NEREIS (NEANTHES) MICROMMA N. SP. (POLYCHAETA: NEREIDIDAE) FROM THE NORTHERN GULF OF MEXICO WITH A NOTE ON THE STRUCTURE OF NEREIDID PALPS

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ABSTRACT

A new species of polychaete annelid, *Nereis (Neanthes)* micromma, is described and illustrated. The species, which is most abundant on muddy sand bottoms, has been collected offshore from the Texas and Louisiana coasts in the northern Gulf of Mexico; it has also been collected in Gulf influenced bay areas in Texas. Although present the entire year in Texas waters, population data indicate maximum reproductive activity occurs in the fall. Most specimens have been collected from waters of 25 to 36 parts per thousand salinity.

The inappropriateness of "biarticulate" in describing the palps of some nereidids is discussed.

INTRODUCTION

Numerous specimens of a nereidid* polychaete that could not be assigned to any known species were collected during several successive research projects conducted off the Texas coast beginning in 1973. The species, described herein, was consistently called *Nereis* sp. in all project reports (Harper and Case 1975; Harper, Scrudato and Giam 1976; Harper 1977a, b). The species has also recently been collected at several localities offshore from the Louisiana coast west of the Mississippi Delta (unpublished data).

The genus *Nereis* is separated into two subgenera, *Nereis (Nereis)* which has homogomph falcigers in the posterior notopodia, and *Nereis* (*Neanthes*) which lacks them. The new species belongs in the latter subgenus. Many authors, including Fauchald (1977), consider the differences in posterior setae sufficient to elevate the subgenera to generic status.

Specimens of *Nereis micromma* have been deposited in the following collections: National Museum of Natural History, Washington, D.C. (USNM), Texas A&M Marine Laboratory, Galveston, Texas (AMML), working collection, Department of Oceanography, Texas A&M University, College Station, Texas

* The orthographic familial spelling is Nereididae (Pettibone, personal communication), thus the common term is nereidid. Whether this usage will be widely accepted remains to be seen.

(TAMU); Allan Hancock Foundation, University of Southern California, Los Angeles, California (AHF).

NEREIS (NEANTHES) MICROMMA SP. NOV.

Material examined—TEXAS: Freeport, 19 km offshore on muddy sand bottom of drowned Brazos-Colorado River delta, 28°44.5′N, 95°13.2′W, 21 m, 2 December 1977, holotype (USNM 55575), 17 paratypes (USNM 55576, 55578), 12 paratypes (AHF Poly 1251), 5 paratypes (AMML); 4 January 1978, 10 specimens (AMML), 4 specimens (TAMU); 24 February 1978, 3 specimens (AMML). Freeport, 8 km offshore on clay bottom of Brazos River subaqueous delta, 28°49.4′N, 95°19.6′W, 17 m, 15 December 1977, 1 specimen (USNM 55577), 8 specimens (TAMU). Freeport, 15 km offshore on muddy sand bottom, 28°44.3′N, 95°17.5′W, 21 m, 29 May 1973, 6 specimens (USNM 55691). Galveston, muddy sand bottom of U.S. Army Corps of Engineers spoil disposal area off Galveston, 29°17.0′N, 94°41.1′W, 10 m, 23 January 1976, 8 specimens (USNM 55579); 24 January 1976, 1 specimen (AMML). Buccaneer Oil/Gas Field, about 50 km south of Galveston, 28°53.3′N, 94°41.5′W, sand-mud bottom, 21 m, 13 specimens (USNM 55580), 6 specimens, (AMML).

Other records—TEXAS: Lower Matagorda Bay, sandy mud bottom, 4 m. LOUISIANA: offshore from Atchafalaya Bay to Mississippi Delta in depths of 9 to 45 m.

Diagnosis: Body slender, elongate; prostomium with 2 pairs of small eyes, pair of short antennae and pair of palps; peristomium with 4 pairs of tentacular cirri, the upper posterior pair twice as long as others; proboscis with few paragnaths on areas IV, VI and VII–VIII; upper notopodial ligule first appears on setiger 6; in posterior segments, upper notopodial ligule enlarged, foliaceous, vascularized, with small terminal dorsal cirrus; notoacicula lacking in far posterior parapodia.

Description: Body long; cylindrical anteriorly, somewhat dorsoventrally flattened and tapering posteriorly. Prostomium (Fig. 1a) with 2 short tapered antennae, 2 tapered palps, the distal halves of which mostly retract into proximal halves (creating appearance of biarticulate palps), and 2 pairs of small eyes; anterior pair slightly arcuate, posterior pair suboval. Peristomium (Fig. 1a) with 4 pairs of tentacular cirri; anterior pairs and ventral posterior pair subequal, reaching to setiger 1 or 2; posterior pair twice as long, reaching setiger 3 to 7 depending on state of state of contraction of anterior segments. Proboscis (Figs. 1b, c) with pair of toothed jaws and very few conical paragnaths; dental formula —area I: 0; area II: 0; area III: 0; area IV: 0–3 in oblique row; area V: 0; area VI: 0–5 in triangle, arch or row; area VII–VIII: 3–5 in single row (occasionally in pairs).

First and second segments following peristomium subbiramous, having dorsal cirrus, lower notopodial ligule, neuropodial postsetal lobe and ventral cirrus; upper notopodial ligule, notosetae and notoaciculum lacking (Fig. 2). Remaining parapodia biramous. Parapodia 3 through 5 similar, with dorsal cirrus, lower notopodial ligule, postsetal lobe and ventral cirrus (Fig. 3). Upper notopodial ligule of larger adults appearing first on setiger 6 (Fig. 4) and present thereafter. On smaller adults the upper notopodial ligule first appears on setiger 7, and on young specimens, 25–35. Upper notopodial ligule smaller than dorsal cirrus on setiger 6, slightly smaller on setigers 7 and 8 and subequal or slightly larger to about setiger 20 (Fig. 5). From setiger 20 to about setiger 50, upper notopodial ligule smaller than dorsal cirrus, and smaller, more cirriform than subtriangular lower notopodial ligule. Neuropodial ligule and ventral cirrus subequal.

Upper notopodial ligule begins enlarging at about setiger 50, becoming noticeably larger and triangular by setiger 60. In middle and posterior body regions, upper ligule enlarged, foliaceous and vascularized, with small terminal dorsal cirrus (Fig. 6).

Setae located as follows: notosetae, where present, in a line slanting downward and posteriorly above lower notopodial ligule; upper neurosetae in bundle immediately above and behind acicular lobe; lower neurosetae in semicircle below and behind acicular lobe, almost contiguous with upper notosetal bundle. Shafts of all setae canaliculated. Spiniger blades range from long to short within setal bundles and from parapodium to parapodium; from setiger 3, short bladed spinigers consistently occur in upper neuropodial bundle, anterior part, and lower neuropodial semicircle, below acicular lobe.

On setiger 1, upper neurosetal bundle consisting of anterior heterogomph falcigers with rounded tips and coarse teeth (Fig. 7a) and posterior homogomph spinigers (Figs. 7b, c, d). Lower neurosetae are all heterogomph falcigers with rounded tips and coarse teeth (Fig. 7e). On setiger 2, upper neurosetae are short bladed heterogomph spinigers in anterior part of bundle (Fig. 8a) and homogomph spinigers posteriorly (as in Figs. 7b, c, d); lower neurosetae are heterogomph falcigers with fine teeth below acicular lobe (Fig. 8b) and heterogomph spinigers behind lobe (Fig. 8c).

On remaining anterior segments, notosetae are homogomph spinigers; upper neurosetae are anterior short bladed heterogomph spinigers (Fig. 8a) and posterior homogomph spinigers (Figs. 7b, c, d); lower neurosetae are short bladed heterogomph spinigers (Fig. 8a) below acicular lobe and longer bladed heterogomph spinigers behind lobe.

Setae become less numerous posteriorly; separation between upper and lower neurosetal bundles less distinct. Notosetae in posterior body region are 2–3 homogomph spinigers (Fig. 9a), upper neurosetae are 2 heterogomph spinigers (Fig. 9b) and 2–3 longer bladed homogomph spinigers; lower neurosetae are 2 heterogomph falcigers (Fig. 9c) and 2 short bladed heterogomph spinigers (Fig. 8a). Far posterior parapodia lacking notoacicula; notopodium represented by ligule and single homogomph spiniger. Neurosetae are as on preceding posterior segments. Pygidium bilobed with pair of anal cirri (Fig. 10).

Etymology: The specific epithet refers to the small eyes of the species.

Size range: The holotype, an adult worm 86 mm long, 1.0 mm wide and having 240 fully formed segments followed by 12 incompletely developed segments, is the largest complete specimen collected. A headless specimen (USNM 55577), broken between setigers 5 and 6, is 98 mm long, 1.5 mm wide and has 300 fully formed segments, followed by 12 incompletely formed segments. Thus adult specimens attain lengths of 100 mm or more.

Color: When living, anterior segments colorless, semi-transparent, and jaws may be seen through integument. Golden flecks appear in dorsal integument by setiger 17, becoming more abundant posteriorly; dorsal surface and upper notopodial ligules almost completely golden in middle and posterior segments. Blood red; dorsal vessel narrow anteriorly, becoming broader posteriorly, easily seen through transparent ventral surface. Jaws amber; acicula black; setae dark.

When preserved, the body is uniformly opaque white with no hint of the beauty of the living worm. In rose Bengal stain, structures in the ligules absorb much stain, turning bright red while remainder of body stains light pink. Under magnification, bright red areas appear glandular, consisting of highly convoluted tubular structures giving rise to slender tubular structures running toward tip and base of ligule. These stained structures present in lower notopodial and neuropodial ligules from setiger 1; in former, mass fills most of ligule, and in latter, mass occupies ventral half of ligule and may extend into parapodium proper. Structure present in upper notopodial ligule from setiger 6; in cirriform ligule, structure cylindrical, filling much of ligule; in foliaceous, mid-body ligules, structure restricted to tip of ligule, and is absent from far posterior ligules.

Distribution: The species is presently known only from the northern Gulf of Mexico, having been collected from the upper Texas coast and the Louisiana coast. The species occurs from near Gulf bay bottoms to about 45-m depth offshore.

Notes on living worms: Living worms, collected on 23 February 1978 off Freeport, Texas in 21-m depth, were observed in the laboratory. In a finger bowl with no substrate, the anterior end of the worm was active, but the posterior end was usually kept coiled. The specimens exhibited no tendency to swim, but thrashed violently if touched. If a substrate was provided, the worms immediately began to burrow, using the proboscis to create a path through the sediment. Burrowing was accomplished rapidly.

The ventrally directed palps were kept extended and relatively close together (Fig. 11), unlike the preserved state in which the palps almost always curve outward and the distal halves are mostly retracted into the proximal halves (Fig. 1a). The palps constantly probed the bottom of the container and were periodically retracted and reextended.

The tentacular cirri were carried as follows: anterior dorsal—forward about 45° and extended laterally; anterior ventral—forward about 45° and extended ventral (usually in contact with the bottom of the container); posterior dorsal —forward about 30–45° and extended dorsally about 30° from the vertical; posterior ventral—perpendicular to the side of the body.

The living worms were broadest at setiger 6 or 7. Peristomium and segments 5–8 with lateral and ventral longitudinal ridges.

Ecological notes: *Nereis micromma* was collected most frequently from muddy sand bottoms, occurring infrequently on silt or clay bottoms, and has not been collected from hard sand bottoms. Most specimens have been collected from localities having bottom water salinities of 25 to 36 parts per thousand.

The population trends of *N. micromma* at two study areas, 8 and 19 km off Freeport, Texas, are shown in Figure 12. Sediment temperature and bottom water salinity trends in the two study areas are provided for comparison (Fig. 13). The worms were more abundant on muddy sand bottoms at the 19 km site (21-m depth) than on the predominantly clay bottoms at the 8 km site (17-m depth). Populations were largest in the fall (October–December) and smallest in late spring (May–June), and were larger in the 1978–79 fall–winter period than during the same period in 1977–78. The presence of heteronereidids in the June through August samples, followed immediately by a population irruption in September–October, indicates that spawning occurred primarily in the early fall, triggered by decreasing temperatures. Of particular interest is the population trend between December and April at the 19 km site; the populations declined to a low in February, underwent an increase in March, and declined again in April. When this pattern emerged in 1977–78, it was thought to be due to sampling error, but reoccurrence in 1978–79 indicates that it may be an annual event. A similar trend occurred at the 8 km site, but is not as distinct because of the smaller population size. In both instances, the depressed populations coincided with the lowest recorded sediment temperatures and the March increases occurred as the temperature began to increase. The salinity was relatively stable throughout the study at the 19 km site and probably had little, if any, influence on the trends. Because there was no indication of a brief reproductive period preceding the March population increase, the short-lived population decrease in the middle of winter may have been caused by the worms burrowing deeper into the substrate than the sampling devices (15 cm high Ekman grabs) could penetrate, thus avoiding the cold temperatures of the upper sediment layers.

During this period of study, *Nereis micromma* was the third most abundant benthic species at the offshore site, comprising 6% of the population, and was eighth in abundance on the nearshore clay bottoms, comprising 2% of the population.

Similar species: Of the several species of nereidids that coexist with *Nereis micromma*, only one, *Nereis (Neanthes) succinea* Frey and Leuckart, 1847, is similar. The posterior parapodia of both species have enlarged, foliaceous upper notopodial ligules with small, terminal dorsal cirri. The latter species can be easily separated by the larger eyes, the dark brown dorsal color on the anterior part of the body and the larger, more numerous paragnaths.

A NOTE ON THE STRUCTURE OF NEREIDID PALPS

Most authors include "biarticulate palps" as a characteristic of the Family Nereididae; the palps of most nereidids examined do appear to have a thick basal segment and a smaller, button-like terminal segment. *Nereis micromma* is no exception, and it was not until a number of specimens with extended palps were collected that the characteristic was questioned. Examination of living *N. micromma* confirmed that the palps are, in fact, eversible, much the same as the proboscis. If preserved specimens are carefully examined using transmitted light, the separation line between the basal and distal parts of the palp may be seen.

Living *Nereis succinea* were collected from an oyster reef in West Bay, Galveston, and examined also. The palps were eversible as in *N. micromma.* When probing the bottom of the container, the palps inverted and everted. When *N. succinea* is preserved, however, the palps appear biarticulate and the line between the basal and distal parts is obscured by head coloration.

Because two species of *Nereis* (*Neanthes*) have eversible rather than biarticulate palps, it is probable that many, if not all, members of the genus share the trait, and that eversible palps may be common to the family. If so, the family will require a slight redefinition.

ACKNOWLEDGMENTS

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LITERATURE CITED

FAUCHALD, K. 1977. The polychaete worms. Definitions and keys to the orders, families and genera. Nat. Hist. Mus. Los Angeles County, Sci. Ser **28**:1–190.

HARPER, D. E., JR. 1977a. An investigation of the effects of dredging and dredged material disposal on the offshore biota at Galveston, Texas. Texas A&M Research Foundation Project 3347 final report to the U.S. Army Corps of Engineers, Waterways Experiment Station, Vicksburg, Mississippi.

————. 1977b. The distribution and abundance of macro- and meiobenthic organisms in the vicinity of the Buccaneer Oil/Gas Field. Texas A&M Research Foundation Project 3368 final report to the National Marine Fisheries Service, Galveston, Texas.

———— and R. J. CASE. 1975. Numerical analysis of benthic data. In: SEADOCK, Inc., Environmental Report: Texas Offshore Crude Oil Unloading Facility. Vol., 2, Chapt. 10, Sect. 10.4, pp. 551–573. Texas A&M Research Foundation Project 945 final report to SEADOCK, Inc., Houston, Texas.

————, R. J. SCRUDATO and C. S. GIAM. 1976. A preliminary investigation of the Buccaneer Oil/Gas field. Texas A&M Research Foundation Project 3309 final report to the National Marine Fisheries Service, Galveston, Texas.

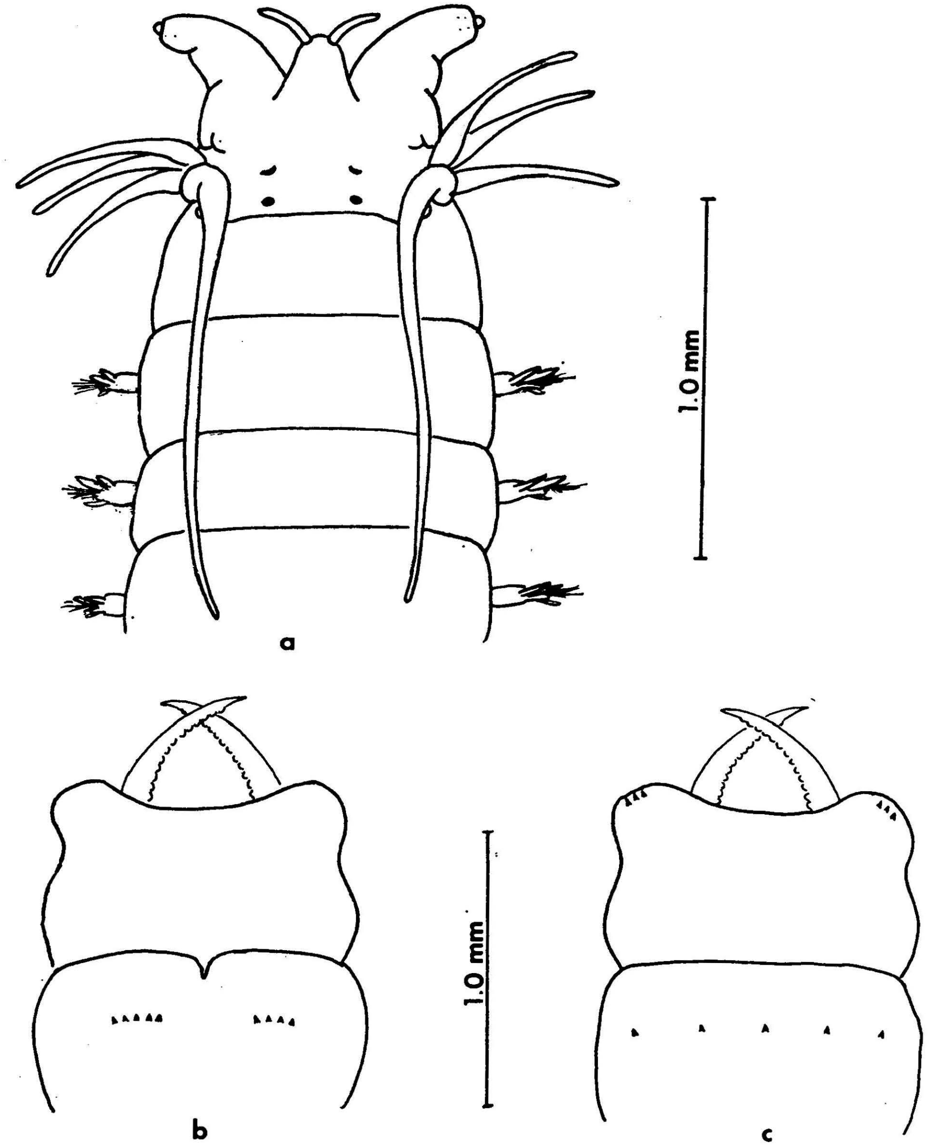

FIG. 1. *Nereis (Neanthes) micromma* n. sp. a) anterior end, dorsal view of preserved worm; b) dorsal view of extended proboscis; c) ventral view of extended proboscis.

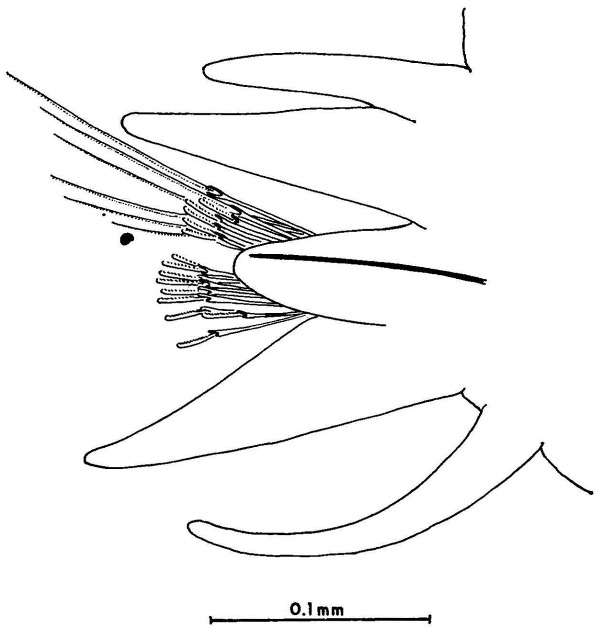

FIG. 2. *Nereis (Neanthes) micromma* n. sp. Right 1st parapodium, anterior view.

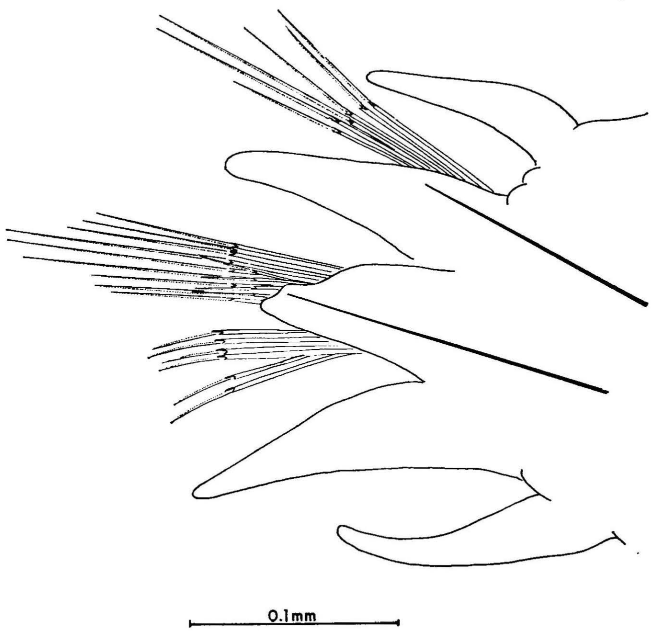

FIG. 3. *Nereis (Neanthes) micromma* n. sp. Right 5th parapodium, anterior view.

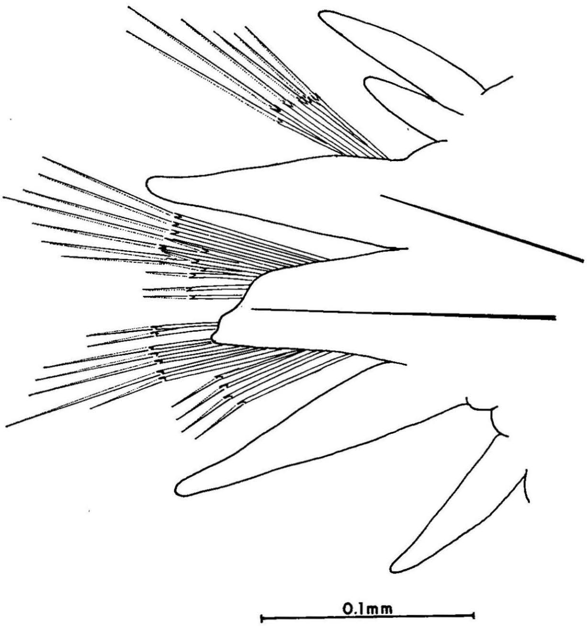

Fig. 4. *Nereis (Neanthes) micromma* n. sp. Right 6th parapodium, anterior view.

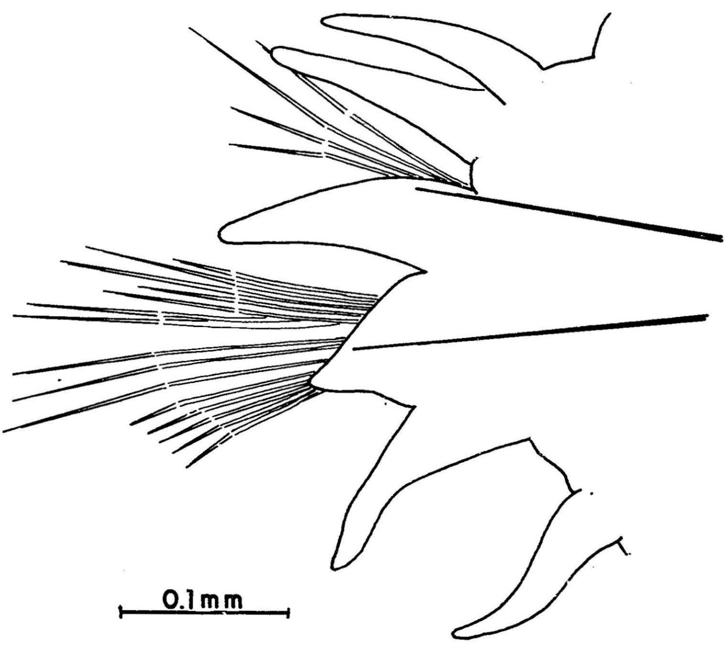

Fig. 5. *Nereis (Neanthes) micromma* n. sp. Right 15th parapodium, anterior view.

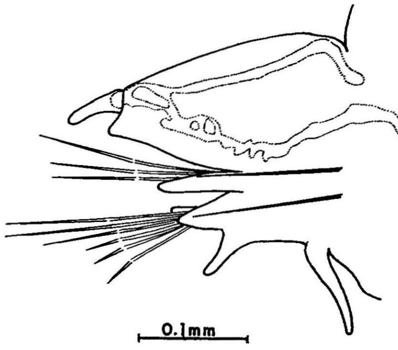

Fig. 6. *Nereis (Neanthes) micromma* n. sp. Right 150th parapodium, anterior view.

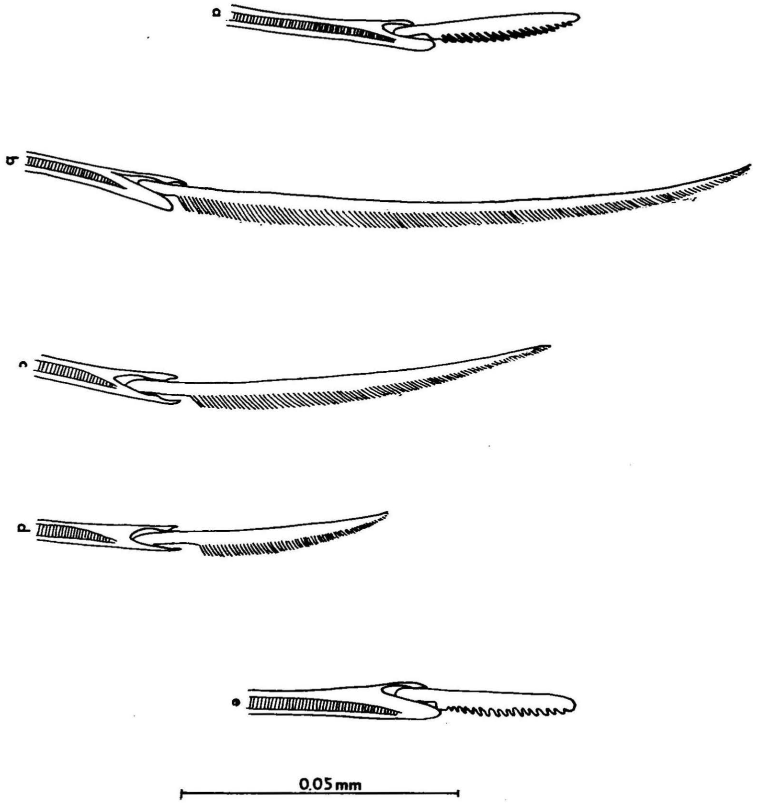

Fig. 7. *Nereis (Neanthes) micromma* n. sp. Neurosetae from setiger 1: a) upper anterior heterogomph falciger; b) upper posterior long bladed homogomph spiniger; c) upper posterior medium bladed homogomph spiniger; d) upper posterior short bladed homogomph spiniger; e) lower heterogomph falciger.

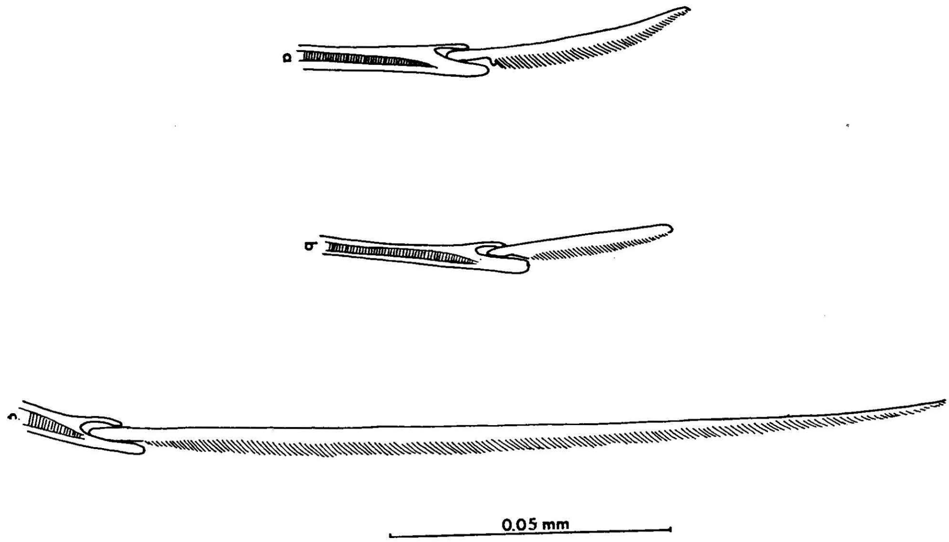

FIG. 8. *Nereis (Neanthes) micromma* n. sp. Neurosetae from setiger 2: upper anterior short bladed heterogomph spiniger; b) lower heterogomph falciger; c) lower heterogomph spiniger.

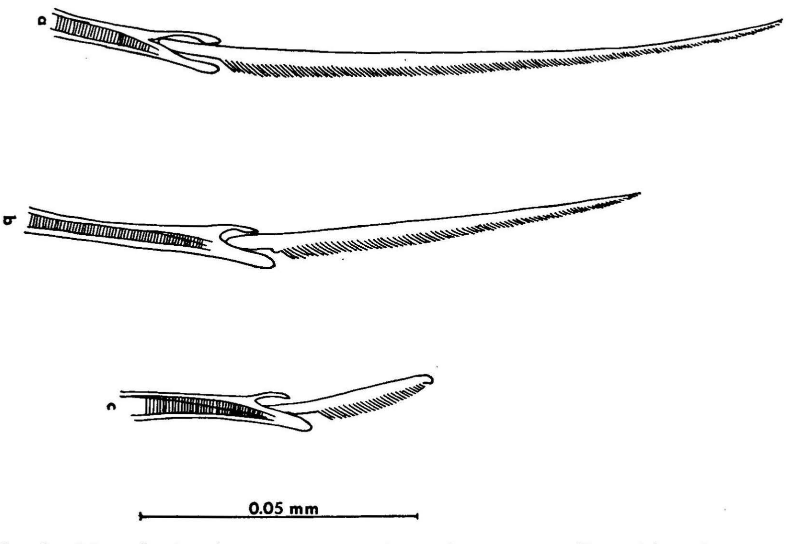

FIG. 9. *Nereis (Neanthes) micromma* n. sp. Setae from parapodium 150: a) notopodial homogomph spiniger; b) upper neuropodial heterogomph spiniger; c) lower neuropodial heterogomph falciger.

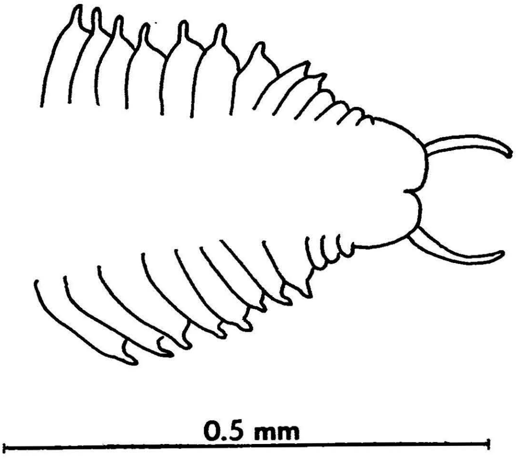

Fig. 10. *Nereis (Neanthes) micromma* n. sp. Posterior end and pygidium, dorsal view.

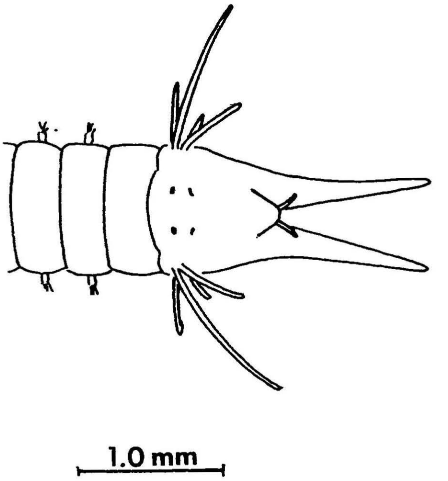

Fig. 11. *Nereis (Neanthes) micromma* n. sp. Dorsal view of living worm showing the approximate attitude of palps and tentacular cirri.

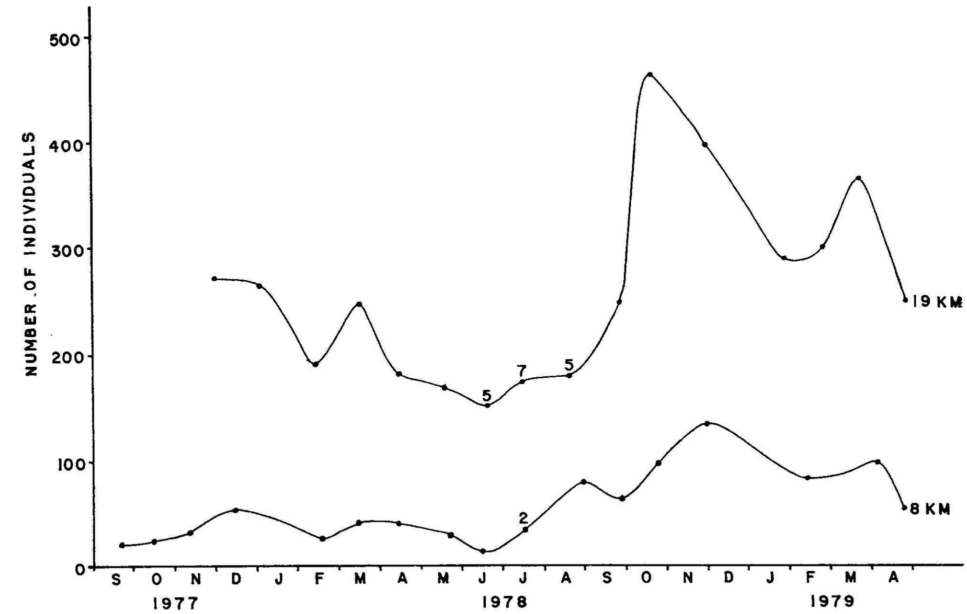

FIG. 12. Temporal trends in abundance of *Nereis micromma* at two study areas, 8 km (17-m depth. clay bottom) and 19 km (21-m depth, muddy sand bottom), off Freeport, Texas. Data points are the total number of individuals collected at the 15 stations in each study area. Numbers above data points represent total number of heteronereidids collected.

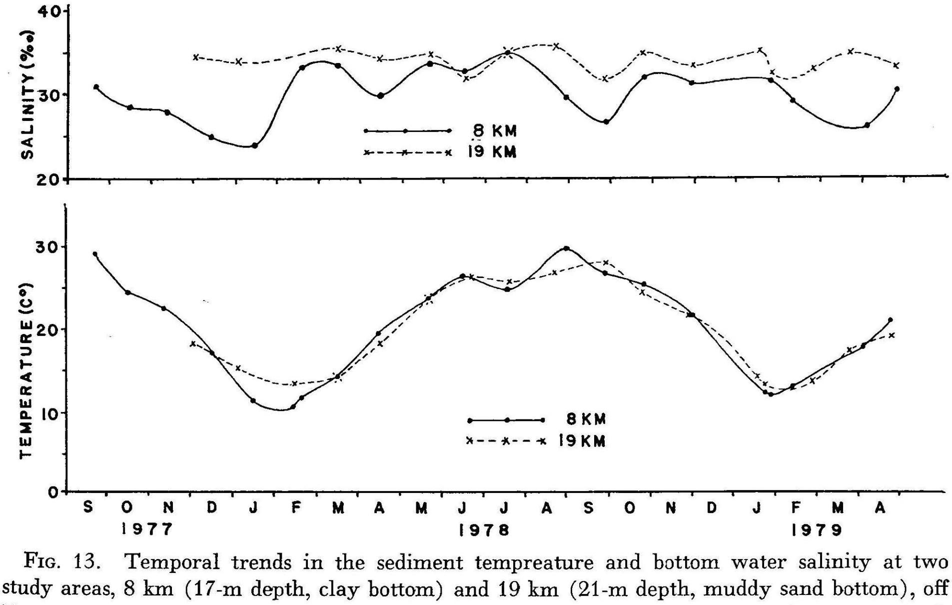

FIG. 13. Temporal trends in the sediment tempreature and bottom water salinity at two study areas, 8 km (17-m depth, clay bottom) and 19 km (21-m depth, muddy sand bottom), off Freeport, Texas. Data points are the average temperature and salinity recorded during each cruise. The several abiotic data points without corresponding *Nereis* population data points represent cruises aborted before all stations were occupied; abiotic data were used while biological data were not.