 1952:159), besides the different color of the column and the occurrence of 12 pairs of perfect mesenteries, is the size of the filamental basitrichs. While the filaments in material from Port Aransas and Port Isabel are provided with basitrichs ranging in size from 12.7 to $14 \times 2.2 \mu\text{m}$, the above-described specimen has much larger nematocysts of the corresponding type: $22 \times 3.3 - 32 \times 4.9 \mu\text{m}$. The same tendency can be seen also with regards to the basitrichs of the column.

Antholoba perdis (Verrill 1882)

OCCURRENCE.— $40^{\circ}06'N$, $71^{\circ}00'W$, 179 m, 1 specimen; $40^{\circ}10'N$, $70^{\circ}00'W$, 114 m, silty sand, 1 specimen; $40^{\circ}10'N$, $71^{\circ}15'W$, 110 m, silty sand, 1 specimen.

GENERAL CHARACTERISTICS.—The column is smooth and, in the material studied, transversely wrinkled. The smaller specimens are olive-shaped; the larger specimen is cup-shaped with an expanded distal part. The color is greyish, with scattered, irregularly shaped, brownish spots. The oral disc of the larger specimen is greyish yellow with faintly marked, brown, and radially directed streaks. An outer lip-shaped fold is here provided on its outside with a zone, reddish brown in color. Two parallel ribbons of the same color

divide this fold and the central part of the oral disc into two halves. The excavated pedal disc is faintly set off from the column. The length of the column is 12-21 mm, and its diameter is 16-44 mm. The pedal disc is maximally 23 mm in diameter. The tentacles are numerous (in the largest specimen about 600), short and conical, greyish in color. They are longitudinally furrowed and provided with an apical pore; in the smaller specimens they are sometimes equipped with small, papillar processes. The tentacles are arranged in five cycles, those of the outer cycles being much smaller than the inner ones (even in the largest specimen the outer tentacles are papillary). The fifth cycle of mesenteries is not complete. The number of perfect mesenteries in the larger specimen is 48. There are more mesenteries distally than proximally. The sphincter is alveolar (Figure 6). The retractors are diffuse and extended in length. The entoderm of the tentacles and the oral disc is reddish brown. All the specimens were sterile.

NEMATOCYSTS.—*Column*: basitrichs $20-28 \times 2.7-3.3$. *Tentacles*: basitrichs $15-16 \times 1.6-2.2$, $23 \times 2.2 - 36 \times 3.3-3.8$; spirocysts (very numerous)

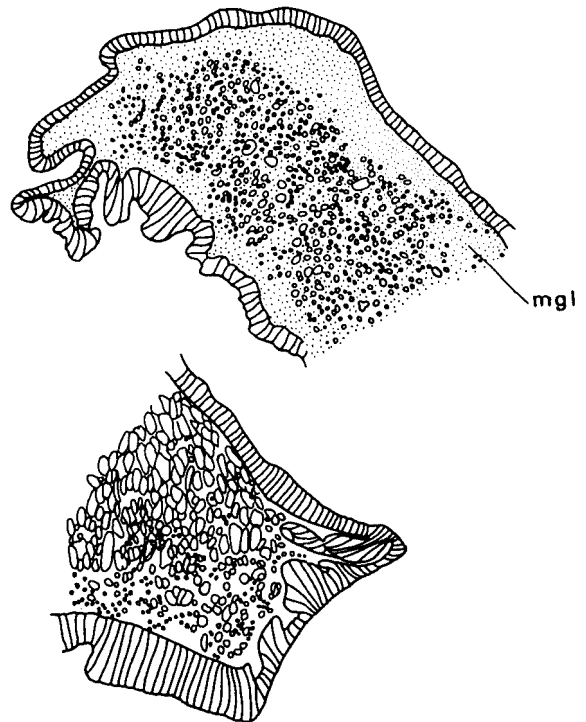


FIGURE 6.—*Antholoba perdis*. Sections through the distal parts of the sphincter in young specimens. mgl—mesogloal layer.

19 × 3.3 - 46 × 3.8. *Actinopharynx*: basitrichs 14 × 1.6 - 16 × 2.2 (- 27 × 2.7); microbasal *p*-mastigophors 15 × 3.3 - 31 × 4.9. *Filaments*: basitrichs 14 × 1.6 - 28 × 2.7; microbasal *p*-mastigophors (very numerous) 14 × 4.4 - 31 × 4.9-5.5 μm.

Metridiidae

Metridium senile fimbriatum (Verrill 1865)

OCCURRENCE.—40°35'N, 67°59'W, 84 m, gravel, 5 specimens; 40°40'N, 68°01'W, 84 m, sand, 1 specimen; 40°51'N, 68°55'W, 66 m, sand, 4 specimens; 41°04'N, 71°24'W, 42 m, 1 specimen; 42°00'N, 69°56'W, 48 m, gravelly sand, 1 specimen; 42°15'N, 70°12'W, 26 m, 3 specimens; 42°22'N, 70°18'W, 33 m, 2 specimens; 42°42'N, 65°18'W, 91 m, 1 specimen; 42°42'N, 65°40'W, 90 m, 3 specimens; 42°47'N, 66°25'W, 99 m, 1 specimen; 42°54'N, 66°14'W, 166 m, 2 specimens; 43°07'N, 65°57'W, 97 m, 1 specimen; 43°17'N, 65°35'W, 40 m, gravel, 1 specimen; 43°36'N, 68°50'W, 115 m, 2 specimens; 43°43'N, 66°30'W, 84 m, 1 specimen; 43°44'N, 66°28'W, 75 m, 1 specimen.

GENERAL CHARACTERISTICS.—They agree with earlier descriptions of the species (cf., e.g., Carlgren 1893:102). The height of the column varies between 5 and 35 mm, and the diameter of the pedal disc is 7-47 mm. The color is yellow to yellowish brown in the preserved state. The specimens from 40°51'N were all very young, the youngest being equipped with only 12 tentacles.

NEMATOCYSTS (sizes of the above-mentioned, small specimens in parentheses).—*Column*: basitrichs 15 × 2.7 - 19 × 3.3 (10 × 1.6 - 12 × 2.2); microbasal amastigophors 26-28 × 3.8-4.4 (16 × 3.3 - 21 × 3.8-4.4); microbasal *p*(?)-mastigophors 23-31 × 3.8-4.4; spirocysts 22-27 × 3.3-3.8. *Tentacles*: basitrichs (11.5 × 1.6 -) 18 × 2.2 - 28 × 2.7-3.3 (17-21 × 2.7-3.3); microbasal amastigophors 13 × 2.7 - 15 × 3.3; spirocysts 21 × 3.3 - 31 × 4.9 (11 × 2.7 - 17 × 4.4). *Actinopharynx*: basitrichs 26-39 × 3.8 (17 × 2.2 - 27 × 2.7-3.3); microbasal *p*-mastigophors 22-23 × 3.8 (17-23 × 3.3-3.8); microbasal amastigophors (rare) ca. 31 × 4.4. *Filaments*: basitrichs (very rare) ca. 14 × 3.8 (12 × 2.7); microbasal *p*-mastigophors 16-25 × 4.4, 24-32 × 3.8-4.4 (12-14 × 4.4, 21-23 × 3.8-4.4). *Acontia*: microbasal *b*-mastigophors 51-67 × 3.2-4.9 (40 ×

3.8 - 57 × 4.4); microbasal amastigophors (28 × 3.8 -) 49-64 × 4.9-5.5 (36 × 4.4 - 55 × 5.5) μm.

Aiptasiomorphidae

Haliplanella luciae (Verrill 1898)

OCCURRENCE.—39°00'N, 76°22'W, 16 m, silty clay, 10 specimens.

GENERAL CHARACTERISTICS.—They agree with earlier descriptions (Stephenson 1925:888, 1935:197; Field 1949:10). The sizes of the nematocyst capsules deviate, however, in some respects from what has been described earlier (cf. Carlgren 1940a).

NEMATOCYSTS.—*Column*: basitrichs 10-11 × 1.6, 19 × 3.3 - 23 × 3.8; microbasal *p*- or amastigophors 19 × 3.8 - 21 × 4.4. *Tentacles*: basitrichs 15 × 1.6 - 20 × 2.2; microbasal *p*-mastigophors 18 × 3.8 - 25 × 4.9; spirocysts ca. 16 × 4.4-4.9. *Actinopharynx*: basitrichs (?) (the capsules are slightly bent) 30-32 × 2.7-3.3; microbasal *p*-mastigophors 23-27 × 3.8; microbasal *p*- or amastigophors 21-23 × 2.7-3.3. *Filaments*: basitrichs 14 × 1.6 - 19 × 2.2; microbasal *p*-mastigophors 22-28 × 3.8; microbasal a(?) -mastigophors 17 × 3.3 - 28 × 3.8; spirocysts 12.5 × 2.7 - 17 × 5.4. *Acontia*: basitrichs 15-18 × 1.6; microbasal *p*-mastigophors 43 × 5.5 - 56 × 6.5 μm. It was not possible to determine if there are any microbasal amastigophors present in the acontia, as all the mastigophor capsules were unexploded.

The only difference in the cnidom of the above-mentioned specimens and earlier descriptions of the species (cf. Carlgren 1945; Field 1949) besides the unsettled presence of microbasal amastigophors in the acontia (cf. Hand 1955) are the occurrence in this sample, of basitrichs in the actinopharynx, in agreement with the conditions in *Aiptasiomorpha texaensis* (cf. Carlgren and Hedgpeth 1952).

Sagartiidae

Sagartiogeton verrilli Carlgren 1942

OCCURRENCE.—40°32'N, 67°05'W, 338 m, 3 specimens, on fragments of mussel shell; 42°25'N, 66°21'W, 256 m, gravel, 1 specimen.

GENERAL CHARACTERISTICS.—The length

of the column varies between 8 and 18 mm, whilst the diameter of the pedal disc is 12-20 mm. The column is greyish, salmon-colored and divisible into scapus and scapulus. The scapus is provided with distinct mesenterial insertions shimmering through the ectoderm and has small tenaculi. The tentacles of the studied specimens are about 9 mm long, conical and acute. They are hexamerously arranged; in the largest specimen there are five cycles (6+6+12+24+40). The reddish-brown actinopharynx is strongly folded and provided with two siphonoglyphs. The color of the tentacles is greyish white, the largest specimen with reddish-brown pigmentation. The pairs of mesenteries are arranged in four to five cycles (proximally there are 90-100 mesenteries—distally only half the number are developed). The number of perfect mesenteries tends to vary. In one of the studied specimens there are 17 pairs (including the two directive pairs). The first cycle of mesenteries is sterile. The retractors of the first cycle of mesenteries are strong, of a circumscribed diffuse type (Figure 7A); in the other mesenteries they are diffuse. The parietobasilar muscles are rather weak (Figure 7B). The acontia are numerous and whitish in color. The mesogloea, diffuse spincter is rather long.

NEMATOCYSTS.—*Scapus*: basitrichs 9-11.5 × 1.6, 16-17 × 2.2-3.3; microbasic amastigophors 30.5-35 × 4.4, ca. 15 × 3.8 (rare). *Tentacles*: basitrichs 13 × 2.2 - 27 × 2.7; microbasic amastigophors (16 × 3.8 -) 26 × 4.4 - 44 × 6.5; spirocysts 22 × 3.8 - 36 × 6. *Actinopharynx*: basitrichs 27-32 × 3.3; microbasic *p*-mastigophors ca. 23 × 4.4, 27-31 × 4.4-4.9. *Filaments*: basitrichs (rare) ca. 27 × 3.8; microbasic *p*-mastigophors 26-31 × 4.4-4.9; spirocysts 22 × 4.9 - 34 × 6. *Acontia*: basitrichs 36.5 × 3.8 - 43 × 4.4-4.9; microbasic amastigophors 57 × 6 - 64 × 7.1 μm.

Hormathiidae

Hormathia nodosa (Fabricius 1780)

OCCURRENCE.—40°54'N, 66°35'W, 265 m, 4 specimens; 41°30'N, 69°00'W, 146 m, till, 1 specimen; 42°14'N, 69°57'W, 102 m, 1 specimen; 42°26'N, 66°28'W, 265 m, gravel, 8 specimens.

GENERAL CHARACTERISTICS.—The 9-28 mm high scapus is provided with white tubercles arranged in longitudinally oriented rows. The

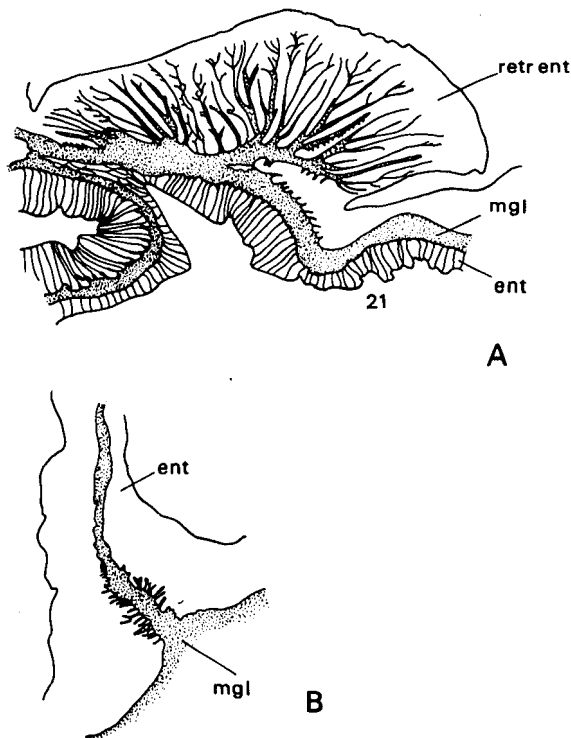


FIGURE 7.—*Sagartiogeton verrilli*. A. Section of the retractor of a perfect mesentery with adjacent parts of the actinopharynx. B. Section of the peripheral part of a mesentery (from the distal part of the scapus). ent—entoderm, mgl—mesogloea, retr ent—entoderm of retractor muscle.

scapular ridges are white and are 12 in number. The scapus is covered by a thin, greyish-white to greyish-brown periderm and is equipped with shallow longitudinal as well as transverse furrows; on the edge of the scapulus only radiating furrows are seen. The diameter of the column is 12-33 mm (diameter of scapus: diameter of the pedal disc = ca. 3:4). The tentacles are conical, reddish brown, and in older specimens longitudinally furrowed. They are 96 in number. The mesenteries have a maximum of 48 pairs (6+6+12+24), 6 of which (including the 2 pairs of directives) are perfect and sterile. The anatomical characters agree with earlier descriptions (cf. Carlgren 1893, 1933; Verrill 1922).

NEMATOCYSTS.—*Scapus*: basitrichs 8 × 1.1 - 11 × 1.6, 21-24 × 3.3-3.8; spirocysts 17 × 3.8 - 25 × 4.4. *Tentacles*: basitrichs 17 × 2.2 - 34 × 3.8; spirocysts 23 × 3.3-4.4 - 44 (56) × 5.4-7.6. *Actinopharynx*: basitrichs 16 × 1.6 - 35 × 3.3-3.8; microbasic *p*-mastigophors 23-33 × 3.8. *Fila-*

ments: basitrichs $14 \times 1.1 - 16.4 \times 1.6$, $28 \times 3.3 - 31 \times 3.8$ -4.4; microbasic *p*-mastigophors $21 \times 3.3 - 23 \times 3.8$. *Acontia*: basitrichs 32 -40 \times 3.8-4.4 μ m.

Hormathia nodosa (?) (Fabricius 1780)

OCCURRENCE.— $41^{\circ}34'N$, $68^{\circ}40'W$, 128 m, sandy silt, 1 specimen.

GENERAL CHARACTERISTICS.—The column is divisible into scapus and scapulus, the former being provided with a thin periderm and rather large, acuminated tubercles spread over the surface. The color of the scapus is proximally dark greyish brown, distally brown. Bordering upon the scapulus there are 12 large marginal tubercles. The pedal disc is not excavated; there are traces of mussel shell. The tentacles lack bulbous swellings on the abaxial side. They are arranged in four cycles. The actinopharynx and the sphincter agree with those in *H. nodosa* (cf. Carlgren 1893). The number of mesenteries is 96 (6+6+12+24 pairs), the perfect ones being 24 pairs in the distal part of the column. Immediately above the margin of the actinopharynx there are 20 pairs of perfect mesenteries. Only the six pairs of protomesenteries are sterile. The morphology of the retractors, parietobasilar, and basilar muscles agrees with that in typical *H. nodosa*. The length of the preserved specimen is: scapus 16 mm and scapulus 7 mm. The size of the pedal disc is 36×49 mm. The sizes of the different nematocyst types differ only slightly from those described in *H. nodosa* (see above). The large number of perfect mesenteries is, however, remarkable.

In view of the many morphological similarities between this specimen and typical *H. nodosa*, I consider it as an aberrant specimen of this species.

Actinauge verrilli McMurrich 1893

OCCURRENCE.— $42^{\circ}11'N$, $65^{\circ}56'W$, 229 m, gravel, 1 specimen; $42^{\circ}20'N$, $67^{\circ}28'W$, 289 m, sandy gravel, 1 specimen; $42^{\circ}50'N$, $69^{\circ}00'W$, 187 m, sand-silt-clay, 1 specimen.

GENERAL CHARACTERISTICS.—The morphology of these specimens agrees with earlier descriptions of the species (cf. McMurrich 1893; Carlgren 1933). The scapus is equipped with a greyish-brown or brown periderm; it has a reticular appearance, arising from transverse as

well as longitudinal, rather low, furrows. Distally there are 12 coronary tubercles. The firm wall of the scapulus is often whitish and is provided with 24, white, scapular ridges, proximally fusing two by two into 12. The scapus is cylindrical or dome-shaped, with the length 29-30 mm. The diameter of the scapus is proximally 17-30 mm and distally 19-20 mm. The length of the scapulus is 14 mm. The pedal disc is strongly excavated, often embracing sand grains. The long and tapering tentacles are arranged in four to five cycles. The outer tentacles are basally provided with abaxial swellings, which give rise to distinct processes. There are four cycles of mesenteries. Six pairs (including the two directive pairs) are perfect and sterile.

NEMATOCYSTS.—*Scapus*: basitrichs $8 \times 1.6 - 23 \times 4.4$. *Tentacles*: basitrichs $12 \times 2.2 - 27 \times 2.7$ -3.3, ca. 40×3.8 (rare); microbasic *p*-mastigophors 24.5×3.8 -5.2 - 38×8.2 ; spirocysts $19 \times 3.3 - 37 \times 4.4$ -6; 46-56 \times 5.5-7. *Actinopharynx*: basitrichs $13 \times 1.6 - 17 \times 2.2$, 28-50 \times 3.3; microbasic *p*-mastigophors $22 \times 3.8 - 29 \times 4.4$. *Filaments*: basitrichs $11 \times 1.1 - 17 \times 2.2$; 28-30.5 \times 3.3, microbasic *p*-mastigophors 19×3.8 -4.9 - 35×4.4 . *Acontia*: basitrichs ($14 \times 2.2 -$) $26 \times 3.3 - 36.5 \times 3.8$ -4.4 μ m.

Phelliactis americana n. sp.

HOLOTYPE.—Specimen collected by the vessel *Delaware* from the type-locality (station number 27) on 19 February 1963 with an otter trawl. Deposited in the U.S. National Museum, catalog number USNM 54323.

TYPE-LOCALITY.— $42^{\circ}48'N$, $63^{\circ}42'W$, 366 m, temperature $+1.7^{\circ}C$.

PARATYPE.—Specimen collected by the vessel *Albatross IV* from station number 73 ($42^{\circ}17'N$, $65^{\circ}55'W$, 238 m, gravel) on 15 August 1968 with a 1-m Naturalist dredge. Deposited in Northeast Fisheries Center, Woods Hole.

DIAGNOSIS OF HOLOTYPE.—Column firm, divisible into scapus and scapulus; somewhat asymmetric. Scapus distally with 48 rows of large, sometimes acute, tubercles. Scapular ridges about 70. Sphincter mesogloal, and alveolar, very strong. Tentacles about 190, conical, and longitudinally furrowed with basal, abaxial swellings. Mesenteries in five cycles, 12 pairs being perfect

and sterile. Retractors of diffuse, restricted type. Parietobasilar muscles weak. Cnidom: *scapus* basitrichs; *tentacles* basitrichs and spirocysts; *actinopharynx* basitrichs and microbasic *p*-mastigophors; *filaments* basitrichs and microbasic *p*-mastigophors; *acontia* basitrichs.

GENERAL CHARACTERISTICS.—The column is firm and divisible into scapus and scapulus. It has a somewhat asymmetric appearance, one half of the body being larger than the other. The scapus (18 mm long) is cylindrical in the contracted state and has a reticular appearance with low tubercles formed by longitudinally as well as transversely oriented, low furrows; distally the scapus is provided with 48 rows of larger, sometimes acute, tubercles. The color of the remaining traces of periderm is brownish. The proximal part of the body is pillarlike, with the diameter 30 mm. About 70 scapular ridges are continued in the basilar swellings of the outer tentacles. The sphincter is rather short, but very strong, especially orally; it is alveolar and vertically stratified (Figure 8B). The actinopharynx is equipped with 12 longitudinal folds on each side of the two symmetrically arranged siphonoglyphs. The tentacles number about 190; they are rather short, conical, and longitudinally furrowed and are basally provided with abaxial swellings. The mesenteries are arranged in five cycles (6+6+12+25+50 pairs), 12 pairs (including the 2 pairs of directive mesenteries) being perfect and sterile. The retractors are of diffuse type, rather strong, and with their, in some perfect mesenteries, rather restricted pennons near to the actinopharyngeal wall (Figure 8C, D). The parietobasilar muscles are weak. The column, being somewhat wider distally than proximally, lacks cinclides. The whitish acontia are numerous and often very long. The mesogloal layer is very thick in the whole column as well as in the mesenteries.

In the *paratype* the distal part of the column is in some parts severely damaged; the oral part is also introverted, giving rise to an oral slit, 58 mm long. The length of the scapus in this specimen is 40-30 mm; it is provided with low tubercles spread out over the column; distally there are 24 tubercles bordering the scapular ridges. The tentacles are arranged in four cycles (there are about 70 in the outer cycle) and are provided with abaxial swellings (Figure 8A). The mesenteries are hexamerously arranged in five cycles (the last cycle is, however, not complete in this specimen); prox-

imally there are 75 pairs in total. The number of perfect and sterile mesenteries was impossible to determine in the paratype, but there are probably less than 12 pairs (probably 8). The wide and peripherally almost membraneous pedal disc is, to a small extent, excavated; its diameter measures 90 mm.

NEMATOCYSTS.—*Scapus*: basitrichs ca. 14 × 1.6-2.2, 24.5-44 × 3.3; spirocysts (not found in the paratype) 27 × 4.4 - 60 × 5.5. *Tentacles*: basitrichs 17-21 × 2.2 (not common), 34-43 × 3.3-3.8; spirocysts 38 × 4.4-4.9 - 75 × 8.7. *Actinopharynx*: basitrichs 16 × 2.2 (rare), 37 × 3.3 - 42 × 3.8; microbasic *p*-mastigophors 30 × 4.4 - 39 × 4.9. *Filaments*: basitrichs 12 × 1.6 - 22 × 2.2, 33 × 2.7 - 48 × 3.3; microbasic *p*-mastigophors 28 × 4.4 - 34 × 4.9. *Acontia*: basitrichs 16 × 2.2 - 23 × 2.5, 32 × 3.3 - 52 × 3.8 μm.

There are some morphological similarities between the above described specimens and *Phelliaactis hertwigii* Simon as well as *Ph. incerta* Carlgren. The retractors of the perfect mesenteries are, however, stronger in *Ph. americana*, and the number of perfect mesenteries is larger (in the holotype 12 pairs).

Amphianthus nitidus (Verrill 1899)

OCCURRENCE.—41°27'N, 66°06'W, 128 m, 1 specimen; 41°39'N, 65°50'W, 183 m, 6 specimens; 42°10'N, 65°29'W, 163 m, 1 specimen.

GENERAL CHARACTERISTICS.—The column is firm, in the contracted state semispherical, and 9-16 mm high. The color is greyish white with a blue luster. The scapus is, in one of the studied specimens, equipped with eight low, extended tubercles. The diameter of the pedal disc is 12-16 mm. There is a distinct limbus. The tentacles are hexamerously arranged in four to five cycles (6+6+12+24+ a seldom completed fifth cycle), rather short, conical, and sometimes provided with an apical pore. The inner tentacles are larger than the outer ones. There are four to five cycles (57 pairs at most) of hexamerously arranged mesenteries, eight to nine pairs of which (including the two directive pairs) are perfect. All the mesenteries, except those of the last cycle and at least one of the directive pairs, are fertile. The number of mesenteries is larger proximally than distally. The acontia are numerous and yellow. The distally very strong, mesogloal sphincter, the actinopharynx,

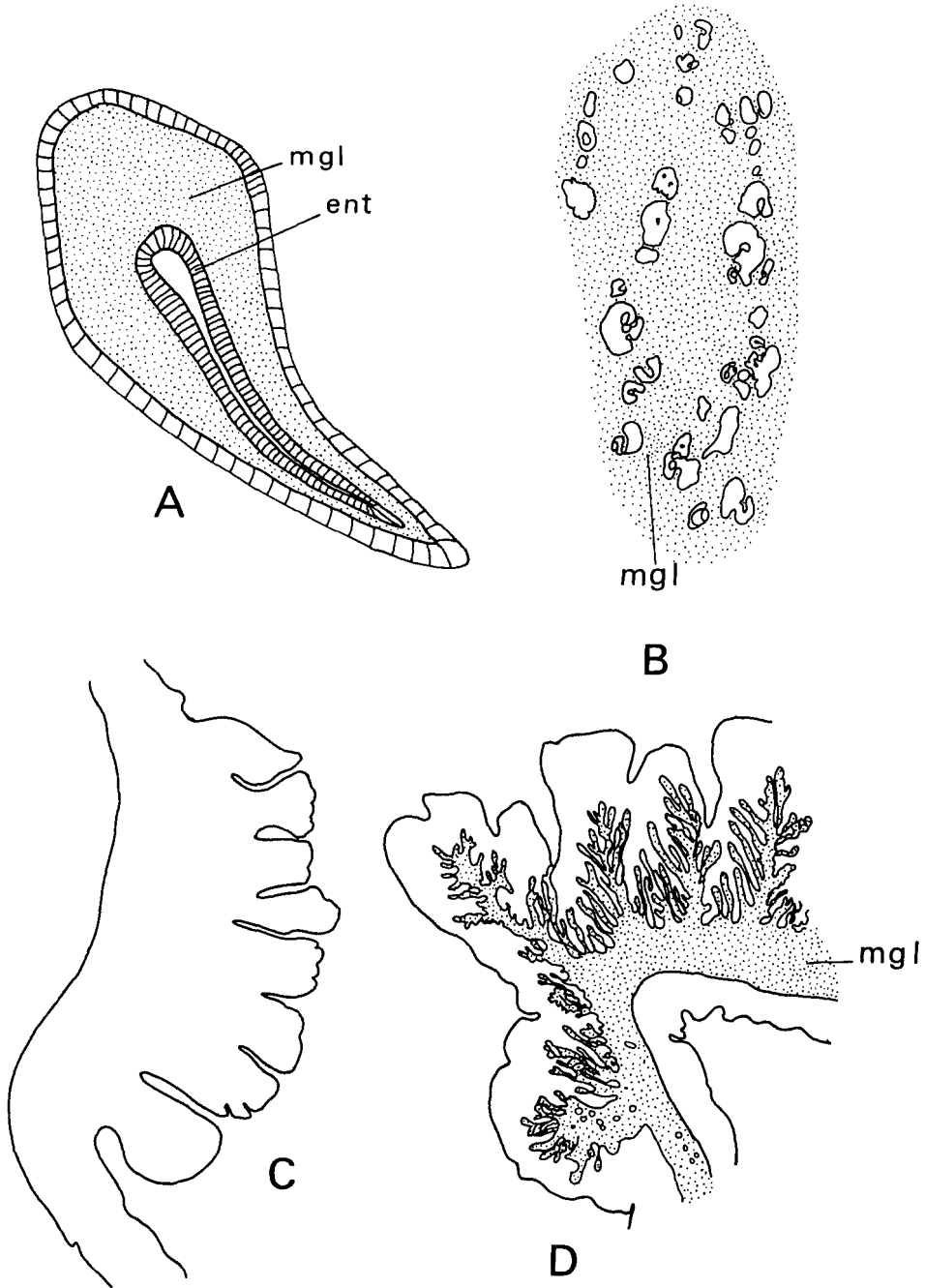


FIGURE 8.—*Phelliactis americana*. n. sp. A. Section through the basal part of a tentacle. B. Section through a part of the sphincter, showing the alveolar arrangement of the muscle fibrils (the fibrils are omitted in the figure). C. Section through a retractor from the third cycle of mesenteries. D. Cross section of a part of a retractor of one of the directive mesenteries. ent—entoderm, mgl—mesogloea.

and musculature of the specimens agree with earlier descriptions (cf. Carlgren 1934).

NEMATOCYSTS.—*Column*: basitrichs $8 \times 1.6 - 12.5 \times 2.7$, $29-35 \times 2.7$; microbasic *p*-mastigophors $17 \times 4.9 - 27 \times 6$; spirocysts $29 \times 3.3 - 61 \times 6$. *Tentacles*: basitrichs $18.5 \times 3.8 - 30 \times 6$; microbasic *p*(?)-mastigophors $18.5 \times 4.4 - 29 \times 4.4-5.5$; spirocysts $19 \times 3.3 - 47 \times 7.6$. *Actinopharynx*: basitrichs $24-25 \times 3.3$; microbasic *p*-mastigophors $23 \times 4.4 - 26 \times 5.5$ (axial filament = about half the length of the capsule); ca. 27×4.9 (axial filament almost as long as the capsule). *Filaments*: basitrichs ca. 9×2.2 ; microbasic *p*-mastigophors $22 \times 4.4 - 28 \times 4.9$. *Acontia*: basitrichs ca. 14×2.2 ; $42 \times 6 - 57 \times 6.5 \mu\text{m}$.

Stephanauge nexilis (Verrill 1883)

OCCURRENCE.— $41^{\circ}54'N$, $65^{\circ}44'W$, 366 m, 2 specimens; on the denuded axis of an octocoral.

GENERAL CHARACTERISTICS.—The yellowish, firm column is strongly elongated in the sagittal plane. The dimensions of the scapus is proximally 22×4 mm, the height of the column being 7 mm. In one of the specimens, the scapus is provided with 26 low, circularly arranged tubercles bordering 28 vague, radiating scapular ridges. The mesenterial insertions into the body wall are distinct. The number of the yellow, short, basally wide tentacles is not greater than that of the mesenteries (72 and 78). The sphincter is alveolar and strong, slowly diminishing in thickness towards the proximal part of the scapus. The wide actinopharynx is brownish yellow. It is equipped with two siphonoglyphs. The mesenteries are hexamerously arranged, more than six pairs (including the two pairs of directives) being perfect. At least some of the perfect mesenteries are equipped with genital organs. The retractors are diffuse and rather weak. The strong parieto-basilar muscles produce distinct muscular lobes high up in the scapus, approximately at the middle of the mesenteries. The number of mesenteries is not greater proximally than distally. No acontia were found in these specimens (they might have been few and hidden by the strongly developed filaments), but basitrichs of probably acontian origin were measured in one of the specimens. No cinclides could be found.

NEMATOCYSTS.—*Scapus*: basitrichs (rare) ca. 12×2.2 ; microbasic *p*-mastigophors $12 \times 4.4-5.5 - 19 \times 5.5$. *Tentacles*: basitrichs $9 \times 1.7 - 20 \times 2.7$; microbasic *p*-mastigophors (axial filament almost as long as the capsule; diameter = $1.5 \mu\text{m}$) $21 \times 5.5 - 23 \times 7.1$; spirocysts $25 \times 3.8 - 49 \times 4.4$. *Actinopharynx*: basitrichs $15-18 \times 3.3$; microbasic *p*-mastigophors $17 \times 4.4 - 22 \times 5.4-6$. *Filaments*: basitrichs $14-16 \times 2.7-3.3$ (-28×2.7); microbasic *p*-mastigophors 16×3.8 (-6) $- 27 \times 5.5$. *Acontia*(?): basitrichs $30.5-36.5 \times 3.8 \mu\text{m}$.

Hormathiidae (?)

Stephanauge (?) *spongicola* (Verrill 1883)

OCCURRENCE.— $39^{\circ}56'N$, $69^{\circ}45'W$, 201 m, 3 specimens; $40^{\circ}00'N$, $69^{\circ}30'W$, 128 m, 3 specimens; $40^{\circ}02'N$, $70^{\circ}47'W$, 161 m, 6 specimens; $40^{\circ}03'N$, $71^{\circ}16'W$, 183 m, 16 specimens. At all the localities the specimens were found on the outside of the parchmentlike tubes of onuphid polychaetes.

GENERAL CHARACTERISTICS.—The column is often smooth but sometimes provided with a few adhesive warts; it is divisible into scapus and scapulus. The scapus was reddish brown to greyish brown in the preserved material, its length being 4-12 mm. The largest diameter is 10-11 mm. The scapulus is whitish to pale red. The periderm of the scapus is thin and easily falls off. The tentacles are conical, acute, and yellowish. They are hexamerously arranged in four to six cycles, those of the inner cycles being distinctly longer than the outer ones. The sphincter is short, mesogloal, and agrees in its structure with that described by Carlgren (1950). It is not capable of covering all the tentacles. The actinopharynx is about three-quarters the length of the column, wide, and equipped with 18-20 deep, closely lying longitudinal folds (Figure 9A); it is yellowish in color. One (?) to four siphonoglyphs are present. In a specimen with two siphonoglyphs there was an eccentric position for them. There are (5-) 8-12 pairs of perfect mesenteries, the imperfect ones being 8-16 (-22) pairs. The structure of the retractors of the perfect mesenteries was in agreement with that described by Carlgren (1950) and in many ways reminiscent of those in *Phellia gausapata*. The number of directive pairs varies, being two, three, or four. The retractors of the perfect

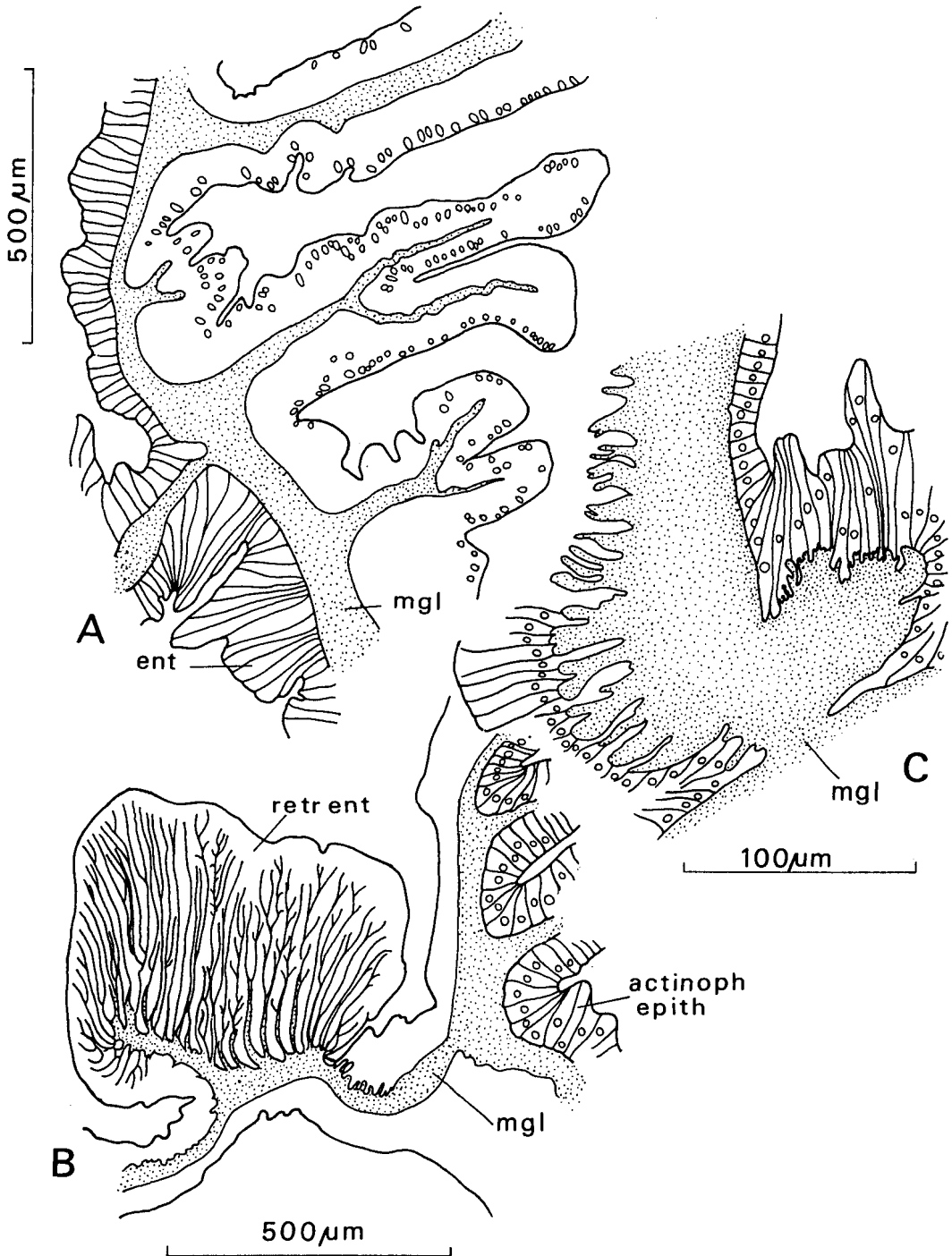
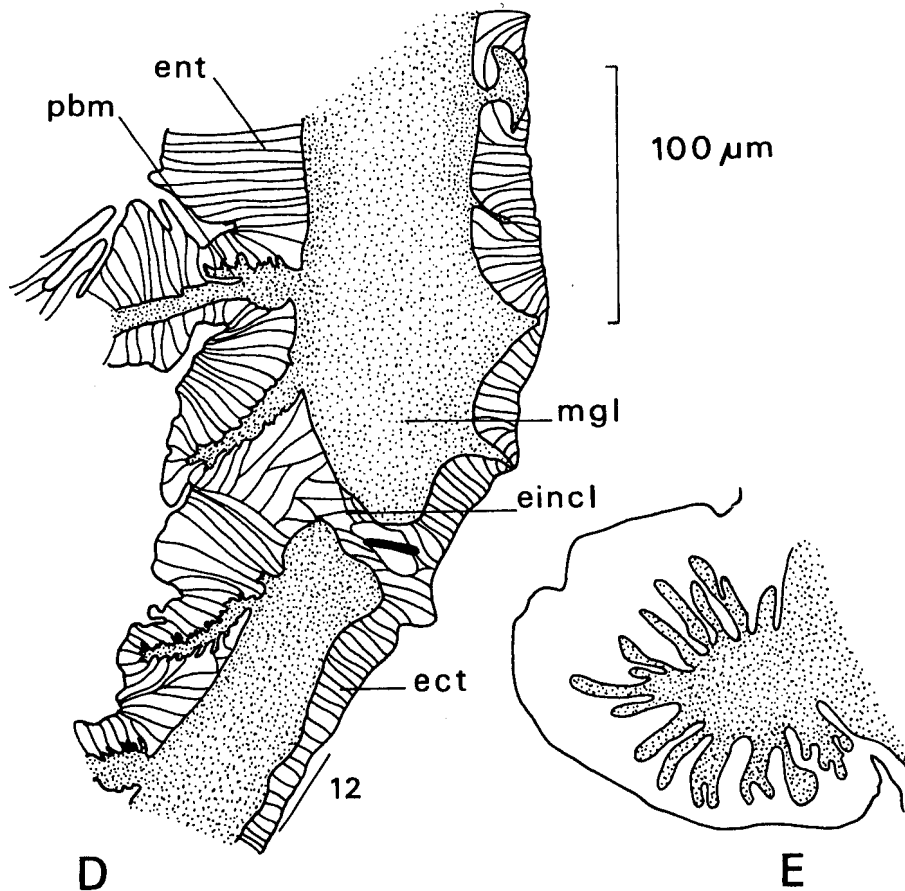


FIGURE 9.—*Stephanauge(?) spongicola*. A. Section through part of the actinopharynx. B. Cross section of a retractor of one of the protomesenteries. C. Cross section of the peripheral part of a perfect mesentery (the section is from the distal part of the column). D. Section through a part of the body wall. E. Section through a mesentery of the last cycle. actinoph epith—epithelium of actinopharynx, ect—ectoderm, eincl—ectodermal invagination forming an imperforate cinclis, ent—entoderm, mgl—mesogloea, pbm—parietobasilar muscle, retr ent—entoderm of retractor muscle.



mesenteries are strong, five to eight pairs being circumscribed, and sometimes reniform (Figure 9B), those of the other perfect mesenteries being diffuse but with a tendency to become restricted. The parietobasilar muscles are rather strong, forming distinct lamellae on the peripheral parts of the mesenteries (Figure 9C). The imperfect mesenteries lack retractors as well as filaments (always?) (Figure 9E). In those specimens where genital organs were found, these were always developed in perfect mesenteries. The acontia are numerous and provided with basitrichs. Only one imperforate cinclis (Figure 9D) was found in the sections of the species. Probably the species reproduces asexually by laceration. The proximal part of the column and the often wide pedal disc are often asymmetrical.

NEMATOCYSTS.—*Column*: basitrichs ($21 \times 2.7 - 23-27 \times 3.3-3.8$, $31-39 \times 4.4$; atrichs $19-20 \times 4.4-4.9$, $39-45 \times 12.5-14.7$. *Tentacles*: basitrichs $11 \times 1.6-2.2 - 33 \times 3.3-3.8$; atrichs (not common;

in many tentacles completely missing) $39 \times 13.1 - 49 \times 5.5$, spirocysts (very numerous, and in some of the studied specimens with a very small variation in size) $17 \times 2.2 - 34 \times 3.8-4.9$. *Actinopharynx*: basitrichs $14 \times 2.2 - 32 \times 3.8$; microbasal *p*-mastigophors $17-26 \times 3.8-4.4$. *Filaments*: basitrichs $12-15 \times 2.2$; microbasal *p*-mastigophors $13 \times 3.3 - 26 \times 4.3-5.5$. *Acontia*: basitrichs $13-16 \times 2.2-2.7$, $33 \times 3.3 - 45 \times 3.8 \mu\text{m}$.

In specimens from $40^{\circ}03'N$, there were also found atrichs in the filaments (12×6 , $18 \times 4.9 - 24 \times 5 \mu\text{m}$) as well as holotrichs ($22 \times 4.9 - 24 \times 5 \mu\text{m}$). Both these nematocyst types are probably residues of intaken food—the specimens in question were found together with some individuals of *Epizoanthus incrustatus*.

This species, first described by Verrill (1883) as *Sagartia spongicola*, has been the object of later investigations by, e.g., McMurrich (1898) and Carlgren (1950). Carlgren (1950) (on the basis of acontian armament with basitrichs?) described the species as a hormathiid and a member of the

genus *Stephanauge*, being aware of the existing anatomical differences in the development of the sphincter, the retractors, and the number of perfect mesenteries, siphonoglyphs, and directive mesenteries. To these differences should be added the occurrence of atrichous haplonemes, not only in the column ectoderm, but also in, at least, some of the inner tentacles. The arrangement of the mesenteries into filament-equipped perfect and into imperfect ones devoid of filaments as well as retractors should also be taken into consideration.

The morphology of this species shows so many differences from other species of the genus *Stephanauge* that I consider it very doubtful to place the species in this genus, or, taking into consideration the occurrence of atrichs in the studied specimens, in any other hormathiid genus.

ACKNOWLEDGMENTS

I thank Roland L. Wigley, National Marine Fisheries Service, Woods Hole, who kindly placed the material at my disposal and who also supplied me with station data.

I also thank Karl-Georg Nyholm, Institute of Zoology, University of Uppsala, and Tor G. Karling and Roy Oleröd, Swedish Museum of Natural History, Stockholm, for their kind compliance in placing laboratory facilities and desired material at my disposal. My thanks are also due to Bo Molin, Uppsala, for the magnificent technical assistance he provided by sectioning and staining some of the studied material and for redrawing the figures.

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