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FIVE NEW SPECIES OF MARINE GASTROTRICHA FROM THE ATLANTIC COAST OF FLORIDA

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ABSTRACT

Intertidal and subtidal sands from four locations along the Atlantic coast of Florida (Matanzas Beach, Ormond Beach, Seagull Beach and Vilano Beach) yielded five new species of marine Gastrotricha. *Acanthodasys silvulus* new species and *Paraturbanella aggregotubulata* new species constituted the Macrodasyida; *Neodasys ciritus* new species, *Chaetonotus sagittarius* new species, and *Halichaetonotus bataceus* new species comprised the Chaetonotida. *Acanthodasys silvulus* differs from its two congeners in the smaller size of the cuticular armature, the distribution of lateral adhesive tubes, and the size of the caudal appendages. *Paraturbanella aggregotubulata* possesses dorsal adhesive tubes, and has lateral adhesive tubes that are clumped in the mid-trunk region. *Neodasys ciritus*, a well-known but previously undescribed species, is distinguished by two columns of pigmented-cells positioned along the lateral margins of the digestive tract that impart a rusty-red color to the animal. It also lacks a caudal peduncle. *Chaetonotus sagittarius* and *H. bataceus* differ from their congeners primarily in the morphology and distribution of their cuticular armature.

Gastrotrichs are a common component of the interstitial meiofaunal community inhabiting intertidal and subtidal marine sediments (Swedmark, 1964). While the Atlantic coast of Florida is replete with suitable habitat for gastrotrichs, only a few studies have been completed; notably those of Evans and Hummon (1991), Decho et al. (1985), Ruppert and Shaw (1977), Hummon (1974), Schoepfer-Sterrer (1974), and Thane-Fenchel (1970). To date, 31 species of marine gastrotrichs have been reported from Florida. The examination of intertidal and subtidal sands from the Atlantic coast of Florida has revealed a rich gastrotrich fauna including five species which are new to science.

METHODS

The specimens described herein were taken from sediments collected during June, July, and September, 1990 at Matanzas Beach, Ormond Beach, Seagull Beach, and Vilano Beach, Florida (Fig. 1).

Intertidal samples were taken by digging holes in the beach approximately 0.5 m deep at low tide and removing sediment from the walls of the hole with a plastic scoop. Sand obtained in this manner was placed into plastic bags. Subtidal samples were taken at a water depth of 2 m during low tide by inserting a hand-held piston corer with a diameter of 2.5 cm into the bottom sediment to a depth of approximately 12 cm. The sand in the corer was extruded into a plastic bag which was then sealed. Upon return to the laboratory, samples were stored at 14°C to extend the life of the organisms. Gastrotrichs were extracted from the sediments by narcotization with isosmotic $MgCl_2$, and then by subsequent rinsing of the sediments with seawater and decantation into 60-mm plastic Petri dishes. Individual living gastrotrichs were located by examining the supernatant fluid at 50× magnification under a Wild M-8 dissecting microscope and were removed by mouth pipette to a glass slide, on which then was mounted an 18-mm square coverslip supported by bits of non-toxic modeling clay on its corners.

Further examination, drawing, and video recording of specimens were done under Nomarski differential interference contrast optics on a Nikon LaboPhot II microscope. High-resolution video images were taken with an MTI CCD-72 camera (570-line resolution) with electronic image enhancement circuitry, and recorded with a Panasonic AG-1960 Super-VHS video recorder (400-line resolution). Drawings, made concurrently with image recording by means of a drawing tube, were transferred to AutoCAD 386 using a Kurta IS/ONE digitizing pad. The computerized images were modified and detailed within AutoCAD after reviewing the video images on an MTI 104100-01 black and white flat-field monitor (1,000-line resolution), from which measurements could be made directly with a transparent rule. Abbreviations: An—anus, BrS—sensory bristle, CaB—buccal capsule, Cep—cephalion, CiA—anterior cilia, CiT—ciliary tuft, CiV—ventral cilia, Fu—furcal branches, GlE—epidermal

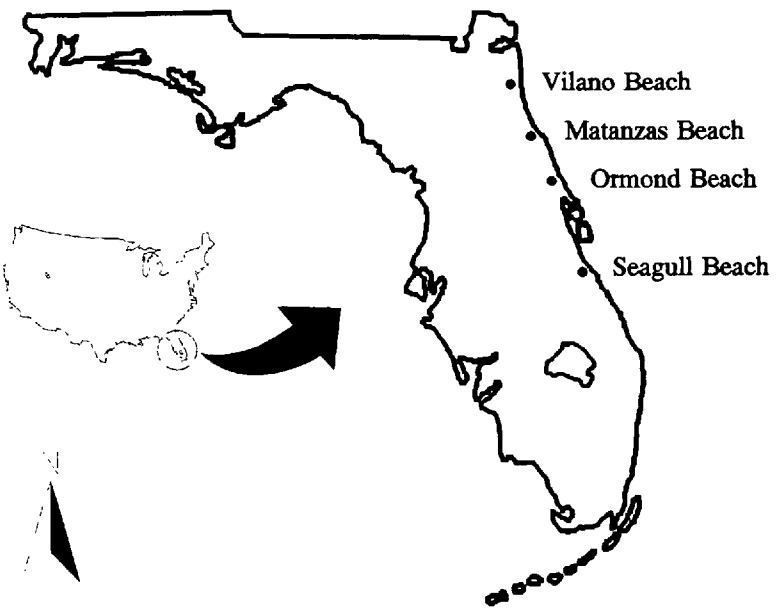

Figure 1. Four sampling locations on the Atlantic Coast of Florida. Intertidal and subtidal sediments were sampled at each location. Sediments are principally siliceous with small amounts of shell fragments.

gland, Hyp—hypostomium, In—intestine, LbC—caudal lobes, Mo—mouth, Ov—ovum, Ph—pharynx, Pp—pharyngeal pores, RoF—frontal reproductive organ, Sc—scale, ScH—hydrofoil scale, Sp—sperm, Spn—spine, TbA—anterior adhesive tubes, TbD—"*dohrni*" tubes, TbL—lateral adhesive tubes, TbP—posterior adhesive tubes, Tn—tentacles, TrC—ciliary tract, Ts—testis.

SYSTEMATIC SECTION

Order Macrodasyida Rao and Clausen, 1970
Family Thaumastodermatidae Remane, 1927
Subfamily Diplodasyinae Ruppert, 1978
Genus *Acanthodasys* Remane, 1927

Acanthodasys silvulus new species
Figure 2

Holotype.—The adult specimen, 375 μm in length, which is illustrated and represented on Super-VHS format videotape [ICZN, 1985: Art. 72(c)(v)], but which is no longer extant. Seagull Beach, Florida (28°13'N, 80°36'W); sandy subtidal sediments; July 1990. Copies of this high resolution (400-line) Super-VHS video recording and a lower resolution VHS (240-line) version have been deposited in the Ohio University Invertebrate Museum, Athens, Ohio and submitted to the National Museum of Natural History, Washington, D.C.

Diagnosis.—*Acanthodasys* with cuticle densely covered with small (5 μm) uniancres; all scales with spines. Buccal cavity large, rounded "V" in longitudinal-section. Mouth terminal; diameter less than width of head. Prominent pharyngeal pores with corresponding indentations in body wall. Four anterior adhesive tubes ventrally just behind mouth. Ten pairs of lateral adhesive tubes,with one pair anterior to pharyngeal-intestinal junction; two posterior-most pairs reduced in

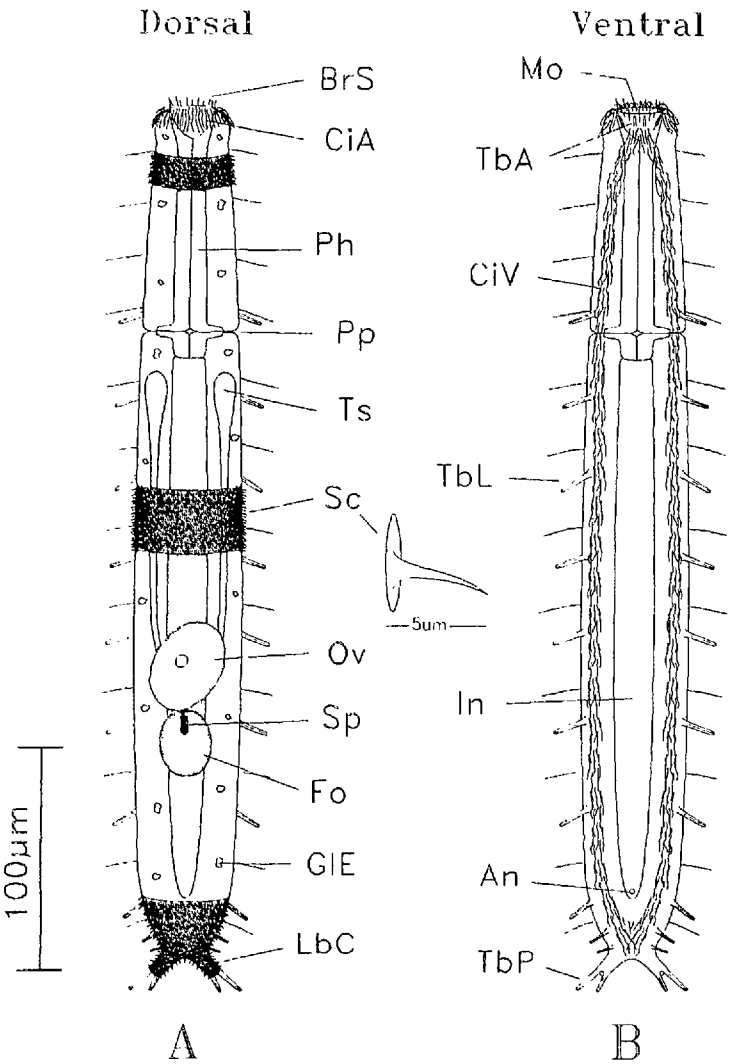

Figure 2. Adult *Acanthodasys silvulus* n. sp. Dorsal cutaway view (A) of internal structures. Densely-packed uniancres cover dorsal and lateral surfaces. Ventral ciliary tracts (B) join both anteriorly and posteriorly.

size. Distinct caudal lobes bear two adhesive tubes each. Ventral locomotor cilia in two, widely separated longitudinal rows that join near anterior and posterior ends.

Etymology.—*silvulus* (L) diminutive of forest, after small, densely-packed uniancres.

Description.—Body strap-shaped and rounded in cross-section; adults ranging in length from 345–430 µm and width from 47–53 µm (5 specimens); mouth 21–25 µm in diameter. Buccal cavity large, rounded V-shape in longitudinal-section. Pharynx 110–120 µm long with prominent pharyngeal pores located near base corresponding to marked indentations in body wall (Fig. 2A, B). Paired testes observed to begin just posterior to the pharyngeal-intestinal junction, tapering

into vasa deferentia that continue posteriorly to mid-trunk region where they join. Frontal organ (Ruppert, 1978) posteriorly adjacent to junction of vasa deferentia (Fig. 2A); caudal organ not observed. Ten to 12 pairs of irregularly-shaped epidermal glands distributed evenly along body. Trunk terminates with two caudal lobes about 10 μm in length.

Two narrow bands of ventral locomotor cilia, positioned near lateral margins of trunk, join just behind the mouth and anus (Fig. 2B). Dorsal ciliary band encircles the head.

Cuticular armature consists of small, oval scales (uniancres) each with single erect spine about 5 μm long (Fig. 2). Uniancres densely packed and of uniform size. Scales without spines not observed.

Four equal-size (6–8 μm in length) anterior adhesive tubes just posterior to rim of mouth on ventral side. Eight pairs of lateral adhesive tubes (10–12 μm in length) spaced evenly along trunk from pharyngeal-intestinal junction to caudal lobes (Fig. 2A); one pair of these anterior to pharyngeal-intestinal junction. Two additional, smaller pairs of lateral adhesive tubes (6–8 μm in length) on trunk just anterior to caudal lobes; two unequal-length posterior adhesive tubes on distal end of each caudal lobe (Fig. 2B).

Remarks.—Two species of *Acanthodasys* have been described to date, *A. aculeatus* Remane, 1927 and *A. arcassonensis* Kisielewski, 1987. Ruppert (1978) mentioned five species (*A. diplodasyoides, A. tetranchyrodermatoides, A. vermiformis, A. thrinax,* and *A. platydasyoides*) that have never been illustrated or described and must be considered *nomena nuda* (Kisielewski, 1987). *Acanthodasys silvulus* differs from *A. aculeatus* by having smaller, more abundant uniancres that are of a uniform size regardless of location on the body; *A. aculeatus* has uniancres that increase in size posteriorly. *Acanthodasys aculeatus* (as figured by Remane, 1927, fig. 5) has most of its lateral adhesive tubes grouped at the caudal end; however Forneris (1961) shows a greater number and more even distribution of lateral adhesive tubes than Remane described (also see Kisielewski, 1987). In the author's experience (personal observations of specimens from the U.S.A. and Italy), *A. aculeatus* has about the same number of lateral adhesive tubes as *A. silvulus,* with several pairs of these clumped together near the base of the caudal lobes and two or more pairs anterior to the pharyngeal-intestinal junction (compared to 1 pair in *A. silvulus*). Additionally, the lateral adhesive tubes of *A. aculeatus* are variable in length with the anterior-most tubes being the longest. *Acanthodasys silvulus* has a smaller mouth, fewer anterior and lateral adhesives tubes, and larger more robust caudal appendages than *A. arcassonensis*; *A. silvulus* also lacks scales without spines as occur on both *A. aculeatus* and *A. arcassonensis. Acanthodasys silvulus* was found in medium, siliceous sands in 1 m of water at Seagull Beach, Florida.

Family Turbanellidae Remane, 1925
Genus *Paraturbanella* Remane, 1927

Paraturbanella aggregotubulata new species
Figures 3, 4

Holotype.—The adult specimen, 600 μm in length, which is illustrated and represented on Super-VHS format videotape [ICZN, 1985: Art. 72(c)(v)], but which is no longer extant. Seagull Beach, Florida (28°13'N, 80°36'W); sandy intertidal sediments; July 1990. Copies of this high resolution (400-line) Super-VHS video

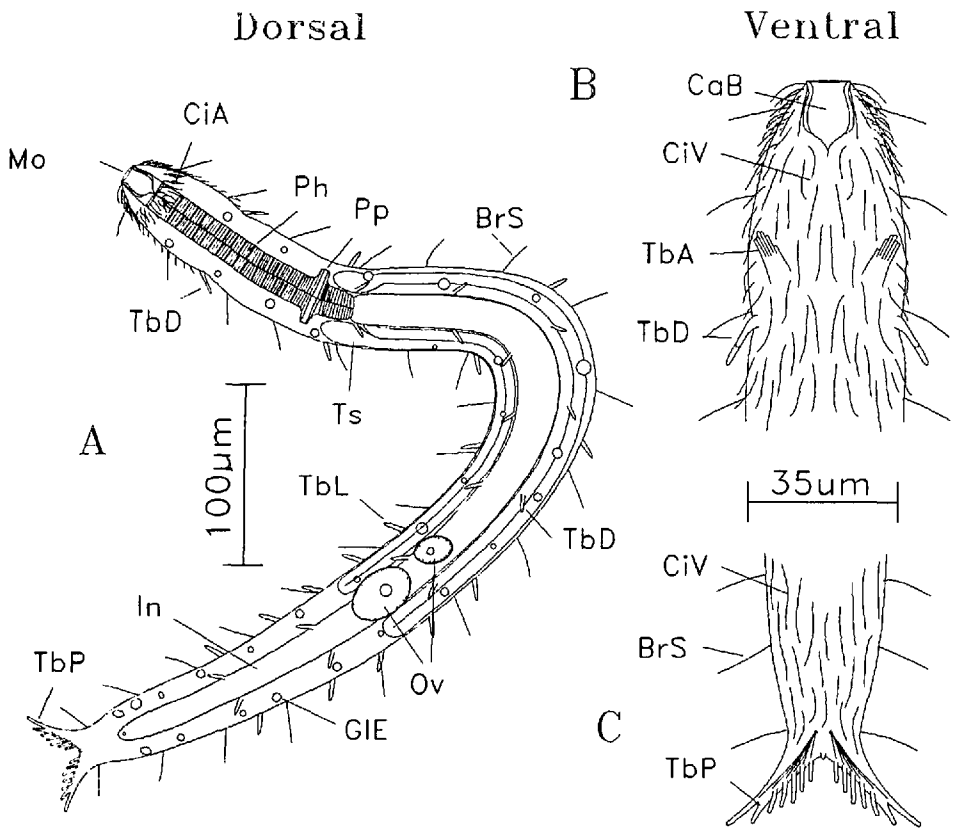

Figure 3. Adult *Paraturbanella aggregotubulata* n. sp. Internal organs and dorsal surface features (A) including evenly-spaced dorsal adhesive tubes and aggregated lateral adhesive tubes. Anterior adhesive tubes are borne on fleshy "hands" (B); small "*dohrni*" tubes are inserted ventro-laterally just behind anterior tubes. Caudal lobes (C) are finely tapered with a single row of 7 adhesive tubes on each lobe.

recording and a lower resolution VHS (240-line) version have been deposited in the Ohio University Invertebrate Museum, Athens, Ohio and submitted to the National Museum of Natural History, Washington, D.C.

Diagnosis.—*Paraturbanella* with large, heavily cuticularized buccal cavity. Eight pairs of lateral adhesive tubes,with a single pair anterior to pharyngeal-intestinal junction, two pairs in mid-body region, and five pairs in close proximity to each other in posterior trunk region. Six unequal-size anterior adhesive tubes on paired, ventral appendages. Small "*dohrni*"-type adhesive tubes. Six to 10 pairs of dorsal adhesive tubes. Seven posterior adhesive tubes in single row on each of two, tapered caudal lobes; small caudal cone present.

Etymology.—*aggregatus* (L) clustering and *tubulus* (L) for clustering of the lateral adhesive tubes along trunk.

Description.—Body strap-shaped with overall lengths of adults (5 specimens) ranging from 550–600 µm (Fig. 3A). Terminal mouth with diameter of 10 µm; buccal cavity large (10 µm wide by 15 µm long) and heavily cuticularized (Fig. 3B). Pharynx ranges from 190–210 µm in length with prominent pharyngeal pores near base. Intestine terminates in ventral anus near base of finely tapered caudal lobes. Testes begin just posterior to pharyngeal pores, thence tapering into vasa

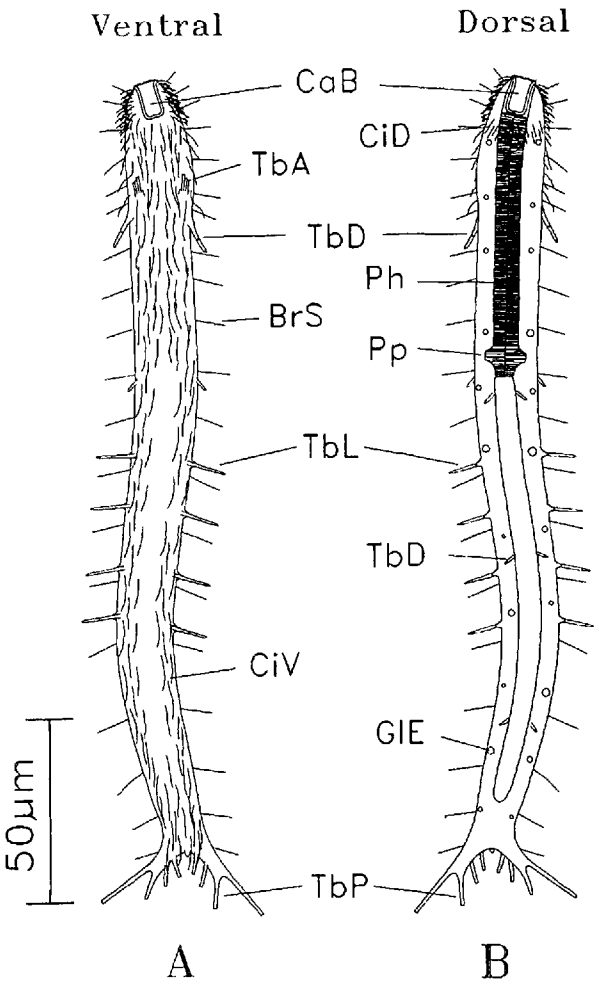

Figure 4. Juvenile *Paraturbanella aggregotubulata* n. sp. have fewer adhesive tubes of all types than do adults. Lateral adhesive tubes occur only in mid-trunk region.

deferentia that continue posteriorly to mid-trunk where they turn anteriorly to base of testes and join ventrally at midline. Numerous pairs of lateral sensory bristles (15–20 µm in length) occur along trunk from head to caudal lobes. Caudal lobes finely tapered (Figs. 3C, 4A).

Small caudal cone (2–4 µm in length) present between caudal lobes (Fig. 3C). Cone present in both subadults and juveniles (Fig. 4A). Ventral locomotor cilia cover the entire surface of pharyngeal region and posterior end, but form two broad, longitudinal bands on trunk. Sparse anterior ciliary band present on head (Fig. 3A).

Ventral adhesive tubes borne on short, fleshy appendages ("hands"). Each hand bears six unequal-length tubes (2–6 µm in length) in adults (Fig. 3B) with medial-most tube much smaller than others. Subadults and juveniles have fewer (2–4) tubes on each appendage (Fig. 4A). Additional ventral adhesive tubes in anterior trunk region consist of pair of unequal-length tubes known as *dohrni* tubes (Remane, 1927 and see Evans and Hummon, 1991) that are inserted just posterior to ventral hands (Fig. 3B). Longer tube of each pair 10–12 µm in length and shorter

tube 6–8 μm in length in adults. Lateral adhesive tubes (10–15 μm in length) consist of eight pairs inserted ventrolaterally; a single pair anterior to pharyngeal-intestinal junction, two widely-spaced pairs in mid-trunk region, and remaining five pairs clustered together in posterior trunk region (Fig. 3A). Dorsal adhesive tubes (8–10 μm in length) consist of 8–10 pairs that begin at pharyngeal-intestinal junction and terminate at same level as lateral adhesive tubes (Fig. 3A). Seven posterior adhesive tubes of unequal-length (6–12 μm) in single row borne on posterior margin of each caudal lobe. Subadults and juveniles have fewer tubes of all types (Fig. 4B).

Remarks.—There are presently 10 species in the genus *Paraturbanella.* Important taxonomic characters for this genus include 1) size, shape and degree of cuticularization of the buccal cavity, 2) presence/absence, number and distribution pattern of the adhesive tubes, 3) size and shape of the *dohrni* tubes, 4) presence/absence and size of the caudal cone, and 5) ventral ciliary pattern. *Paraturbanella aggregotubulata* most closely resembles *P. eireanna* Maguire, 1976 and *P. intermedia* Wieser, 1957 in general body shape, and in size and cuticularization of the buccal cavity. *Paraturbanella aggregotubulata* differs from both of these species by having 1) shorter *dohrni* tubes, 2) dorsal adhesive tubes, and 3) lateral adhesive tubes clustered in the mid-trunk region. *Paraturbanella aggregotubulata* has fewer posterior adhesive tubes than *P. intermedia* and possesses a caudal cone (absent in *P. eireanna*). *Paraturbanella armoricana* (Swedmark, 1954), and Kisielewski (1987) has dorsal adhesive tubes and shows a small degree of clustering of lateral adhesive tubes, but differs from *P. aggregotubulata* in having 1) fewer (5 vs. 6) anterior adhesive tubes, 2) a double row of posterior adhesive tubes, and 3) a narrower constriction of the trunk near the base of the caudal lobes. *Paraturbanella armoricana* also lacks a caudal cone and the heavy buccal cuticularization characteristic of *P. aggregotubulata. P. aggregotubulata* was found at all sampling locations and in both subtidal and intertidal siliceous sands.

Order Chaetonotida Rao and Clausen, 1970
Suborder Multitubulatina d'Hondt, 1971
Family Neodasyidae Remane, 1929
Genus *Neodasys* Remane, 1927

Neodasys ciritus new species
Figure 5

Holotype.—The adult specimen, 480 μm in length, which is illustrated and represented on Super-VHS format videotape [ICZN, 1985: Art. 72(c)(v)], but which is no longer extant. Ormond Beach, Florida (29°17'N, 80°59'W); sandy intertidal sediments; September 1990. Copies of this high resolution (400-line) Super-VHS video recording and a lower resolution VHS (240-line) version have been deposited in the Ohio University Invertebrate Museum, Athens, Ohio and submitted to the National Museum of Natural History, Washington, D.C.

Diagnosis.—*Neodasys* with goblet-shaped, heavily-cuticularized buccal capsule extending beyond mouth. Digestive tract bordered by two longitudinal rows of globular, red-pigmented cells. Distinct furcal branches with squared tips; not borne on peduncle. Ventral locomotor cilia in two broad longitudinal rows that join near anus. Clump of several longer cilia in interciliary field near caudal end. Head with two lateral lobes bearing cilia and sensory bristles. Lateral sensory bristles sparse.

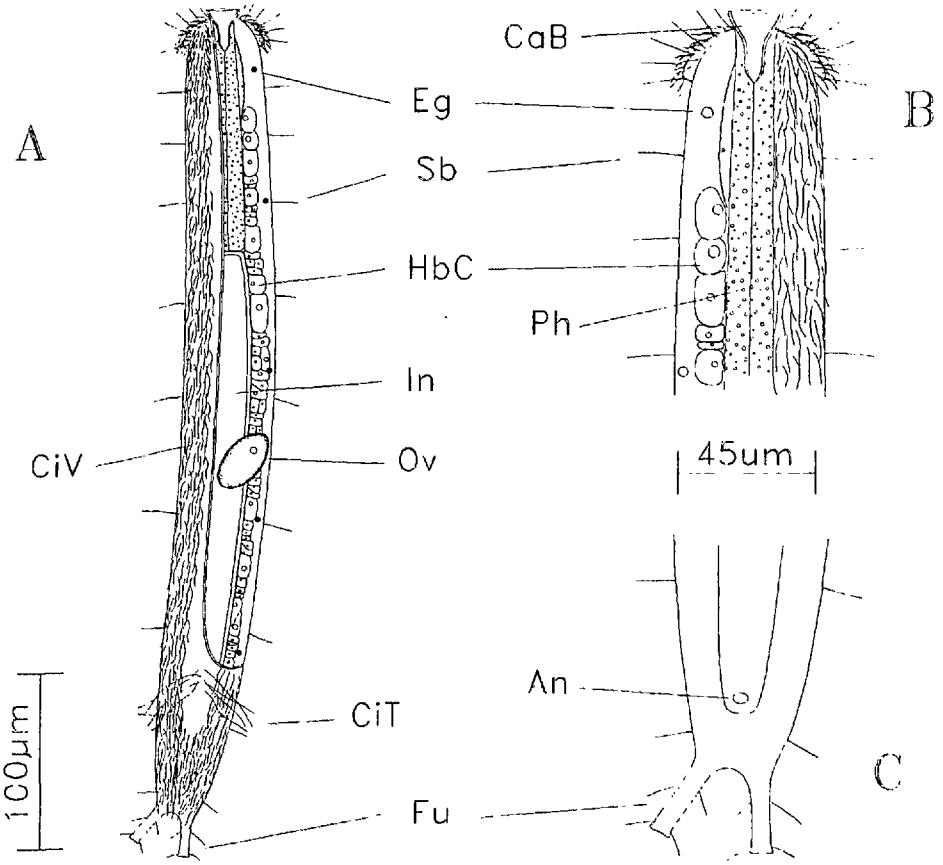

Figure 5. Adult *Neodasys ciritus* n. sp. Red-pigmented cells bordering the digestive tract (A) have been reported to contain hemoglobin; long tuft of ventral cilia occurs near posterior end. Goblet-shaped buccal capsule (B) is heavily cuticularized and projects anteriorly beyond head. Furcal branches (C) bear sensory bristles and have squared tips.

Etymology.—*Ciritus* (L) for small beard, referring to the patch of unusually long ventral cilia.

Description.—Adult specimens (5 specimens) ranged from 460–520 µm in length; body of uniform width (42–48 µm). Heavily cuticularized buccal capsule leads to short pharynx (130–140 µm), thence to intestinal tract which terminates in ventral anus near posterior end of trunk (Fig. 5C). Digestive tract bordered dorsolaterally by rectangular and cuboidal cells (Y-cells) in one or two layers from mid-pharyngeal region to termination of intestine. Six small epidermal glands, on each side of digestive tract, uniformly distributed from head to posterior end of trunk (Fig. 5A, B). Caudal appendages 28–30 µm in length with squared tips.

Two lateral lobes on head covered with numerous short cilia and several longer sensory bristles (Fig. 5B); lateral sensory bristles continue to tip of furcal branches. Ventral locomotor cilia in two wide longitudinal bands; separate on head and trunk, confluent from near anus to furca. Unusual tuft of long (about 40 µm), ventral cilia in interciliary field just anterior to confluence of ventral ciliary bands (Fig. 5A).

Remarks.—*Neodasys ciritus,* the "red" gastrotrich, has a long history in the gastrotrich literature and has been described as *Neodasys* sp. by several workers

(Colacino and Kraus, 1984; Kraus and Colacino, 1984; Ruppert, 1982, 1978, 1977; Ruppert and Hogue, 1978; Ruppert and Travis, 1983; Travis, 1983), while other workers have erroneously referred to it as *N. chaetonotoideus* Remane, 1927 (Rieger, 1976; Rieger and Rieger, 1977; Hummon, 1969).

Hummon (1969) gives a detailed description of adult and subadult specimens found in Massachusetts beaches, describing the red-pigmented cells as lying in two longitudinal bands adjacent to the digestive tract. He also describes the reproductive system and sperm morphology. Ruppert (1977) includes drawings and photomicrographs of both whole animals and of the reproductive system, specifically the testes and spermatozoa. He describes the red-pigmented cells as "Y-cells," compares *Neodasys* sp. and *N. uchidai* Remane, 1961 with respect to their general morphology, and provides information on the ecological and geographical distributions of both species. Kraus et al. (1981) were the first to show that the red color in *Neodasys* sp. is due to the presence of hemoglobin in the Y-cells. Ruppert and Travis (1983) give the most complete description of *Neodasys* sp. to date and include a detailed cytological description of the hemoglobin-containing cells. They also give a brief history of red coloration in meiobenthic organisms. Their description of this species, and that of Ruppert (1977) are in general agreement with my observations of *N. ciritus*. However, no previous workers have observed the tuft of long ventral cilia, probably due to the fact that these cilia are only visible in a lateral view of the animal (seldom obtained with a glass slide and cover slip preparation).

Colacino and Kraus (1984) conducted oxygen transport and uptake studies on *Neodasys* sp. and concluded that simple diffusion of oxygen through the body wall is sufficient to meet the metabolic needs of an active *Neodasys,* speculating that the hemoglobin-cells store oxygen for use when *Neodasys* finds itself in anoxic sediments. *Neodasys ciritus* was very common both intertidally and subtidally at all sampling locations in this study, but was never observed in sediments which appeared to be anoxic.

Neodasys ciritus differs from *N. chaetonotoideus* and *N. uchidai* by having 1) a large, goblet-shaped and heavily cuticularized buccal capsule, 2) two longitudinal rows of hemoglobin-containing Y-cells that impart a rusty-red color to the animal, 3) a tuft of long, ventral cilia, and 4) broader longitudinal rows of ventral locomotor cilia. *Neodasys ciritus* also lacks the caudal peduncle of *N. uchidai. Neodasys uchidai* has been reported as having red-pigmented Y-cells (Ruppert, 1977; Rieger et al., 1974; Teuchert, 1974), but these were not noted in Remane's (1961) description of the type specimen for this species. The Y-cells described for *N. uchidai* by Ruppert (1977) appear to be larger and less numerous than in *N. ciritus*; the anterior-most pair of Y-cells in *N. ciritus* differs from those described for *N. uchidai* in being elongated and squamous (Fig. 5B). *Neodasys uchidai* has not been reported from North America.

Suborder Paucitubulatina d'Hondt, 1971
Family Chaetonotidae Zelinka, 1889
Genus *Chaetonotus* Ehrenberg, 1830

Chaetonotus sagittarius new species
Figure 6

Holotype.—The subadult specimen, 180 μm in length, which is illustrated and represented on Super-VHS format videotape [ICZN, 1985: Art. 72(c)(v)], but which is no longer extant. Vilano Beach, Florida (29°55'N, 81°17'W); sandy sub-

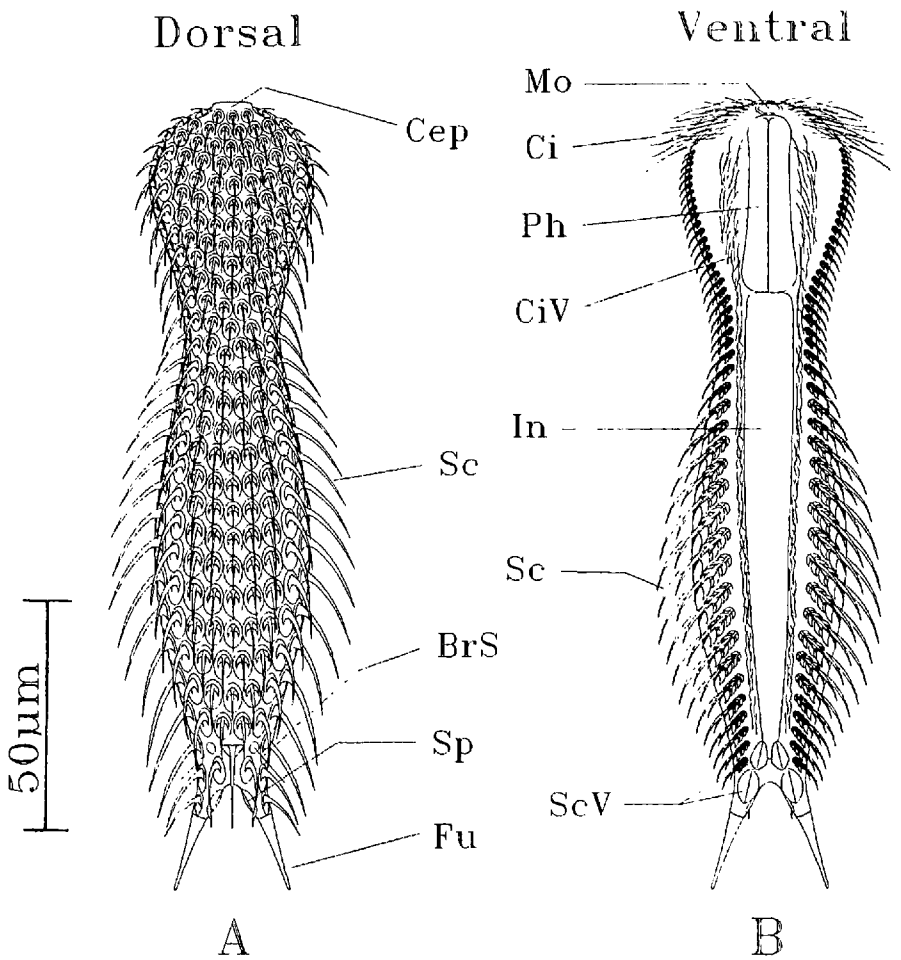

Figure 6. Adult *Chaetonotus sagittarius* n. sp. Dorsal scales (A) possess a single, robust spine. Spines increase in size from midline toward lateral margins. Ventral scales (B) are arranged in oblique rows of two to four spines each; four additional ventral scales with keels occur at junctions of furcal branches.

tidal sediments; June 1990. Copies of this high resolution (400-line) Super-VHS video recording and a lower resolution VHS (240-line) version have been deposited in the Ohio University Invertebrate Museum, Athens, Ohio and submitted to the National Museum of Natural History, Washington, D.C.

Diagnosis.—*Chaetonotus* with well-rounded, unlobed head and sub-terminal mouth; small cephalion present. Seven to 10 longitudinal rows of elliptical dorsal scales with 26–28 scales per row. Simple, curved spine on each scale has robust, half-moon shaped base tapering to sharp point at tip of spine. Single spine without associated scale on posterior trunk near caudal furca. Oval ventral scales with spines arranged in oblique rows of two (head), three (neck), and four (trunk). Two pairs of single-keeled scales on ventral posterior end. Oval scale with short, posterior spine on medial edge of each furcal branch.

Etymology.—*sagittarius* (L), denoting arrows, after the quiver-like arrangement of ventral spines.

Description.—Overall length from 175–186 μm (3 specimens); head (35–39 μm); trunk (33–36 μm). Furcal branches 26 μm in length (Fig. 6A, B). Unlobed head bears small (6 μm in width), rectangular cephalion dorsally (Fig. 6B). Long tactile cilia insert ventrally on each side of head near mouth (Fig. 6A).

Dorsal scales elliptical in trunk region, progressing to circular shape toward neck and head (Fig. 6A). Scales bear simple, long spine (15–25 μm in trunk region, 5–15 μm on neck and head) that has robust half-moon shaped base, and tapers to fine point. Spines in individual lateral row shortest at midline and longest near lateral margins of trunk. Single spine (20 μm in length) without base scale occurs dorsally on midline near caudal furca. Small, round scale with single sensory bristle occurs on either side of this spine. Oval scale on interior margin of each furcal branch bears a short, posterior spine. Ventral scales with single spine arranged in oblique rows of from 2 to 4 scales each; decreasing in number and size from trunk to head and from trunk to caudal furca (Fig. 6B). Maximum length of ventral spines 16 μm. Two pairs of additional ventral scales with keels along their long axis ventrally in posterior trunk region near caudal furca. Posteriormost pair positioned on furcal base and elliptical in shape; second, smaller (7 μm in length) pair anterior to furcal pair and closer to midline.

Ventral ciliation begins with two wide longitudinal bands in head region, narrowing at neck, and continuing separately to posterior trunk region. Interciliary field lacks cuticular armature.

Small, slightly ventral mouth 5–7 μm in diameter. Pharynx slightly bulbous at each end, larger bulb near junction with intestine. Intestine terminates in ventral anus.

Remarks.—*Chaetonotus sagittarius* most resembles *C. chicous* Hummon, 1974 in overall shape, although *C. chicous* has a five-lobed head. Their scales are similar but *C. chicous* has less robust spines on more elliptical scales and also lacks the two pairs of ventral posterior scales. Unlike *C. sagittarius,* the ventral ciliation of *C. chicous* is confluent in the head region. *Chaetonotus sagittarius* has dorsal scales similar to *C. fencheli* d'Hondt, 1974 and spines similar to *C. larus* Ehrenberg, 1838 and *C. maximus* Ehrenberg, 1838 (Balsamo, 1978). The shape and arrangement of the ventral cuticular armature of *C. sagittarius* is unique among members of the genus. *Chaetonotus sagittarius* was found only in subtidal sands at Vilano Beach.

Genus *Halichaetonotus* Remane, 1936

Halichaetonotus bataceus new species
Figure 7

Holotype.—The adult specimen, 120 μm in length, which is illustrated and represented on Super-VHS format videotape [ICZN, 1985: Art. 72(c)(v)], but which is no longer extant. Matanzas Beach, Florida (29°42'N, 81°14'W); sandy intertidal sediments; June 1990. Copies of this high resolution (400-line) Super-VHS video recording and a lower resolution VHS (240-line) version have been deposited in the Ohio University Invertebrate Museum, Athens, Ohio and submitted to the National Museum of Natural History, Washington, D.C.

Diagnosis.—*Halichaetonotus* with nine longitudinal rows of elliptical scales bearing short, curved spines. Single, small rounded scale with spine dorsally at base of caudal furca; bordered on each side by larger round scale with spine. Single column of hydrofoil scales on each side ventrally that bear erect, triangular lamella.

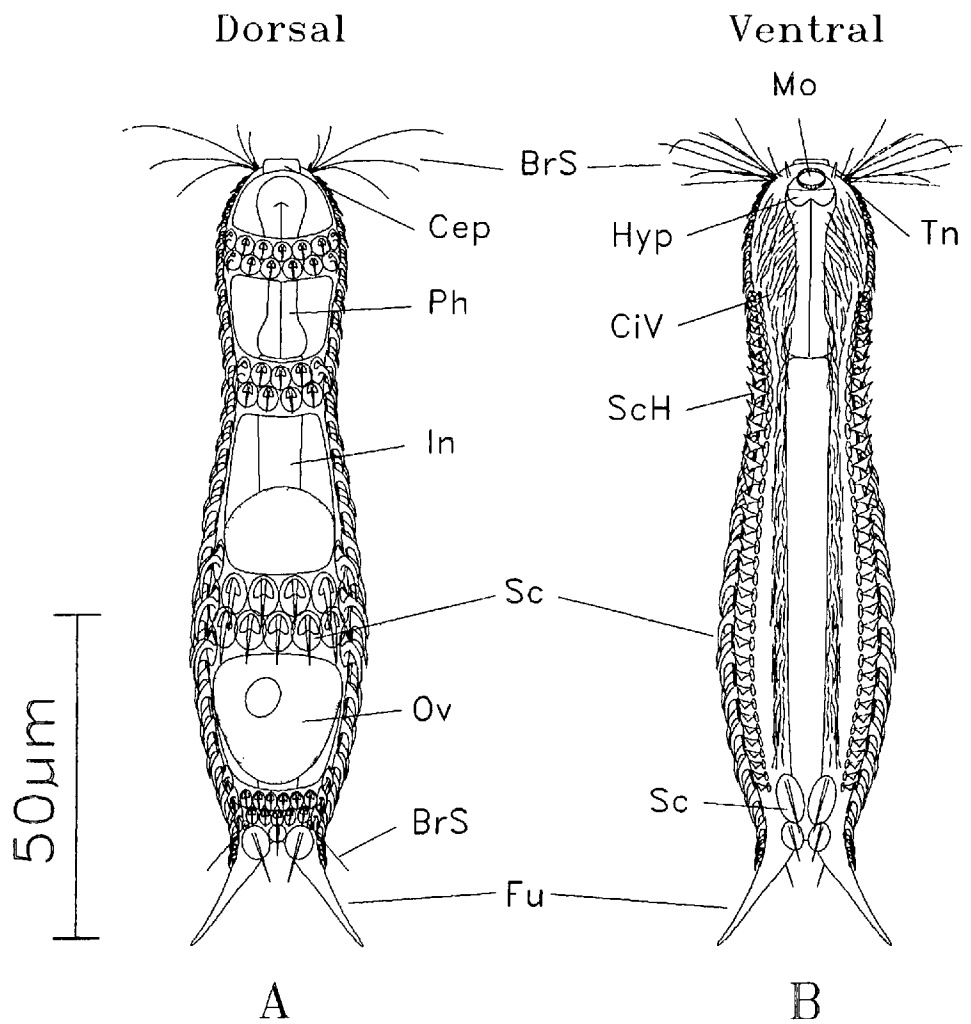

Figure 7. Adult *Halichaetonotus bataceus* n. sp. Elliptical dorsal scales (A) with cutaway view of pharynx, intestine and ovum; three round scales positioned at base of caudal furca. A single column of ventral hydrofoil scales with triangular vane (B) follows lateral margins; two pairs of oval scales along midline near caudal furca.

Four oval scales with short spine near ventral midline of trunk near caudal furca; posterior pair smaller and more rounded than anterior pair. Rectangular cephalion; "W"-shaped hypostomium.

Etymology.—*bataceus* (L), thorny, after the shape of the dorsal scales.

Description.—Ten-pin shaped animal with overall length of 115–125 µm (3 specimens), maximum width of 23–26 µm and head width of 17–19 µm (Fig. 7). Furcal branches 18–20 µm in length. Head bears numerous lateral sensory cilia, rectangular cephalion dorsally, and "W"-shaped hypostomium ventrally.

Cuticular armature consists of dorsal and lateral scales, elliptical in shape with rounded, triangular half-scale and short, curved spine (Fig. 7A); nine scales per transverse row. Scales largest in mid-trunk region becoming smaller towards head and caudum. Three rounded scales with spine dorsally at base of caudal furca.

Middle scale one-half the size of two outer scales. Single longitudinal row of ventral hydrofoil scales follows each trunk margin from mid-pharyngeal region to posterior end of ciliary tract; scale with small elliptical base and erect, triangular lamella (Fig. 7B). Two pairs of elliptical ventral scales each with single, simple spine occur near the midline just anterior to caudal furca; anterior pair 2× size of posterior pair. No scales or spines observed in interciliary field. Two dorsal sensory bristles occur near caudal furca.

Ventral ciliary tract in two rows, wider in the head region, thence tapering into narrow bands on trunk (Fig. 7B); tracts never confluent. Ventral mouth 5 μm in diameter with small tentacle (5 μm in length) on each side. Pharynx 25–30 μm long with enlarged bulbs at anterior and posterior ends. Intestine straight, terminating in ventral anus.

Remarks.—*Halichaetonotus bataceus* differs from many members of the genus *Halichaetonotus* by having simple dorsal spines without visible vanes. These spines are of the same general type as those of *H. littoralis* d'Hondt, 1971, but are more robust. The three round scales with spines located dorsally near the caudal furca are not found elsewhere in this genus. The single row of small hydrofoil scales bearing triangular lamellae also distinguishes *H. bataceus* from its congeners; though somewhat similar hydrofoil scales, but with much larger and rounded lamellae, are found in *H. paradoxus* Remane, 1927 (Kisielewski, 1988). *Halichaetonotus bataceus* was found in intertidal sands at Matanzas Beach, Florida and subtidal sands at Vilano Beach, Florida.

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Literature Cited

Balsamo, M. 1978. Prime richerche sui Gastrotrichi dulciacquicoli italiani. Atti. Soc. Tosc. Sci. Nat., Pisa, Ser. B, 87: 97–126.

Colacino, J. M. and D. W. Kraus. 1984. Hemoglobin-containing cells of *Neodasys* (Gastrotricha, Chaetonotida) II. Respiratory significance. Comp. Biochem. Physiol. 79: 363–369.

Decho, A. W., W. D. Hummon and J. W. Fleeger. 1985. Meiofauna-sediment interactions around subtropic seagrass sediments using factor analysis. J. Mar. Res. 43: 237–255.

Evans, W. A. and W. D. Hummon. 1991. A new genus and species of Gastrotricha from the Atlantic Coast of Florida. Trans. Amer. Micros. Soc. 10: 321–327.

Forneris, L. 1961. Beiträge zur Gastrotrichen fauna der Nord- und Ostsee. Kieler Meeresforsch. 17: 206–218.

Hummon, W. D. 1969. Distributional ecology of interstitial Gastrotricha from Woods Hole, Massachusetts, with taxonomic comments on previously described species. Ph.D. Dissertation, U. Massachusetts, Amherst. 117 p.

———. 1974. S_H: A similarity index based on shared species diversity, used to access temporal and spatial relations among intertidal marine Gastrotricha. Oecologia 17:203–220.

International Congress of Zoological Nomenclature. 1985. International Code of Zoological Nomenclature. U. California Press, Berkeley. 338 pages.

Kisielewski, J. 1987. New records of marine Gastrotricha from the French coasts of Manche and Atlantic I. Macrodasyida, with descriptions of seven new species. Bull. Mus. Natl. Hist. Nat., Paris 9: 837–877.

———. 1988. New records of marine Gastrotricha from the French coasts of Manche and Atlantic II. Chaetonotida with descriptions of four new species. Cah. Biol. Mar. 29: 187–213.

Kraus, D. W. and J. M. Colacino. 1984. The oxygen consumption rates of three gastrotrichs. Comp. Biochem. Physiol. 79A: 691–693.

Kraus, D. W., P. B. Travis, J. M. Colacino and E. E. Ruppert. 1981. Occurrence of hemoglobin in Gastrotricha. Amer. Zool. 21: 950.

Remane, A. 1927. Neue Gastrotricha Macrodasyoidea. Zool. Jahrb. (Abt. Syst., Oekol., Georg. Tiere) 54: 203–242.

———. 1961. *Neodasys uchidai* n. sp., eine zweite *Neodasys*-Art (Gastrotricha, Chaetonotoidea). Kieler Meeresf. 17: 85–88.

Rieger, G. E. and R. M. Rieger. 1977. Comparative fine structure study of the gastrotrich cuticle and aspects of cuticle evolution within the Aschelminthes. Z. Zool. Syst. Evolut.-Forsch. 15: 81–124.

Rieger, R. M. 1976. Monociliated epidermal cells in Gastrotricha: significance for concepts of early metazoan evolution. Z. Zool. Syst. Evolut.-Forsch. 14: 196–226.

———, E. Ruppert, G. E. Rieger and C. Schoepfer-Sterrer. 1974. On the fine structure of gastrotrichs with description of *Chordodasys antennatus* sp. n. Zool. Scripta 3: 219–237.

Ruppert, E. E. 1982. Comparative ultrastructure of the gastrotrich pharynx and the evolution of myoepithelial foreguts in Aschelminthes. Zoomorph. 99: 181–220.

———. 1978. The reproductive system of gastrotrichs. III. Genital organs of Thaumastodermatinae subfam. n. and Diplodasyinae subfam. n. with discussion of reproduction in Macrodasyida. Zool. Scripta 7: 93–114.

———. 1977. Zoogeography and speciation in marine Gastrotricha. Mikrofauna Meeresboden 61: 231–251.

——— and E. W. Hogue. 1978. Phylum Gastrotricha. Pages 98–99 *in* R. G. Zingmark, ed. An annotated checklist of the biota of the coastal zone of South Carolina. U. South Carolina Press, Columbia.

——— and K. Shaw. 1977. The reproductive system of gastrotrichs. I. Introduction with morphological data for two new *Dolichodasys* species. Zool. Scripta 6: 185–195.

——— and P. B. Travis. 1983. Hemoglobin-containing cells of *Neodasys* (Gastrotricha, Chaetonotida). I. Morphology and ultrastructure. J. Morphol. 175: 57–64.

Schoepfer-Sterrer, C. 1974. Five new species of Urodasys and remarks on the terminology of the genital organs in Macrodasyidae (Gastrotricha). Cah. Biol. Mar. 15: 225–254.

Swedmark, B. 1964. The interstitial fauna of marine sand. Biol. Rev. 39: 1–42.

Teuchert, G. 1974. Aufbau und Feinstruktur der Muskelsysteme von *Turbanella cornuta* Remane (Gastrotricha, Macrodasyoidea). Mikrofauna Meeresboden 39: 223–246.

Thane-Fenchel, A. 1970. Interstitial gastrotrichs in some south Florida beaches. Ophelia 7: 113–138.

Travis, P. B. 1983. Ultrastructure study of body wall organization and Y-cell composition in the Gastrotricha. Z. Zool. Syst. Evolut.-Forsch. 21: 52–68.

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