

Nealella, a New Genus of
Myodocopid Ostracoda
(Sarsiellidae: Dantyiinae)

LOUIS S. KORNICKER

and

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ABSTRACT

Kornicker, Louis S., and Francisca Elena Caraion. *Nealella*, a New Genus of Myodocopid Ostracoda (Sarsiellidae: Dantyninae). *Smithsonian Contributions to Zoology*, number 309, 27 pages, 16 figures, 7 plates, 1980.—*Nealella*, a new genus of myodocopid ostracode in the subfamily Dantyninae (the 2nd genus in the subfamily) is proposed. The new genus contains 3 species (2 new) and 1 left in open nomenclature. The species are described and illustrated. Members of the genus have been collected from the continental shelves off Tanzania, Ceylon, Australia, and Indonesia, as well as in Bab el Mandeb—the strait between the Red Sea and the Gulf of Aden.

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Nealella, a New Genus of Myodocopid Ostracoda (Sarsiellidae: Dantyninae)

Louis S. Kornicker
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Introduction

Kornicker and Cohen (1978) proposed a new subfamily Dantyninae of the family Sarsiellidae for a new genus and species of ostracode (*Dantya magnifica*) collected in the Caribbean Sea off Belize. They also included in the new subfamily, but not in the new genus, a species collected near Sri Lanka described as *Sarsiella* (?) *ornithoides* by Brady (1902:189), and a species collected probably in the Indonesian region and identified as *Sarsiella* species by Müller (1906:30). A new genus, *Nealella*, is proposed herein for the two latter species. Two additional species, *Nealella monothrix*, and *Nealella muelleri*, both new, are included in the genus, and are described and illustrated herein. Müller's species is also described and illustrated based on a specimen collected recently in Australia. Because both the specimen described by Müller and the Australian specimen are juveniles, the species is left in open nomenclature as *Nealella* species A. An adult male of the subfamily Dantyninae is described for the first time.

ACKNOWLEDGMENTS.—We thank Dr. Mihai Bačescu, Museum of Natural History "Grigore Antipa," for the ostracodes from Tanzania (expedition on land, organized by "Gr. Antipa" Museum for the

exploration of coral reefs—material of *Nealella muelleri*) and for those captured as a participant of the expedition of the French vessel *Thalassa* in Aden Bay (March, 1974) and for criticizing the manuscript. Mrs. Carolyn Gast rendered the shaded drawings of carapaces. Mrs. Kathryn Brown made many of the initial camera lucida drawings and then inked the final drawings. Freeze-drying of specimens for photography was done in the laboratory of Mr. Roland Hower. The assistance of Walter R. Brown and Miss Mary J. Mann, who operated the scanning electron microscope is acknowledged. The *Thalassa* Indian Ocean cruise was organized and supported by the Institut Scientifique et Technique de Peche Maritime de France. We thank Mr. Peter M. Slattery for the specimen from Australia, and are grateful to Mrs. Anne Cohen for criticizing the manuscript.

Station Data and Species List

Bab el Mandeb (strait between Red Sea and Gulf of Aden); R/V *Thalassa*, Station 103; 15 Mar 1974; 12°18'00"N, 43°23'00"E; water depth 24 m; Charcot dredge; muddy sand; collected by Dr. M. Bačescu.

Nealella monothrix: adult male, USNM 157769; ovigerous female, USNM 157770; 2 adult females, USNM 157810, 157811; 2 adult and 6 juvenile females, USNM 157812; 2 adult and 2 juvenile females deposited in the Museum of Natural History "Grigore Antipa," nos. 473, 474.

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Tanzania, Dar es Salaam, near the Kunduchi marine biology station of Dar es Salaam University. Expedition on land organized by "Gr. Antipa" Museum for the exploration of coral reefs; Jan 1973; collected by Dr. M. Bačescu and Geza Müller.

Nealella muelleri: 1 ovigerous female, USNM 157412.

Queensland, Australia, reef flat off Palfrey, Lizard Island; water depth 12 m; core sample; collected by Mr. Peter M. Slattery.

Nealella species A: 1 juvenile female, USNM 157789.

Zoogeography

Collections of Dantyninae support an eastern Atlantic genus *Dantya* and an Indian Ocean-West Pacific genus *Nealella* (Figure 1). *Nealella* may be subdivided into a species complex consisting of 3 species in the Indian Ocean and another species (left in open nomenclature) living in the Indonesian-northern Australian area.

The primitive 5th limb of *Dantya* suggests that ancestors with that type of 5th limb were once widespread, possibly Gondwanian. After South America drifted away from Africa, the American population retained the primitive 5th limb, whereas Indian Ocean-West Pacific populations evolved a 5th limb similar to those of the Sarsiellinae.

The ancestor of the widespread Sarsiellinae also may have had a primitive 5th limb similar to that of *Dantya*, but apparently no species of Sarsiellinae having a primitive 5th limb are extant.

SARSIELLIDAE Brady and Norman, 1896

The Sarsiellidae contain 2 subfamilies, Sarsiellinae Brady and Norman, 1896, and Dantyninae Kornicker and Cohen, 1978.

DISTRIBUTION.—Members of this family are widespread. The known latitudinal range is 63°N and 73°29'S, and the known depth range is intertidal to 4758 m.

COMPARISON OF ADULT MALE SARSIELLINAE AND DANTYINAE.—The adult male is known only for *Nealella monothrix* (described herein) in the Dantyninae and for many species in the Sarsiellinae. The major difference between adult male members of the 2 subfamilies appears to be in the armature of the 3rd endopodial joint of the mandible that has 3 stout claws on *N. monothrix*, and only 1 or 2 stout claws on members of the Sarsiellinae. Thus the number of claws on the 3rd endopodial joint of the mandible may be used to identify subfamilies of the Sarsiellidae regardless of the sex or stage of development of specimens.

Key to Subfamilies of the Sarsiellidae

FEMALES AND JUVENILE MALES

- Carapace with prominent rostrum; mandible with at least 2 stout claws on each of the 3 endopodial joints DANTYINAE
 Carapace without rostrum or with minute rostrum; mandible with no more than 1 stout claw on each of the 3 endopodial joints SARSIELLINAE

ADULT MALES

- Mandible with 3 claws on 3rd endopodial joint DANTYINAE
 Mandible with 1 or 2 claws on 3rd endopodial joint SARSIELLINAE

DANTYINAE Kornicker and Cohen, 1978

The Dantyninae contain 2 genera, *Dantya* Kornicker and Cohen, 1978, and *Nealella*, new genus.

DISTRIBUTION (Figure 1).—Members of the Dantyninae appear restricted to a latitudinal belt on either side of the equator between about 20°N and 20°S. Some species apparently live in the vicinity of

coral reefs. Species have not been collected deeper than about 25 m.

PHYLOGENETIC RELATIONSHIPS.—A phylogeny of genera and species of *Dantyninae* is proposed based on character states of the carapace, 5th limb and 7th limb. The directionality (plesiomorphic or apomorphic) of these character states is reasonably certain. As indicated in the reconstructed phylo-

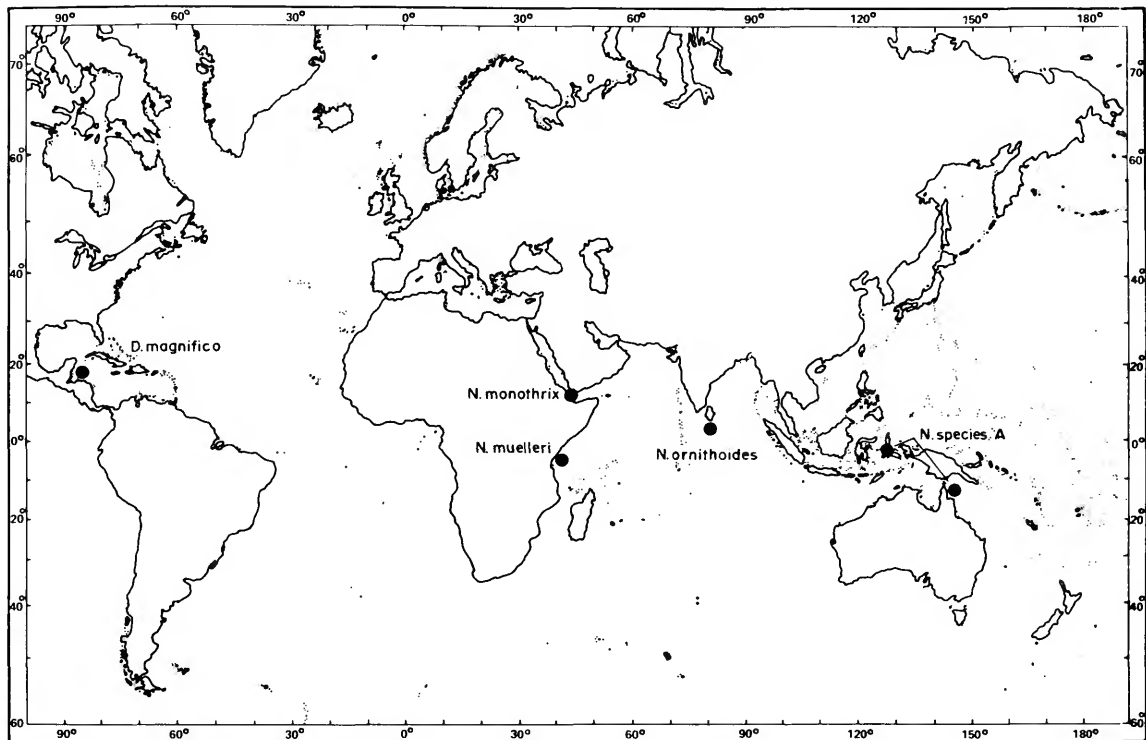


FIGURE 1.—Geographic distribution of species and genera of the subfamily Dantiyinae.

geny (Figure 2), the species *N. muelleri*, *N. monothrix*, and *N. ornithoides* form a species group and are more closely related to each other than to *N. species A*.

Fifth Limb: This limb bears 3 endites on members of the Cypridinidae, the Rutidermatidae, and,

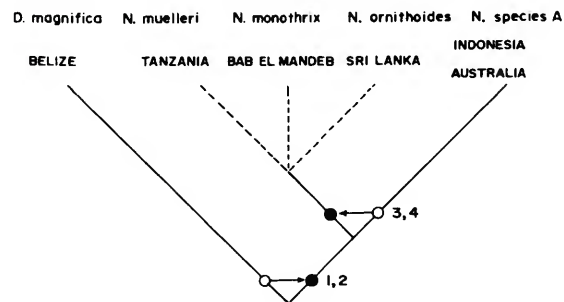


FIGURE 2.—Reconstructed phylogeny of the subfamily Dantiyinae (open circles = plesiomorphic (ancestral) character states; solid circles = apomorphic (derived) character states; numbers = morphological characters referred to in text).

with the exception of members of the genus *Pseudophilomedes*, which bear only 1 endite, members of the Philomedidae. Because of the predominant presence of 3 endites in these families, a fifth limb with 3 endites is interpreted to be the plesiomorphic character state, and fewer than 3 endites to be the apomorphic character state. Thus, in the Dantiyinae, the 5th limb of the single species of *Dantya* with 3 endites is plesiomorphic and the 5th limbs of the 4 species (1 in open nomenclature) of the sister group *Nealella* with 1 endite are synapomorphic. This character is designated by the number 1 in Figure 2. The presence of only 1 endite in members of the genus *Pseudophilomedes* and the Sarsielinae (sister group of the Dantiyinae) is interpreted as being due to either convergence or parallelism.

Exopodial joints 1 and 2 of the 5th limbs of the adult females and juveniles of the Cypridinidae, Philomedidae, and Rutidermatidae bear teeth. The presence of teeth on one or both of these joints is interpreted therefore as being the plesiomorphic character state, and the absence of teeth to be the

apomorphic character state. Thus, in the Dantyainae, the 5th limb of the single species of *Dantya* with a large tooth forming the 2nd exopodial joint is plesiomorphic and the 5th limbs of the 4 species of the sister group *Nealella* without exopodial teeth are synapomorphic. This character is designated by the number 2 in Figure 2. The absence of exopodial teeth on the 5th limbs of the Sarsiellinae, sister group of the Dantyainae, is considered to be either convergence or parallelism.

Seventh Limb: The 7th limbs of *N. muelleri*, *N. monothrix*, and presumably *N. ornithoides* have in addition to normal terminal bristles a single extremely long one (Figures 6*d*, 9*c*, 13*i*). This character is autapomorphic, and is designated by the number 3 in Figure 2.

Carapace Rostrum: The carapace of *Dantya*, the sister group of *Nealella*, bears a narrow rostrum more closely resembling the rostrum of *N.* species A than the rostra of females and juveniles of *N. muelleri*, *N. monothrix*, and *N. ornithoides*, which

are broad and flare distally in lateral view. The narrow rostrum is interpreted here to be the plesiomorphic character state, and the broad flaring rostrum to be the apomorphic character state. The broad flaring rostrum is synapomorphic (possibly autapomorphic) for *N. muelleri*, *N. monothrix*, and *N. ornithoides*. This character is designated by the number 4 in Figure 2.

The synapomorphic character state that unites the genera *Nealella* and *Dantya* in the subfamily Dantyainae and separates that subfamily from the subfamily Sarsiellinae is the presence of at least 2 stout claws on the 1st, 2nd, and 3rd endopodial joints of the female mandible. Members of the Sarsiellinae have only 1 claw on each of these joints. The synapomorphic character state that unites genera of the Sarsiellinae is the absence of a prominent rostrum on the female carapace. Members of the Dantyainae have a prominent rostrum, which is considered here to be a plesiomorphic character state.

Key to Genera of the Dantyainae

- Fifth limb of female and juveniles with 3 endites and large tooth forming 2nd exopodial joint *Dantya*
 Fifth limb of female and juveniles with 1 endite and only bristles on exopodial joints *Nealella*

Nealella, new genus

ETYMOLOGY.—The genus is named for Dr. and Mrs. John W. Neale. Gender feminine.

TYPE-SPECIES.—*Nealella monothrix*, new species herein.

DIAGNOSIS.—Carapace with prominent rostrum and caudal process; rostral infold with bristles forming row; infold of caudal process with broad spinous bristles either forming row or scattered.

First Antenna: 2nd joint with 1 dorsal bristle; 3rd joint short, fused to 4th.

Second Antenna: Protopodite without medial bristle. Basal spines absent on exopodial joints of known species.

Mandible: Coxale endite of female and juveniles well developed. Exopodite of female and juveniles minute with single terminal bristle. Endopodite of female and juveniles: ventral margins of 1st and 2nd joints with 2 stout claws; end joint with 2 long claws and 1 short dorsal claw.

Maxilla: Similar to that of the Sarsiellinae. Exopodite with 3 bristles.

Fifth Limb: Single endite present. Exopodite without teeth.

Sixth Limb: 3 or 4 endites present; end joint short; proximal bristle on posterior margin of limb short.

Seventh Limb: One of the terminal bristles of the limbs of *N. monothrix*, *N. muelleri*, and probably of *N. ornithoides* extremely long; not so for *Nealella* species A.

Furca: Claw 1 fused to lamella, remaining claws separated from lamella by suture. Each lamella with 5 or 6 claws; claw 3 either broader or slenderer than claw 4.

Eyes: Known females with small lateral eyes.

Bellonci Organ: Elongate with proximal sutures.

Upper Lip: Consisting of simple lobe.

COMPARISONS.—The new genus *Nealella* differs from the monotypic genus *Dantya*, the only other

genus in the subfamily, in not having teeth on the exopodite of the 5th limb and in having only 1 endite instead of 3 on that limb. The 5th limb of

Nealella is close to that of members of the Sarsiellinae, whereas, that limb of *Dantya* resembles that of the Philomedidae and Rutidermatidae.

Key to the Species of *Nealella*

FEMALE AND JUVENILES

1. In lateral view, anterior margin of rostrum broadly rounded or almost linear. One of the terminal bristles on 7th limb extremely long (assumed to be present on *N. ornithoides*)2
In lateral view, anterior margin of rostrum narrowly rounded. No extremely long terminal bristle on 7th limb *N. species A*
2. No ventral bristles on 4th joint of female 1st antenna *N. monothrix*
Two or four ventral bristles on 4th joint of female 1st antenna 3
3. Two ventral bristles on 4th joint of female 1st antenna *N. muelleri*
Four ventral bristles on 4th joint of female 1st antenna *N. ornithoides*

Nealella ornithoides (Brady, 1902), new combination

Sarsiella (?) *ornithoides* Brady, 1902:189, pl. 23: figs. 16–21.—Kornicker and Cohen, 1978:490 [referred species to subfamily Dantyiinae].

Sarsiella ornithoides.—Scott, 1905:367 [listed].

HOLOTYPE.—Unique specimen. Probably lost.

TYPE-LOCALITY.—Trincomalee, Ceylon.

REMARKS.—Brady considered the unique specimen he described to be female, but the elongate endopodite on the illustrated 2nd antenna (1902: pl. 23: fig. 19) suggests that the specimen is a juvenile male. Brady recognized that the specimen was not typical of sarsiellids and referred it only provisionally to *Sarsiella* (page 189). He did not illustrate or describe the mandible, maxilla, 5th limb, 6th limb, or 7th limb; however, the outline of the carapace (pl. 23: figs. 16, 17), the segmentation of the 1st antenna (pl. 23: fig. 18), and the distribution of claws on the caudal furca (pl. 23: fig. 21) show that his species is closely related to *Nealella monothrix* and *N. muelleri*, and almost certainly congeneric with those species.

DIAGNOSIS.—Outline of carapace in lateral view (see Brady, 1902: pl. 23: fig. 16) similar to those of *Nealella monothrix* and *N. muelleri*.

First Antenna: Ventral margin of 4th joint with 4 bristles.

Nealella monothrix, new species

FIGURES 3–9, PLATES 1–3

ETYMOLOGY.—The species name refers to the

presence of only 1 bristle on the 4th joint of the 1st antenna of the adult female.

HOLOTYPE.—“Gr. Antipa” Museum no. 473, adult female in alcohol deposited in the Museum of Natural History “Grigore Antipa,” Bucharest, Romania.

TYPE-LOCALITY.—Station 103, R/V *Thalassa*, Bab el Mandeb, 24 m.

ALLOTYPE.—USNM 157769, adult male from same sample as holotype.

PARATYPES.—“Gr. Antipa” Museum no. 474, 1 adult and 2 juvenile females deposited in the Museum of Natural History “Grigore Antipa”; USNM 157770, 157810, 157811, 3 adult females; USNM 157812, 2 adult and 6 juvenile females. All paratypes from same sample as holotype.

DESCRIPTION OF ADULT FEMALE (Figures 3–6).—Carapace elongate with prominent rostrum and caudal process (Figure 3); ventral margin smoothly arched; dorsal margin linear in vicinity of hinge-

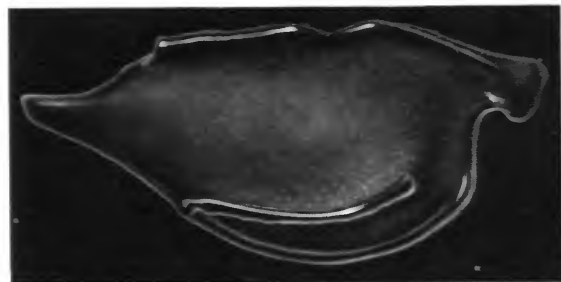


FIGURE 3.—*Nealella monothrix*, new species, carapace of ovigerous female, paratype, USNM 157770, length 2.01 mm.

ment; small lateral indentation present in vicinity of dorsal muscles; carapace with lateral overhang along ventral margin of valve and ventral margin of rostrum (Figure 4a); posterior part of dorsal rib forming narrow alar projection.

Ornamentation: Each valve with rib along ventral and dorsal margins, and rib just within ventral margin with anterior end not reaching anterior margin of valve (Figure 3). Surface with abundant fossae similar to those of *Nealella muelleri* (see Plates 4 and 5); bottom of fossae pustulose. Bristles scattered over valve surface and especially abundant along margin between ventral corner of rostrum and middle of ventral margin of valve.

Infold: Rostral infold with 3 proximal bristles forming row (dorsal of these branching and stouter than others (Figure 4a)). Caudal process with many proximal bristles: distal setose bristle near dorsal margin; about 11 small simple bristles present near inner margin of infold proximal to 4 setose bristles

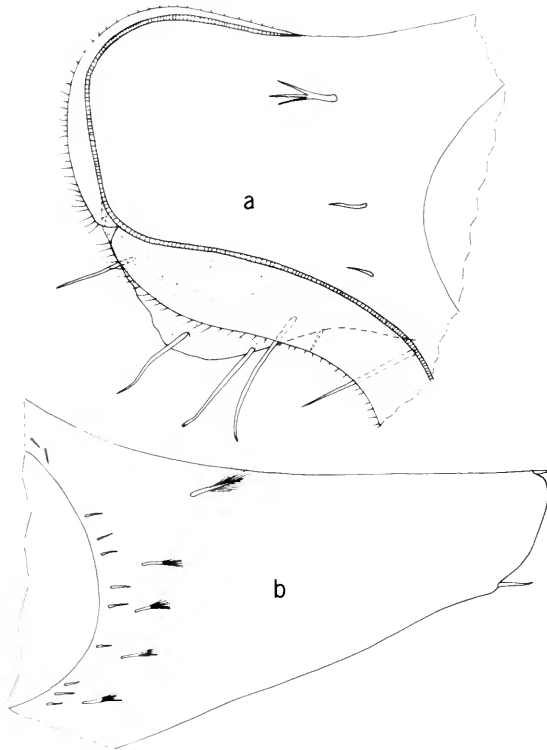


FIGURE 4.—*Nealella monothrix*, new species, inside views of carapace of ovigerous female, paratype, USNM 157770: a, rostrum; b, caudal process.

forming row (Figure 4b). Minute bristle present about mid-way between lower margin of rostrum and ventral margin of valve. Anteroventral infold with 6 long slender bristles forming row along middle of infold. Posterior half of ventral infold anterior to caudal process with about 10 small slender bristles forming row near inner margin of infold.

Selvage: Selvage along anteroventral, ventral, and anterodorsal margins with wide lamellar prolongation with marginal fringe (Figure 4a for rostrum). Selvage missing along posterior margin of caudal process. Lamellar prolongation present along dorsal margin of caudal process but marginal fringe not observed.

Central Adductor Muscle Attachments: Consisting of numerous ovoid attachments.

Size: USNM 157770, length 2.01 mm, height 0.96 mm; USNM 157810, length 2.01 mm, height 0.93 mm; USNM 157811, length only, 1.90 mm; USNM 157812, 2 specimens, length 2.08 mm, height 0.93 mm, length 2.05 mm, height 0.93 mm.

First Antenna (Figure 5a): 1st joint bare, 2nd joint with 1 spinous dorsal midbristle, and spines forming row along distal lateral edge of joint. 3rd joint fused to 4th, with 2 bristles, 1 dorsal, 1 ventral; 4th joint with 1 spinous terminal dorsal bristle and no ventral bristles (3 adult females examined). Sensory bristle of long 5th joint with 2 small dorsal filaments and terminating in small spine. Medial bristle of minute 6th joint with marginal spines and about three-quarters length of 5th joint. 7th joint: a-bristle spinous, about same length as 5th joint; b-bristle about same length as a-bristle, with 1 small filament distal to middle; c-bristle same length as sensory bristle of 5th joint, with 2 small dorsal filaments and minute spine at tip. 8th joint: bare d- and e-bristles almost same length as c-bristle, with blunt tips; f- and g-bristles about same length as c-bristle, each with 2 small marginal filaments and minute spine at tip.

Second Antenna (Figure 5b): Protopodite bare. Endopodite 2-jointed: 1st joint with 2 small proximal anterior bristles; 2nd joint small, with fairly long subterminal spinous bristle. Exopodite with 9 joints: 1st joint elongate with small medial terminal spine bent at angle; joints 2–8 with small spines forming row along distal margin, but without basal spines; bristle of 2nd joint with proximal ventral

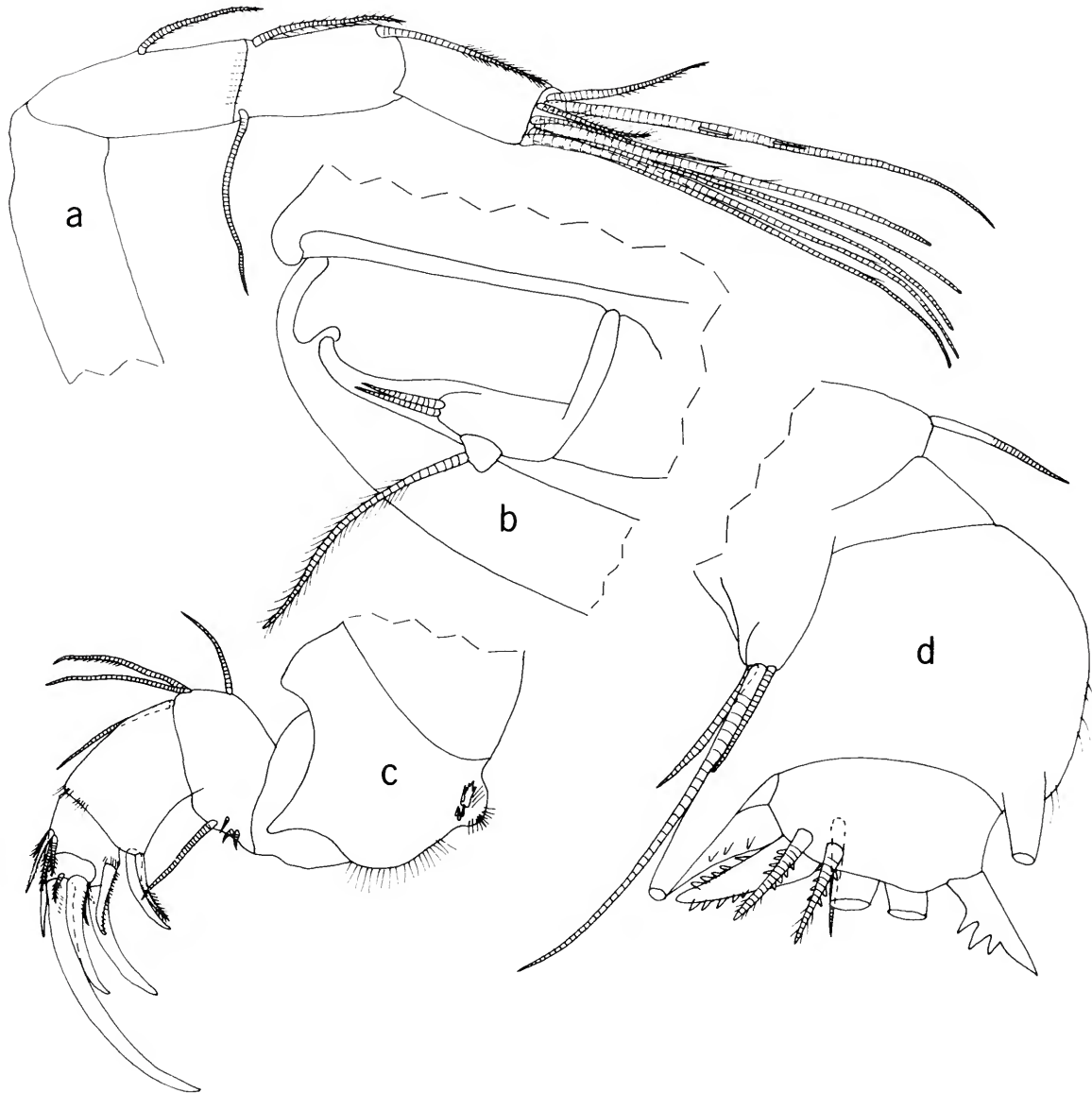


FIGURE 5.—*Nealella monothrix*, new species, ovigerous female, paratype, USNM 157770: a, left 1st antenna, medial view; b, right 2nd antenna, distal part of protopodite, endopodite, and proximal part of 1st joint of exopodite, medial view; c, right mandible, medial view; d, maxilla, endites not shown.

spines and distal natatory hairs; bristles of joints 2–8 with proximal ventral spines, and distal natatory hairs on both margins; 9th joint with 2 or 3 bristles (1 long ventral bristle with proximal ventral spines and distal natatory hairs; 1 medium

length middle bristle with natatory hairs (not always present); 1 short dorsal bristle with short marginal hairs).

Mandible (Figure 5c): Coxale: long hairs along margin proximal to endite; endite bifurcate, con-

sisting of stout spinous process with smaller process branching from it near base; long hairs and 3 minute spine-like processes near base of endite. Basale: dorsal margin with 1 fairly long midbristle and 2 fairly long subterminal bristles; medial side with 4 bristles (3 short, 1 long) near ventral margin; lateral side with 3 small bristles near ventral margin. Exopodite minute, with 1 terminal bristle almost reaching distal end of 1st endopodial joint. 1st endopodial joint: dorsal margin of 1st joint with terminal spines forming row extending onto medial and lateral sides; ventral margin with 2 terminal claws (the medial of these bristle-like in having ventral and dorsal marginal spines, but only weakly ringed); 1 minute bristle present at base of ventral claws (not shown in Figure 5c). 2nd endopodial joint: dorsal margin with 3 short subterminal bristles and 1 slightly longer claw-like bristle, also subterminal; ventral margin with 1 subterminal claw with ventral spines and 1 stouter terminal claw; medial side with few minute spines near bases of ventral claws. 3rd endopodial joint with 3 claws (ventral claw and middle claw with spines near base; ventral claw about one-half length of middle claw; dorsal claw less than one-half length of ventral claw), 1 minute medial bristle near base of middle claw, 1 ventral bristle with base lateral to ventral claw, and 1 minute bristle lateral to ventral claw.

Maxilla (Figures 5d, 6a): 3 endites present with total of about 18 spinous and pectinate bristles. Coxale with 1 dorsal bristle. Exopodite with 3 bristles (1 long, 2 short). Endopodite: 1st joint with a spinous alpha- and beta-bristle (both bristles about same size); 2nd joint with small c-bristle, 2 small pectinate a-bristles, and 5 pectinate end-bristles (anterior of these longer than others, which are about same size).

Fifth Limb (Figure 6b): Single endite with 1 small bristle. Epipodial appendage with 38 spinous bristles. Exopodite (interpretation uncertain): 1st joint with 2 bristles; 2nd joint separated from 1st by indentation in margin, with 2 or 3 bristles; inner lobe of 3rd joint with 1 or 2 bristles, outer lobe with 2 or 3 bristles; 4th joint with 2 bristles; 5th joint forming a separate lobe, with 1 proximal and 2 terminal bristles.

Sixth Limb (Figure 6c): Endite I with 3 bristles (2 small and medial, 1 longer and terminal); endite

II with 2 terminal bristles; endite III with 4 terminal bristles; endite IV not clearly separated from end joint and could be part of it, with 3 terminal bristles; end joint with 4 spinous bristles followed by short space and then 2 stout hirsute bristles and 1 short bristle; end joint and endites III and IV hirsute.

Seventh Limb (Figure 6d, e): Each limb with 6 proximal bristles (3 on each side), each with 4-5 bells, and 6 terminal bristles (5 short, 1 extremely long); short terminal bristles each with 4-8 bells; long terminal bristle about twice diameter other bristles, with 4 or 5 vestigial bells distal to middle, and with long tapering segment distal to bells. Terminus consisting of comb of about 5 faint teeth opposite 2 small inward slanting pegs.

Furca (Figure 6f): Each lamella with 5 or 6 claws; claw 1 not separated from lamella by suture; claws 2-5 or 6 separated from lamella by suture; claws decreasing in length posteriorly along lamella, but claws 1 and 2 much larger than remaining claws; anterior of lamellae with minute spines; long hairs present at base of claw 1.

Eyes: Lateral eyes small, unpigmented, each with 4 ommatidia (Figure 6g, k); medial eye with brown pigment, about same size as lateral eye (Figure 6g, k).

Bellonci Organ (Figure 6k): Elongate with about 7 proximal sutures; broadening distal to middle and then tapering to narrowly rounded tip.

Upper Lip (Figure 6h): Simple lobe with transverse rows of anteroventral and ventral spines.

Y-Sclerite (Figure 6i): Branching distally.

Genitalia (Figure 6j): Oval sclerotized ring on each side of body anterior to furca.

Eggs: USNM 157770 with 4 eggs; USNM 157810 -1 egg; USNM 157811-3 eggs.

Gut Content: Gut of USNM 157770 with abundant fairly large fragments of crustaceans (harpacticoid copepods according to T. E. Bowman), and also few particles of detritus. Gut content indicates that species is carnivore.

DESCRIPTION OF ADULT MALE (Figures 7-9, Plates 1-3).—Carapace smaller and more elongate than that of female and without dorsal indentation in vicinity of dorsal muscles (Figure 7).

Ornamentation: Similar to that of female but dorsal rib extending downward across rostrum (Figure 7, Plates 1a, b); fossae and pits present on sur-

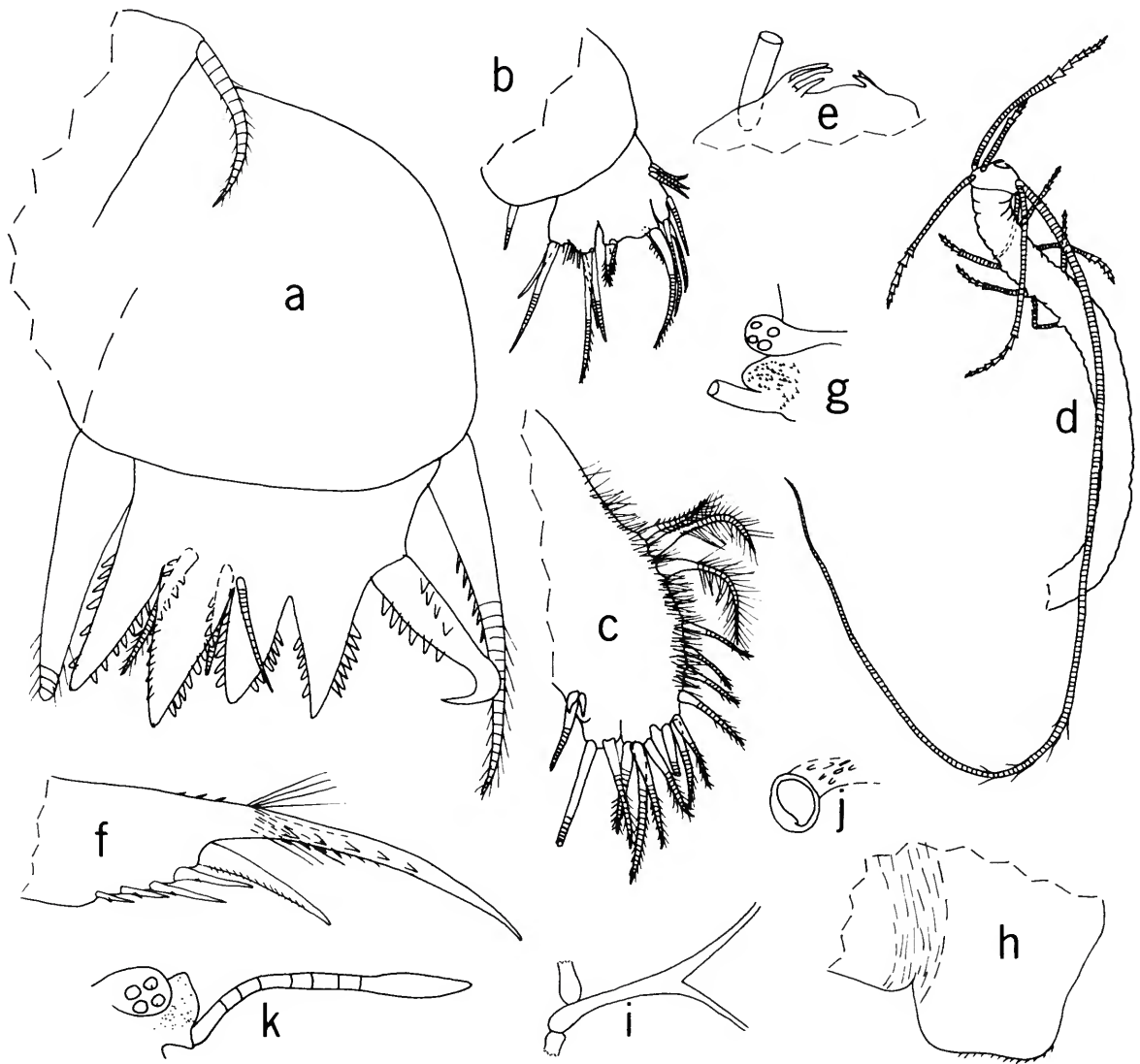


FIGURE 6.—*Nealella monothrix*, new species, ovigerous female, paratype. USNM 157770, *a*, distal part of maxilla; *b*, distal part of 5th limb; *c*, 6th limb; *d*, 7th limb; *e*, tip of 7th limb shown in *d*; *f*, right lamella of furca; *g*, left lateral eye, medial eye and proximal end of bellonci organ; *h*, lateral view of upper lip and esophagus (dashed), anterior towards right; *i*, right Y-sclerite, anterior towards right; *j*, genital opening. *k*, ovigerous female, paratype, USNM 157810, right lateral eye, medial eye and bellonci organ.

face but more faint than those on females in collection (Plates 1*d*, 2*a-c*).

Infold: Rostral infold with 3 proximal bristles forming row (the 2 upper of these divided, other singular); anteroventral infold with 5 long bristles

near middle of infold; infold of ventral margin and caudal process similar to that of female (Plates 2*d*, *e*, 3*c-e*).

Selvage: Similar to that of female, but may not be divided at lower corner of rostrum.

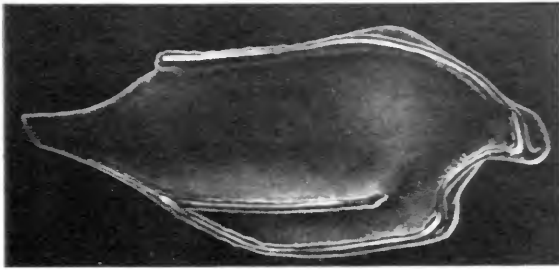


FIGURE 7.—*Nealella monostrix*, new species, carapace of adult male, allotype, USNM 157769, length 1.47 mm.

Size: USNM 157769, length 1.47 mm, height 0.64 mm.

First Antenna (Figure 8a): 1st joint bare. 2nd joint with 1 dorsal midbristle with few proximal hairs, and lateral spines forming row along distal margin. 3rd joint fused to 4th, with 1 dorsal but no ventral bristle. 4th joint with 1 dorsal bristle. 5th joint wedged ventrally between 4th and 6th joints; sensory bristle with bulbous base with abundant filaments, and stem with 4 distal marginal filaments and bifurcate tip; filaments of stem and

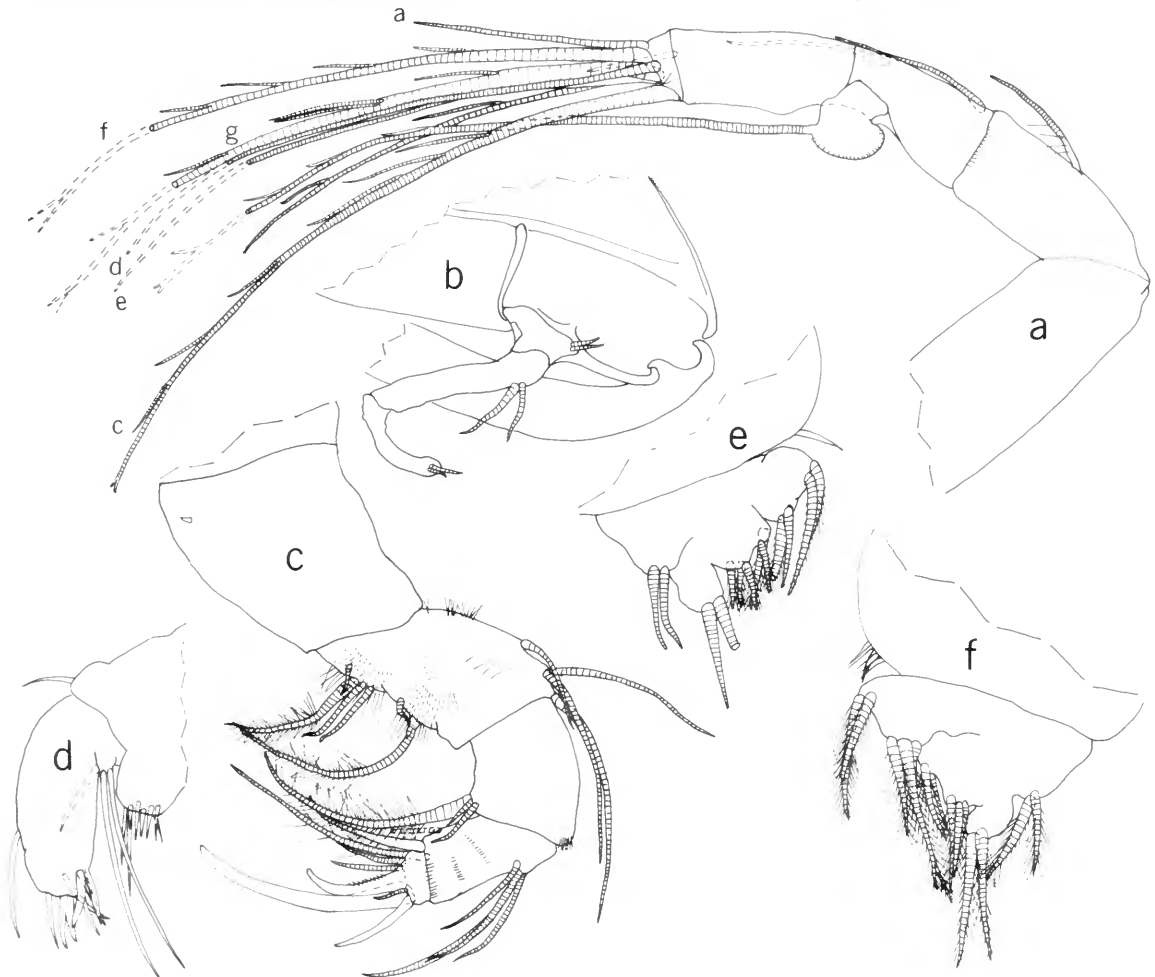


FIGURE 8.—*Nealella monostrix*, new species, adult male, allotype, USNM 157769: a, left 1st antenna, lateral view, filaments of sensory bristle not shown; b, left 2nd antenna, distal part of protopodite, endopodite, and proximal part of 1st joint of exopodite, medial view; c, left mandible, medial view; d, maxilla; e, f, distal parts of 5th limbs.

tip with minute terminal spine. Medial bristle of 6th joint with base dorsal to middle of joint. 7th joint: a-bristle about same length as joints 5-8; b-bristle about twice length of a-bristle, with 1 long proximal filament and shorter distal filament; c-bristle about 3 times longer than a-bristle, with 6 marginal filaments and bifurcate tip. 8th joint: d- and e-bristles bare, longer than b-bristle, with blunt tips; f-bristle shorter than c-bristle, with 4 marginal filaments and bifurcate tip; g-bristle same length as f-bristle, with 4 or 5 marginal filaments and bifurcate tip. Tips of filaments and bristles of 7th and 8th joints (except for d- and e-bristles) with minute terminal spine.

Second Antenna (Figure 8b): Protopodite with cluster of hairs on dorsal margin, otherwise bare. Endopodite 3-jointed: 1st joint short with 2 small proximal anterior bristles; 2nd joint elongate with 2 or 3 proximal anterior bristles; 3rd joint recurved with 2 small bristles near rounded tip. Exopodite similar to that of female; 9th joint with 3 bristles similar to those of female but none with spines.

Mandible (Figure 8c): Coxale without spines or hairs; endite represented by minute spine. Basale: long hairs present on medial and lateral sides and along proximal part of dorsal margin; dorsal margin with 1 bristle distal to middle and 2 subterminal; medial side with 2 or 3 small bristles near ventral margin (1 or 2 proximal, 1 distal); ventral margin with 3 proximal bristles (1 long, 2 short) and 1 long distal bristle. Exopodite minute with 1 long terminal bristle. 1st endopodial joint: dorsal margin with short spines forming terminal row extending onto medial and lateral sides of joint; ventral margin with 1 long and 2 short bristles. 2nd endopodial joint: ventral margin with 1 short spinous subterminal bristle, 1 long slender terminal claw, and 1 long terminal bristle with base on lateral side; medial surface with short spines forming rows; dorsal margin with 4 proximal bristles forming cluster. 3rd endopodial joint with 2 short ventral bristles, 1 small medial bristle, and 3 stout claws (ventral claw strongly curved; middle claw about twice length of ventral claw; dorsal claw about same length as ventral claw but more slender; middle and ventral claws with ventral spines).

Maxilla (Figure 8d): Considerably reduced and with weak endite and endopodial bristles; exopodite well developed, with 1 short bristle and 2 long

bristles, the latter extending past end joint of endopodite.

Fifth Limb (Figure 8e, f): Limb reduced; single endite with 1 very faint bristle. Exopodite (interpretation uncertain): 1st joint with 2 bristles; 2nd joint with 2 or 3 bristles; inner and outer lobes of 3rd joint each with 2 bristles; 4th joint with 3 bristles; 5th joint with 2 bristles.

Sixth Limb (Figure 9a, b): Endite I with 3 bristles (2 small and medial, 1 longer and terminal); endite II with 2 or 3 terminal bristles; endite III with 3 terminal bristles; endite IV not separated from end joint, with 4 bristles; end joint (not including endite IV) with 2 anterior bristles followed by space and then 2 stout hirsute bristles and 1 short bristle; limb hirsute.

Seventh Limb (Figure 9c): Well developed, with 2 proximal bristles (1 on each side), each with 4 bells, and 4 terminal bristles (3 short with up to 7 bells, and 1 extremely long and stout, with 2 vestigial bells near middle); terminus with comb with about 3 faint teeth opposite minute spine or process.

Furca: Each lamella with 6 claws similar to those of female. Minute spines present laterally on lamellae near bases of claws; claws 3-6 with numerous teeth along posterior margins and few teeth along ventral margins.

Eyes: Lateral eye pigmented, fairly large, with about 12 ommatidia (Figure 9e); medial eye not observed, probably fragmented.

Bellonci Organ (Figure 9d): Weakly segmented proximally, similar to that of female.

Upper Lip (Figure 9f): Simple lobe; spines not observed.

Copulatory Organ (Figure 9g): Each limb lobate with few bristles and large hooklike process.

Y-Sclerite: Similar to that of female.

SEXUAL DIMORPHISM.—*Carapace*: Rostrum of male narrower in lateral view than that of female; male carapace smaller than that of female.

First Antenna: Sexual dimorphism similar to that of members of the Sarsiellinae: male with small 5th joint wedged ventrally between 3rd and 4th joints and bearing filamentous sensory bristle. Male of *N. monothrix* without ventral bristles on 3rd and 4th joints.

Second Antenna: Male endopodite 3-jointed with long 3rd joint reflexed on long 2nd joint (a 3-

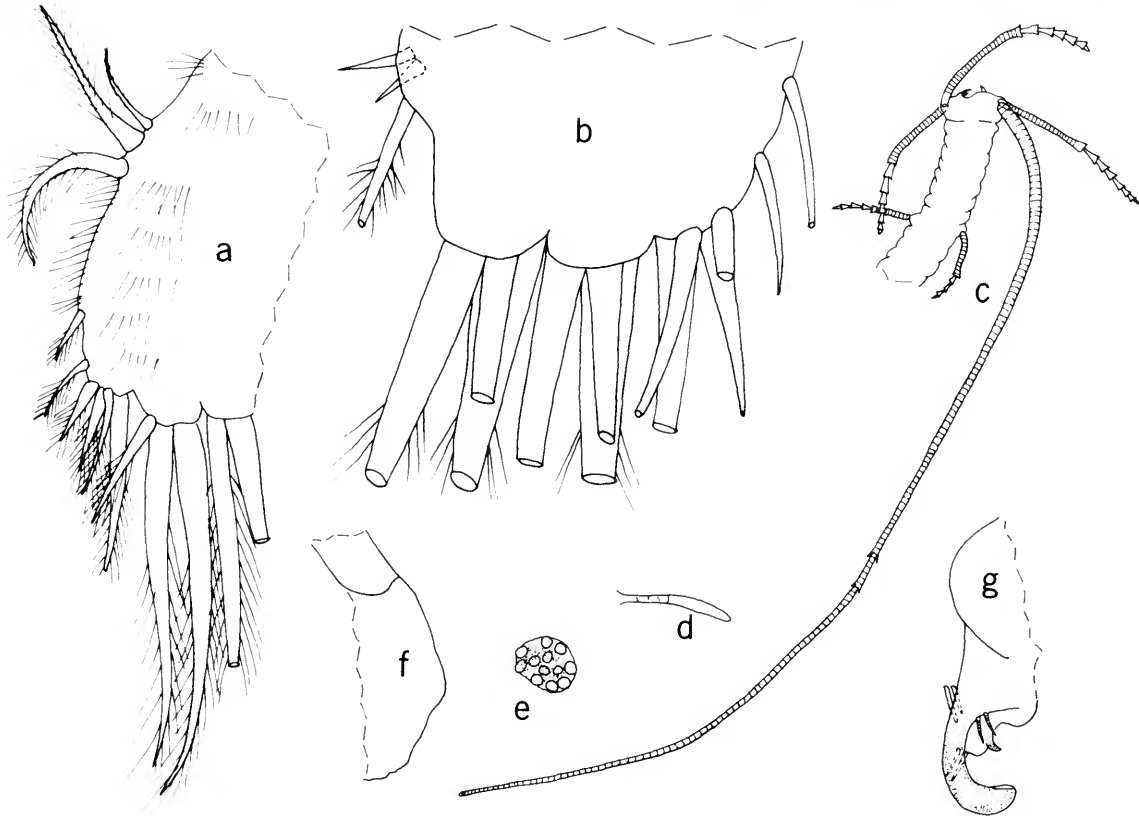


FIGURE 9.—*Nealella monothrix*, new species, adult male, allotype, USNM 157769: *a*, endites II and III and end joint of 6th limb (end joint towards left); *b*, endites I-III and distal part of end joint of other 6th limb (end joint towards right); *c*, 7th limb; *d*, bellonci organ; *e*, lateral eye; *f*, anterior of body with upper lip at bottom and proximal part of 1st antenna at top; *g*, copulatory limb.

jointed endopodite not present on many Sarsiellinae). Female endopodite with small 2nd joint.

Mandible: Coxale endite smaller on male than on female. Endopodite: 2nd joint larger on male than on female; ventral claws on 1st and 2nd joints of female replaced by bristles on male.

Maxilla: Limb reduced and weakly developed in male; 1st endopodial joint of male more elongate than that of female.

Sixth Limb: Many bristles on male more hirsute than equivalent bristles of female.

Seventh Limb: Well developed in both sexes, but that of adult male with fewer bristles.

Furca, Y-Sclerite: Similar in both sexes.

Eyes: Lateral eye of male larger and with more ommatidia than that of female.

Bellonci Organ: Female organ with more sutures than that of male.

Copulatory Organ: Large with terminal hook on male; small sclerotized ring on female.

REMARKS CONCERNING JUVENILE 7TH LIMB.—Extremely long terminal bristle present on 7th limbs of juvenile females.

COMPARISONS.—The new species *N. monothrix* bears no bristles on the ventral margin of the 4th joint of the 1st antenna compared to 4 bristles on *N. ornithoides*.

Nealella muelleri, new species

FIGURES 10-13, PLATES 4-7

ETYMOLOGY.—The species is named for Geza

Müller, Romanian Institute of Marine Researches, Constanta-Agigea who helped to collect the unique specimen.

HOLOTYPE.—USNM 157412, 1 ovigerous female, unique specimen.

TYPE-LOCALITY.—Near the marine biology station of Dar es Salaam University, Dar es Salaam, Tanzania.

DESCRIPTION OF ADULT FEMALE (Figures 10–13, Plates 4–7).—Carapace elongate with prominent rostrum and caudal process; ventral margin smoothly arched but with small projection on anteroventral corner; dorsal margin arched at anterior one-third of valve; rostrum flattened anteriorly; carapace with lateral overhang along ventral margin of valve and ventral margin of rostrum; posterior part of dorsal rib forming narrow alar projection.

Ornamentation: Each valve with rib along ventral and dorsal margins, and rib just within ventral margin with anterior end reaching anterior margin of valve (Figure 10). Surface with abundant fossae (Plates 4, 5), some bearing digitate papillae (Plate 5c, e), others with smooth papillae (Plate 5d, f); surface between fossae with minute pits (Plate 5a–d). Bristles scattered over valve surface, and especially abundant along anterior half of ventral margin (Plate 6a, c).

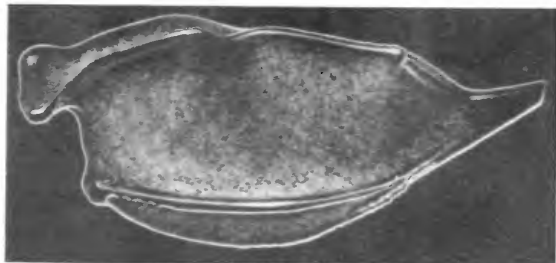


FIGURE 10.—*Nealella muelleri*, new species, carapace of ovigerous female, holotype, USNM 157412, length 1.94 mm.

Infold: Rostral infold with 3 proximal, divided bristles forming row, dorsal of these stouter than others (Figures 11a, Plate 6b, e). Caudal process with 5 setose bristles proximal to middle (Figure 11b, Plate 6d, f) (dorsal of these stouter than others), and about 15 small bristles along inner margin of infold (Figure 11b, Plates 6d, 7a, b). 2 minute bristles present at distal edge of caudal process near middle (Figure 11b; Plate 6d), and 1

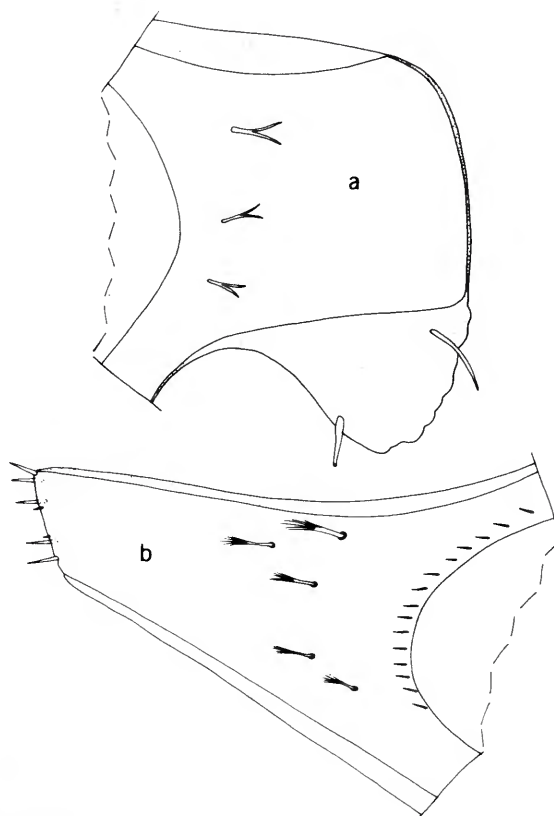


FIGURE 11.—*Nealella muelleri*, new species, inside views of carapace of ovigerous female, holotype, USNM 157412: a, rostrum; b, caudal process.

larger bristle at each corner. Anteroventral infold with 4 slender bristles forming row near middle of infold. Small bristles present along posterior half of ventral infold.

Selvage: Selvage along anteroventral, ventral, and anterodorsal margins with wide lamellar prolongation with marginal fringe (Plates 6a, c, d, 7c, d); wide lamellar prolongation also present along dorsal margin of caudal process.

Central Adductor Muscle Attachments: Consisting of numerous ovoid attachments.

Size: USNM 157412, length 1.94 mm, height 0.91 mm.

First Antenna (Figure 12a, b): 1st joint bare. 2nd joint with 1 dorsal midbristle and short spines forming lateral row along distal margin. 3rd joint



FIGURE 12.—*Neatella muelleri*, new species, ovigerous female, holotype, USNM 157412: *a*, medial eye, bellonci organ (near bottom) and joints 1 to 5 (tip of 5th joint not shown) of left 1st antenna (medial view); *b*, tip of 1st antenna shown in *a* at higher magnification; *c*, left 2nd antenna, medial view; *d*, endopodite and part of protopodite of right 2nd antenna, medial view; *e*, right lamella of furca.

fused to 4th, with 2 bristles, 1 ventral, 1 dorsal. 4th joint with 3 bristles, 1 dorsal, 2 ventral. Sensory bristle of long 5th joint with 2 small marginal filaments and spine at tip. Medial bristle of minute 6th joint spinous, about same length as joints 5–8. 7th joint: a-bristle longer than bristle of 6th joint; b-bristle about three-fourths length of a-bristle, with minute marginal filament near middle; c-bristle about same length as sensory bristle of 5th joint, with 2 short marginal filaments, and spine at tip. 8th joint: d- and e-bristles bare with blunt tips, both bristles shorter than c-bristle; f- and g-bristles about same length as c-bristle, each with 2 short marginal filaments, and spine at tip.

Second Antenna (Figure 12c, d): Protopodite bare. Endopodite 2 jointed: 1st joint with 2 small proximal anterior bristles; small 2nd joint with long spinous subterminal bristle. Exopodite 9-jointed: 1st joint with minute bent medial spine on distal margin; joints 2–8 with spines forming row along distal margins, but no basal spines; bristles of joints 2–8 with proximal ventral spines and distal natatory hairs; 9th joint with 3 bristles (1 ventral with natatory hairs, 1 medial with short hairs, 1 dorsal, very small, bare).

Mandible (Figure 13a–c): Coxale: endite consisting of 1 stout pointed process with 2 marginal spines, and 4 smaller processes near base; long hairs present ventral to base of endite, and also along ventral margin of coxale distal to endite. Basale: medial side with 4 bristles on, or close to, ventral margin; lateral side with 3 small bristles near ventral margin; dorsal margin with 1 mid-bristle and 2 subterminal bristles. Exopodite minute with 1 long spinous terminal bristle. 1st endopodial joint: dorsal corner with spines forming row; ventral margin with 2 spinous claws and 1 small bristle. 2nd endopodial joint: ventral margin with 2 stout claws; dorsal margin with 1 claw-like bristle near middle and 2 small spinous bristles with bases on medial side; lateral side with 1 short spinous bristle near base of ventral claw. 3rd endopodial joint with 2 small ventral bristles (Figure 13c), 1 small medial bristle, and 3 claws (dorsal claw minute and medial to large middle claw; ventral claw about one-half length of middle claw).

Maxilla (Figure 13d, e): 3 endites present: endites I and II each with 6 or 7 bristles, some pectinate; endite III with 5 or 6 bristles. Coxale or basale

with bristle near dorsal margin. 1 bristle present near base of endite III. 1st endopodial joint with spinous alpha- and beta-bristles. End joint with 2 small a-bristles, 1 small c-bristle, and 5 pectinate terminal bristles. Exopodite with 3 bristles, 2 long, 1 short.

Fifth Limb (Figure 13f): Epipodial appendage with 38 bristles. Single endite with 1 short bristle. Exopodite: 1st and 2nd joints each with 2 or 3 bristles; 3rd joint with 2 short bristles on inner lobe and 1 or 2 short bristles on outer lobe; 4th joint with 3 bristles (2 short, 1 long); 5th joint consisting of distinct lobe with 2 terminal bristles.

Sixth Limb (Figure 13g, h): Endite I with 1 long and 2 short bristles; endite II with 3 long bristles; endite III with 4 long bristles; end joint with 4 long bristles forming cluster (endite IV?) followed by short space, 2 bristles, long space, and then 2 long bristles (represented only by sockets on fragmented limbs of unique specimen) and 1 short bristle; limb hirsute.

Seventh Limb (Figure 13i, j): Each limb with 10 proximal bristles (5 on each side), each with 3–5 bells, and 6 terminal bristles (5 short, 1 extremely long); short terminal bristles each with 5–8 bells; long terminal bristle about twice diameter of other bristles, with 4 or 5 constrictions near middle, some with spines (probably represent vestigial bells), and with long tapering segment distal to constrictions. Terminus consisting of comb with 3 or 4 faint teeth opposite 1 or 2 minute inward slanting pegs.

Furca (Figure 12e): Each lamella with 2 stout claws followed by 3 or 4 weak claws; claw 1 not separated from lamella by suture; long hairs present at base of claw 1; minute spines present along anterior margins of lamellae; teeth present along posterior margins of claws.

Eyes: Lateral eyes small unpigmented, each with 2 small ommatidia (Figure 13k); medial eye pigmented, slightly larger than lateral eye (Figures 12a, 13k).

Bellonci Organ (Figure 12a, 13k): Elongate with about 7 proximal sutures, with rounded tip with small terminal spine (all sutures not shown in Figure 12a).

Upper Lip (Figure 13k): Helmet shaped.

Eggs: USNM 157412 with 5 eggs in marsupium.

COMPARISONS.—The new species *N. muelleri* dif-



FIGURE 13.—*Nealella muelleri*, new species, ovigerous female, holotype, USNM 157412: *a*, left mandible, medial view; *b*, part of coxale of right mandible showing processes of endite as seen through limb; *c*, tip of right mandible, lateral view; *d*, maxilla; *e*, distal part of other maxilla; *f*, distal part of 5th limb; *g*, *h*, 6th limbs; *i*, 7th limb; *j*, tip of 7th limb shown in *i*; *k*, anterior of animal showing right lateral eye, medial eye and bellonci organ, and upper lip (at bottom).

fers from *N. monothrix* in having the lower lateral rib intersecting the anteroventral valve margin, and in having 2 instead of no bristles on the ventral margin of the 4th joint of the 1st antenna. The 7th limb of the unique female of *N. muelleri* bears 10 proximal bristles compared to 6 on the female *N. monothrix*. *N. muelleri* differs from *N. ornithoides* (Brady, 1902) in having 2 instead of 4 ventral bristles on the 4th joint of the 1st antenna.

Nealella species A

FIGURES 14-16

Sarsiella species Müller, 1906:31, pl. 4:10-18.—Kornicker and Cohen, 1978:490 [referred species to subfamily Dantiyinae].

MATERIAL.—USNM 157789, 1 juvenile female from the reef flat off Palfrey, Lizard Island, Australia, depth 12 m.

REMARKS.—The specimen described by Müller (1906: 31) and identified by him as *Sarsiella* species is a juvenile male collected probably from the Indonesian region. The Australian specimen is a juvenile female. Until adults from both areas are known, our referral of both specimens to the same species must be considered tentative. The similarity of both carapaces and appendages indicates that the 2 specimens are more closely related to each other than to the 3 known species of the genus collected in the vicinity of Sri Lanka and Africa.

DESCRIPTION OF JUVENILE FEMALE (Instar IV or V) (Figures 14-16).—Carapace elongate with prominent tapering rostrum and broad projecting caudal process (Figure 14); lateral overhang along anterior and ventral margins of rostrum (Figure 15a), and along anteroventral and ventral margins of valve; over-

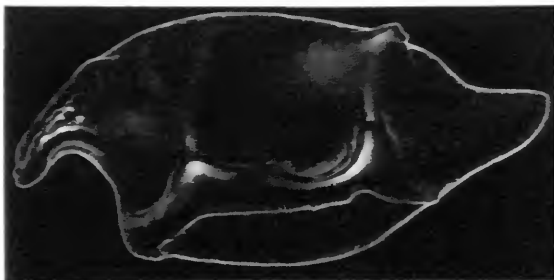


FIGURE 14.—*Nealella* species A, carapace of juvenile female, USNM 157789, length 1.09 mm.

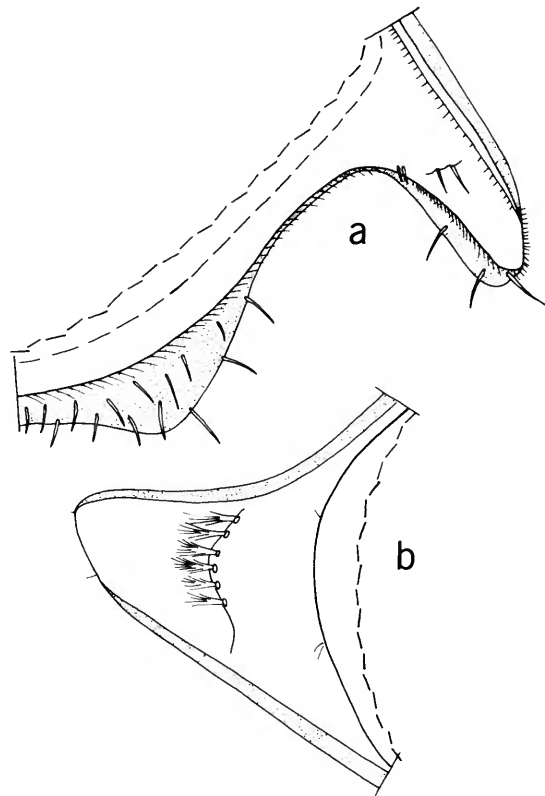


FIGURE 15.—*Nealella* species A, inside views of carapace of juvenile female, USNM 157889: a, rostrum; b, caudal process.

hang widest at anteroventral corner of valve (Figure 15a).

Ornamentation (Figure 14): Valve surface with minute fossae and scattered surface bristles; prominent process present both at posterodorsal corner of valve and at posterior end of horizontal rib that lies between central adductor muscle attachments and ventral margin of valve; narrow lateral rib present on rostrum.

Infold: Rostral infold with 2 bristles near middle and 2 smaller bristles near ventral margin (Figure 15a); infold of caudal process with 6 setose bristles forming row along edge of list, and several small bristles along inner edge of infold (Figure 15 b).

Selvage: Selvage along anterodorsal, anterior, anteroventral and ventral valve margins with wide lamellar prolongation with marginal fringe; the fringed prolongation present along edge of rostrum

(Figure 15a); lamellar prolongation not observed at tip of caudal process.

Size: USNM 157789, length 1.09 mm, height 0.44 mm.

First Antenna (Figure 16a): 1st joint bare. 2nd

joint with single dorsal mid-bristle. 3rd and 4th joints fused; 3rd joint short with 2 bristles (1 ventral, 1 dorsal); 4th joint elongate with 3 bristles (1 dorsal, 2 ventral). Sensory bristle of long 5th joint with 1 proximal filament and spine at tip. Medial

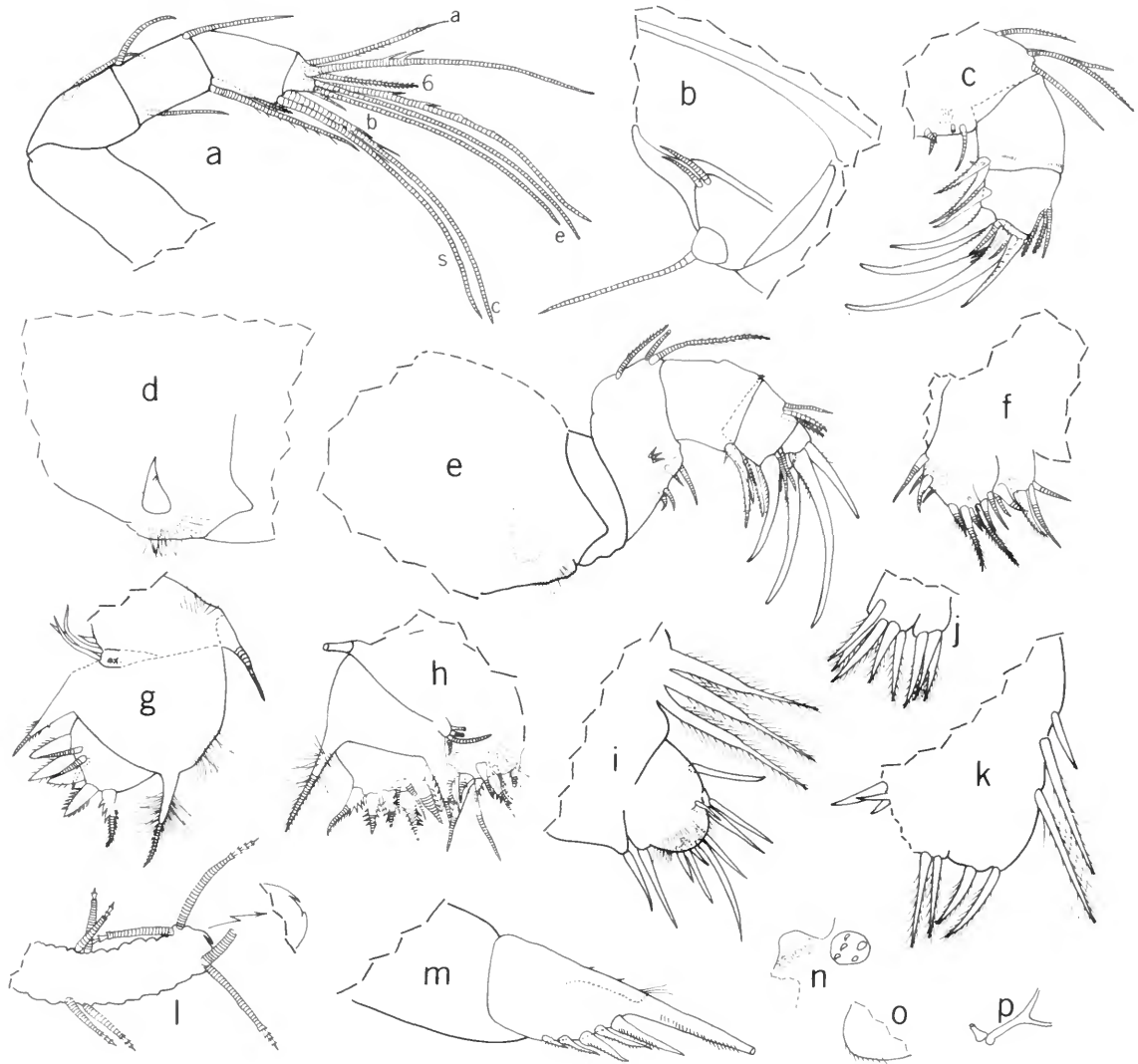


FIGURE 16.—*Nealella* species A, juvenile female, USNM 157789: a, right 1st antenna, lateral view; b, endopodite of right 2nd antenna, medial view; c, left mandible, coxale not shown, medial view; d, coxale of left mandible showing endite, medial view; e, right mandible, lateral view; f, endites of maxilla; g, same maxilla, endites not shown; h, other maxilla; i, distal part of 5th limb; j, two endites of 6th limb; k, 6th limb, some bristles of endites fragmented; l, 7th limb; m, right lamella of furca; n, left lateral eye; o, upper lip, anterior towards left; p, right Y-sclerite, anterior towards right.

bristle on minute 6th joint with marginal spines. 7th joint: a-bristle longer than bristle of 6th joint, with marginal spines; b-bristle less than half length of a-bristle, bare; c-bristle about same length as bristle of 5th joint, with 2 proximal filaments and spine at tip. 8th joint: d- and e-bristles about same length as c-bristle, bare with blunt tips; f- and g-bristles about same length as c-bristle, each with 2 proximal filaments and spine at tip.

Second Antenna (Figure 16b): Protopodite bare. Endopodite 2-jointed: 1st joint with 2 short anterior bristles; 2nd joint small with long slender terminal bristle. Exopodite: terminal margin of 1st joint with minute, straight, medial spine; bristle of 2nd joint reaching well past 9th joint, with ventral spines and distal natatory hairs; bristles of joints 3-8 with stout ventral spines and distal natatory hairs; small 9th joint with 1 medium length ventral bristle with few slender ventral spines and distal natatory hairs, and 1 short bristle with few short hairs; joints 2-8 with spines forming row along distal margins (spines just lateral to base of bristle stouter than others).

Mandible (Figure 16c-e): Coxale with stout medial tooth and hairs along ventral margin (Figure 16d). Basale: dorsal margin with 1 fairly long mid-bristle and 2 fairly long subterminal bristles; medial side with 4 short bristles on or near ventral margin; lateral side with 3 short bristles near ventral margin. Exopodite minute, with long terminal bristle (bristle broken off exopodite on illustrated right limb; present on illustrated left limb). 1st endopodial joint: ventral margin with 2 spinous terminal claws (shorter and medial of these with distal rings) and 1 minute terminal bristle; dorsal margin with few short terminal spines. 2nd endopodial joint: dorsal margin with 3 subterminal bristles; ventral margin with 1 spinous mid-claw with base on medial side and 1 spinous stout terminal claw; lateral side with 1 terminal bristle (with broad unringed base) near base of terminal claw. 3rd endopodial joint with 3 claws, all with proximal spines; ventral claw just slightly smaller than middle claw and about twice the length of dorsal claw; 3 short bristles (2 medial, 1 lateral) present near base of claws.

Maxilla (Figure 16f-h): 3 endites present with total of 17 or 18 spinous and pectinate bristles. Coxale with 1 dorsal bristle. Exopodite with 3 equilength bristles. Endopodite: 1st joint with alpha-bristle with long proximal hairs and short distal spines and beta-bristle with proximal teeth and distal spines; 2nd joint with small c-bristle, 2 small a-bristles, and 5 pectinate end-bristles.

Fifth Limb (Figure 16i): Epipodial appendage with 30 bristles. Single endite with 1 bristle. Exopodite: 1st joint with 1 bristle; 2nd joint not well defined but interpreted as having 2 bristles; inner lobe of 3rd joint not well defined but interpreted as having 1 bristle; outer lobe of 3rd joint with 1 bristle; 4th joint appearing to have 2 bristles; small lobe representing 5th joint with 3 bristles; exopodite with total of 10 bristles.

Sixth Limb (Figure 16j, k): Both limbs fragmented but, in general, appearing similar to that of *Nealella muellevi* described herein.

Seventh Limb (Figure 16l): Each limb with 4 proximal bristles (2 on each side) and 4 terminal bristles (2 on each side); bristles strongly tapering distally (juvenile character); each bristle with 2-4 bells. Terminus with opposing combs, each with 2 or 3 faint teeth.

Furca (Figure 16m): Each lamella with 6 claws with teeth along posterior margins; claw 1 fused to lamella, remaining claws separated from lamella by suture; claw 3 more slender than claw 4 but slightly longer; long hairs present medially at base of claws and on lamella following claws (not shown on illustrated limb); anterior of lamella proximal to claw 1 with few spines.

Eyes (Figure 16n): Lateral eyes small, unpigmented, each with about 5 minute ommatidia; medial eye pigmented, about same size as lateral eye.

Bellonci Organ: Broken off.

Upper Lip (Figure 16o): Simple lobe with slender spines or hairs.

Y-Sclerite (Figure 16p): Branching distally.

COMPARISONS.—The narrow rostrum of *Nealella* sp. A distinguishes the species from other known species of *Nealella*.

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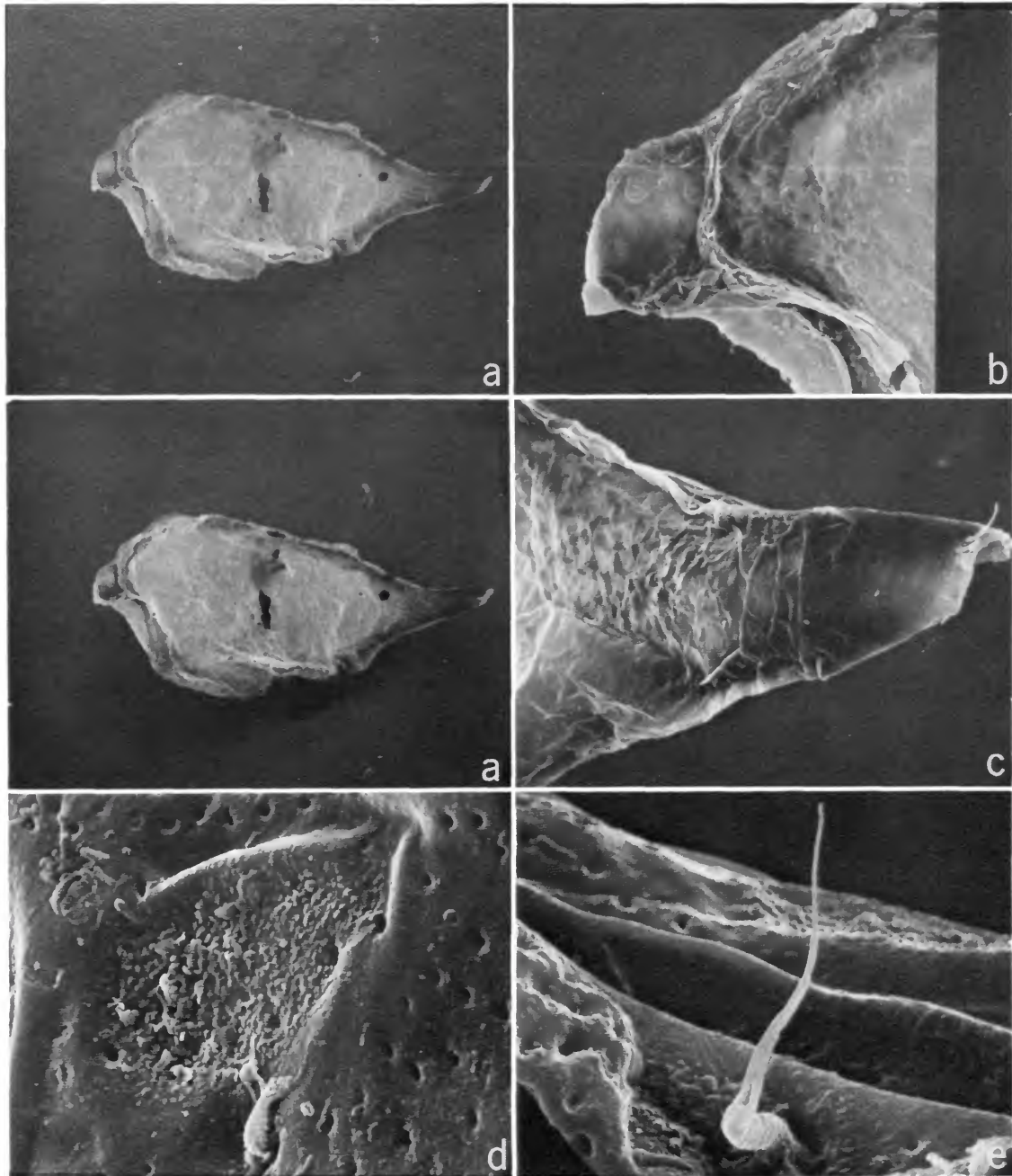


PLATE 1.—*Nealella monothrix*, allotype, USNM 157769, adult male, outside views of left valve: *a*, complete valve, stereopair, $\times 66$; *b*, anterior, from *a*, $\times 300$; *c*, caudal process, from *a*, $\times 400$; *d*, surface detail from *c*, $\times 3000$; *e*, detail of bristle near upper part of *c*, $\times 3600$. (Micrographs reduced to 80% for publication.)

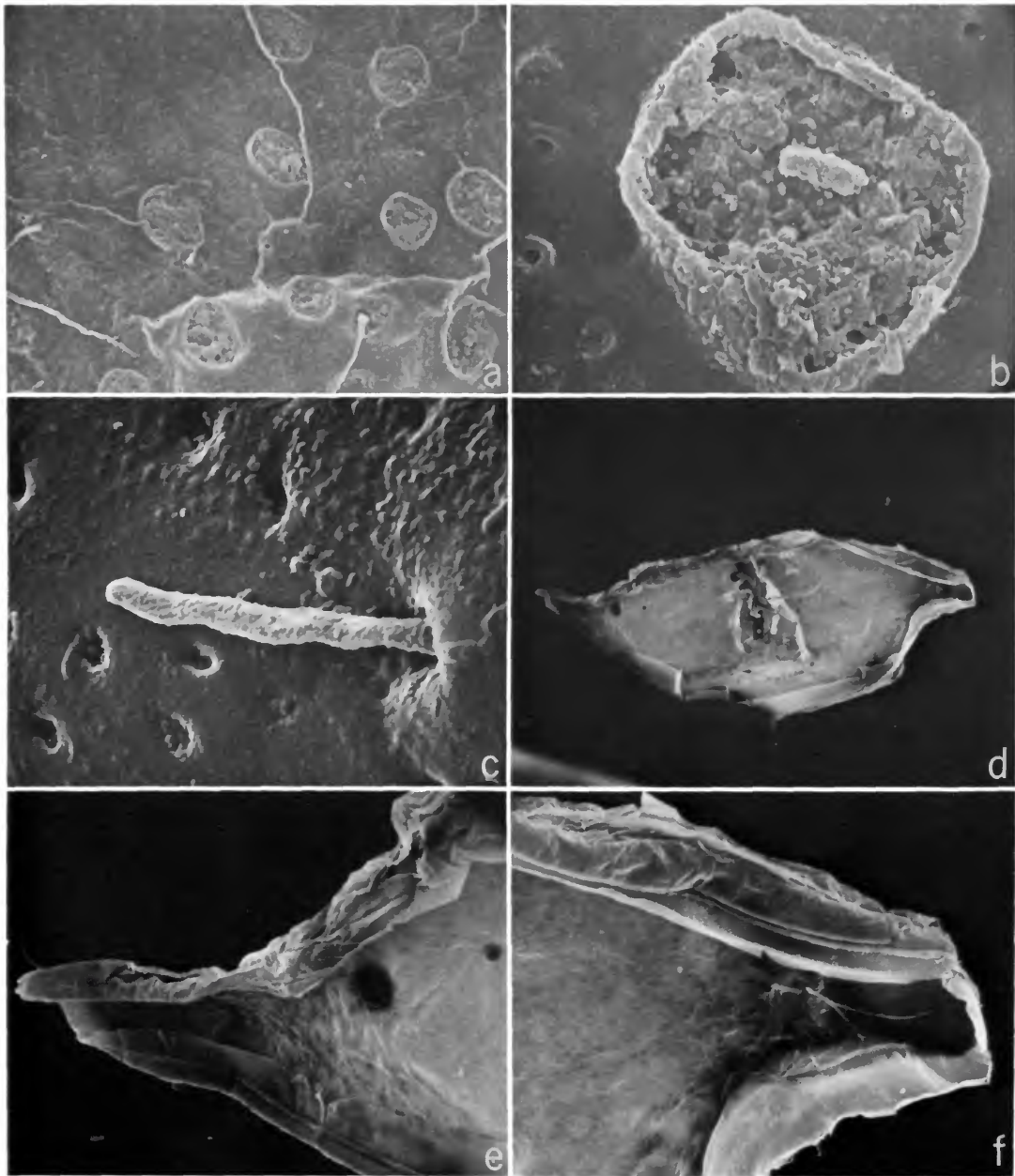


PLATE 2.—*Nealella monothrix*, allotype, USNM 157769, adult male, left valve: *a*, surface fossae and bristles near middle of valve in Plate 1a, $\times 750$; *b*, detail of fossa in *a*, $\times 4800$; *c*, detail of surface pits and bristle near tip of caudal process, from *e*, $\times 300$; *d*, complete valve, inside view, $\times 66$; *e*, caudal process, inside view (edges folded over), from *d*, $\times 300$; *f*, anterior end of valve showing divided bristle on infold of rostrum, from *d*, $\times 320$. (Micrographs reduced to 77% for publication.)

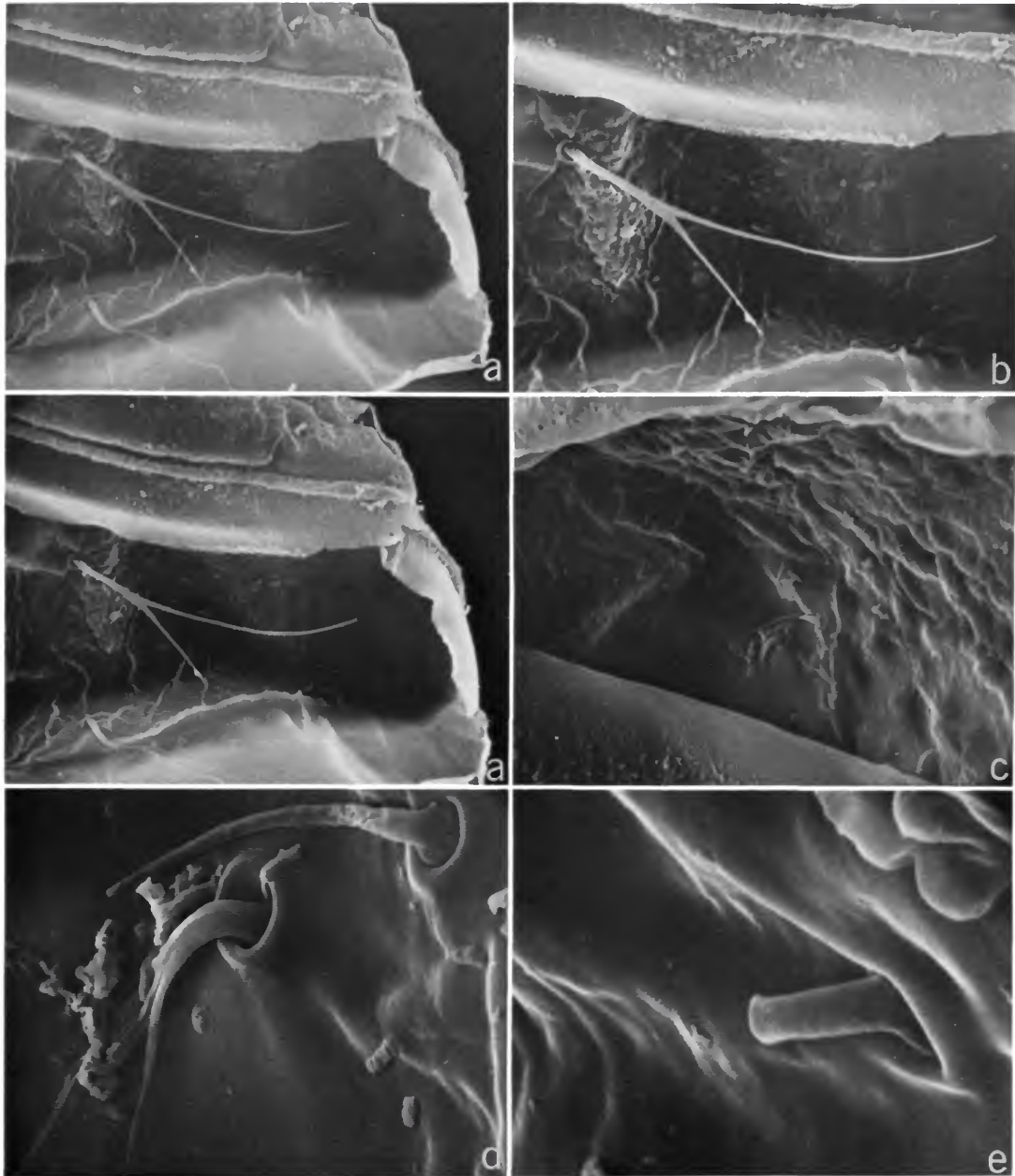


PLATE 3.—*Nealella monothrix*, allotype, USNM 157769, adult male, left valve, inside views: *a*, rostrum, stereopair, $\times 750$; *b*, detail of divided bristle on infold of rostrum, from *a*, $\times 1100$; *c*, infold of caudal process, from Plate 2*e*, $\times 1500$; *d*, detail of setose bristle on infold of caudal process, from near middle of *c*, $\times 7500$; *e*, detail of bristle (broken or folded?) on infold of caudal process near middle of *c* (dorsal to bristle shown in *d*), $\times 15,000$. (Micrographs reduced to 77% for publication.)

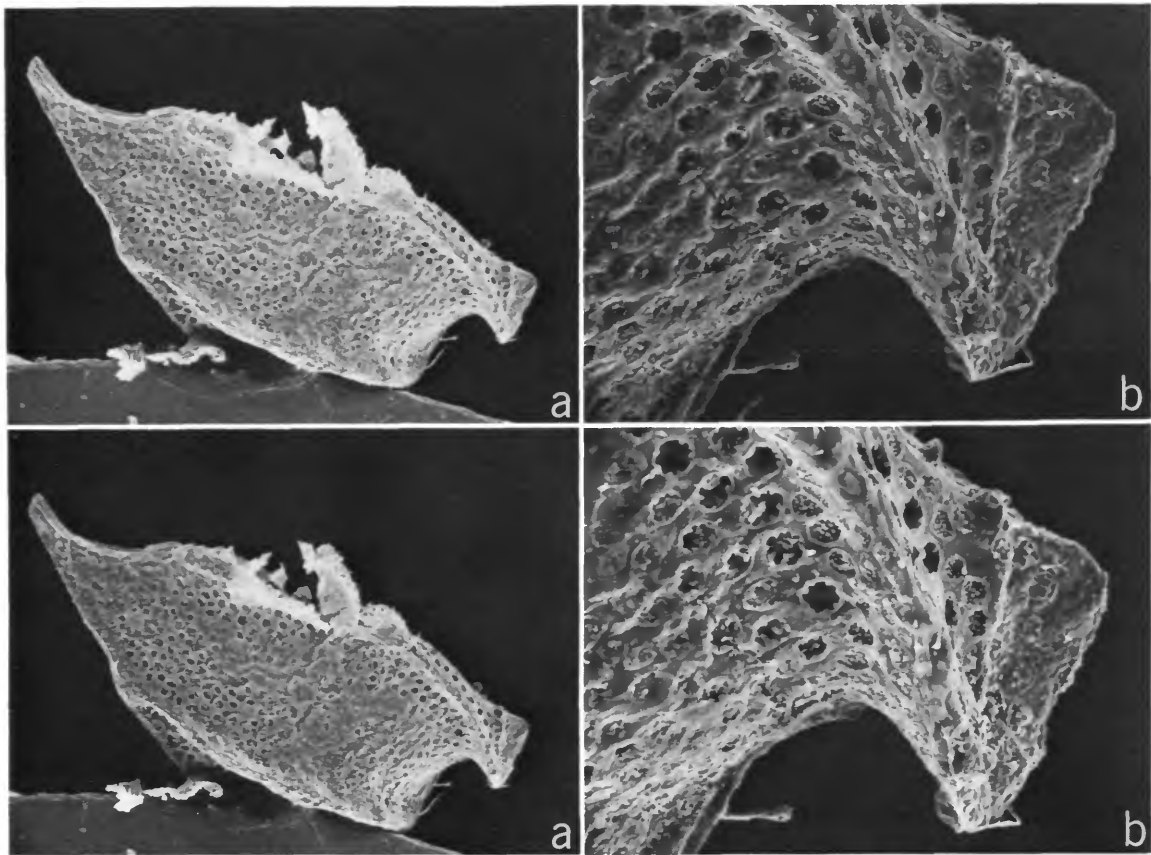


PLATE 4.—*Nealella muelleri*, holotype, USNM 157412, adult female, outside views of right valve (dorsal margin fragmented), stereopairs: *a*, complete valve, $\times 53$; *b*, rostrum, $\times 225$. (Micrographs reduced to 82% for publication.)

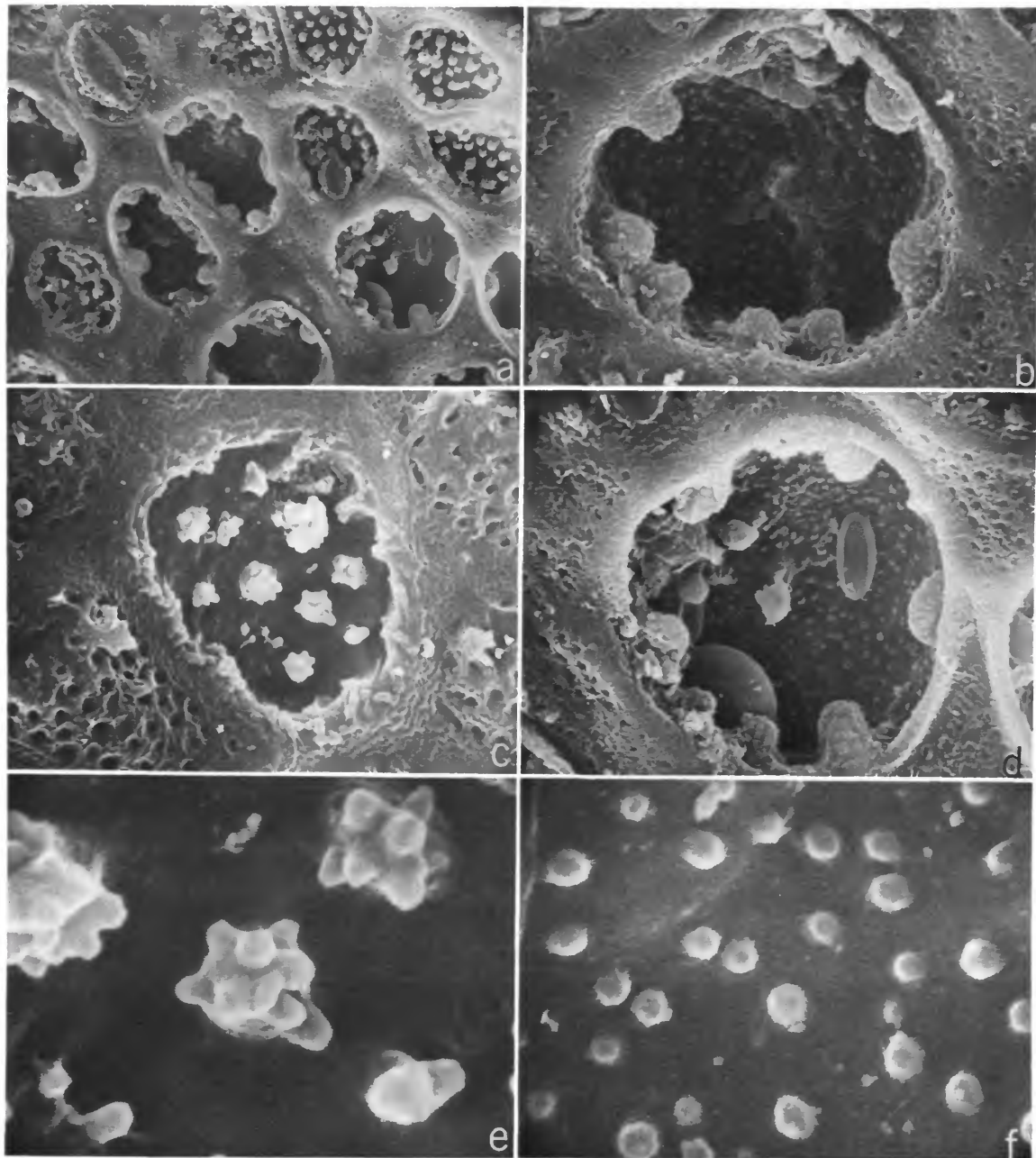


PLATE 5.—*Nealella muelleri*, holotype USNM 157412, adult female, right valve, outside views of ornamentation: *a*, fossae in vicinity of posterodorsal margin, from Plate 1*a*, note diatoms in fossae, $\times 675$; *b*, detail of fossa in *a*, $\times 2000$; *c*, detail of fossa near those shown in *a*, $\times 2350$; *d*, detail of fossa in *a*, note diatom, $\times 1800$; *e*, digitate processes at bottom of fossa in *c*, $\times 10,000$; *f*, pustules at bottom of fossa in *d*, $\times 10,000$. (Micrographs reduced to 82% for publication.)

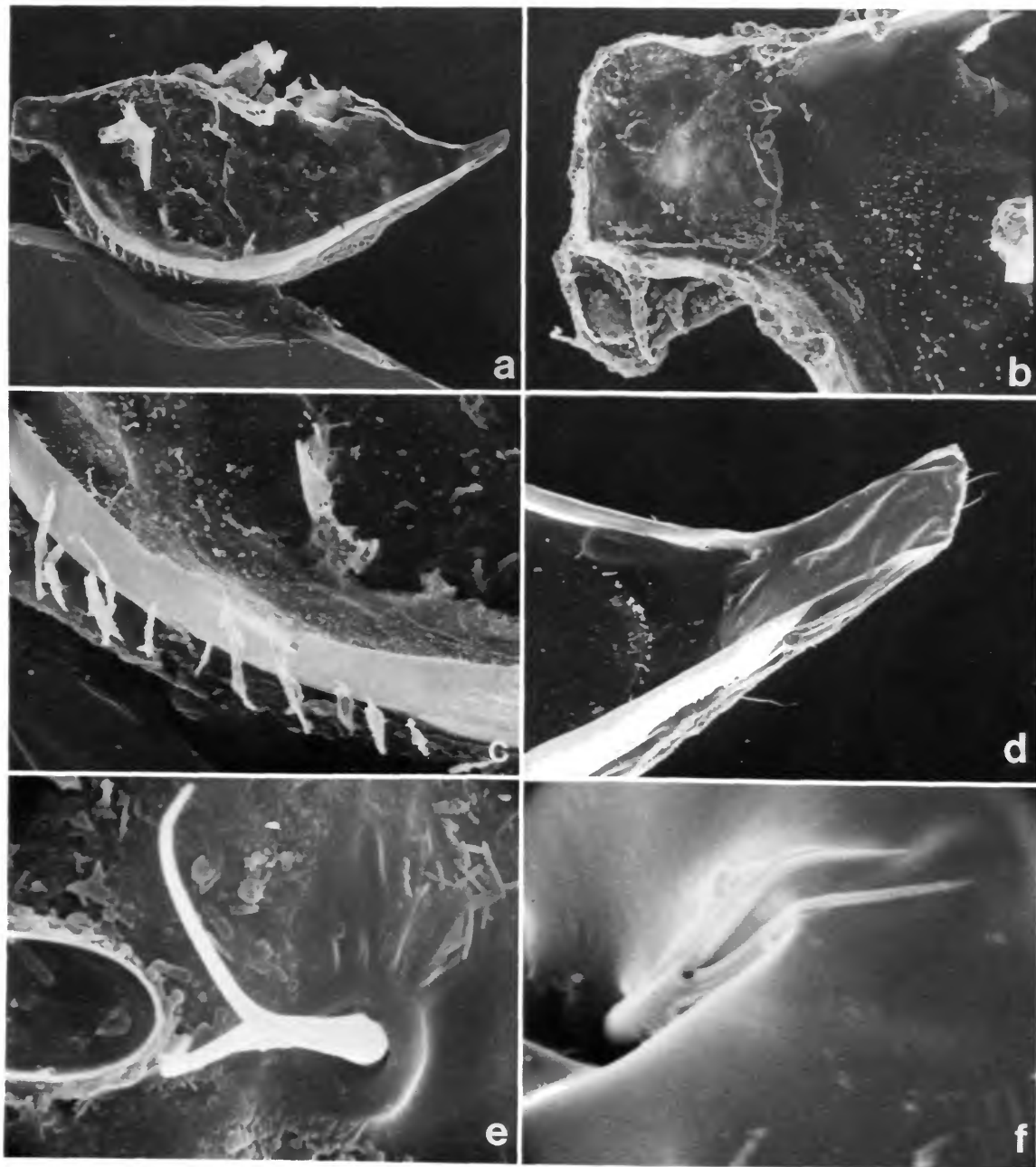


PLATE 6.—*Nealella muelleri*, holotype, USNM 157412, adult female, right valve, inside views: *a*, complete valve, $\times 50$; *b*, rostrum, $\times 260$; *c*, bristles along anteroventral margin, from *a*, $\times 220$; *d*, caudal process, $\times 250$; *e*, divided bristle of rostral infold, from *b*, $\times 4500$; *f*, setose bristle (distal part missing?) of caudal infold, from *d*, $\times 5800$. (Micrographs reduced to 82% for publication.)

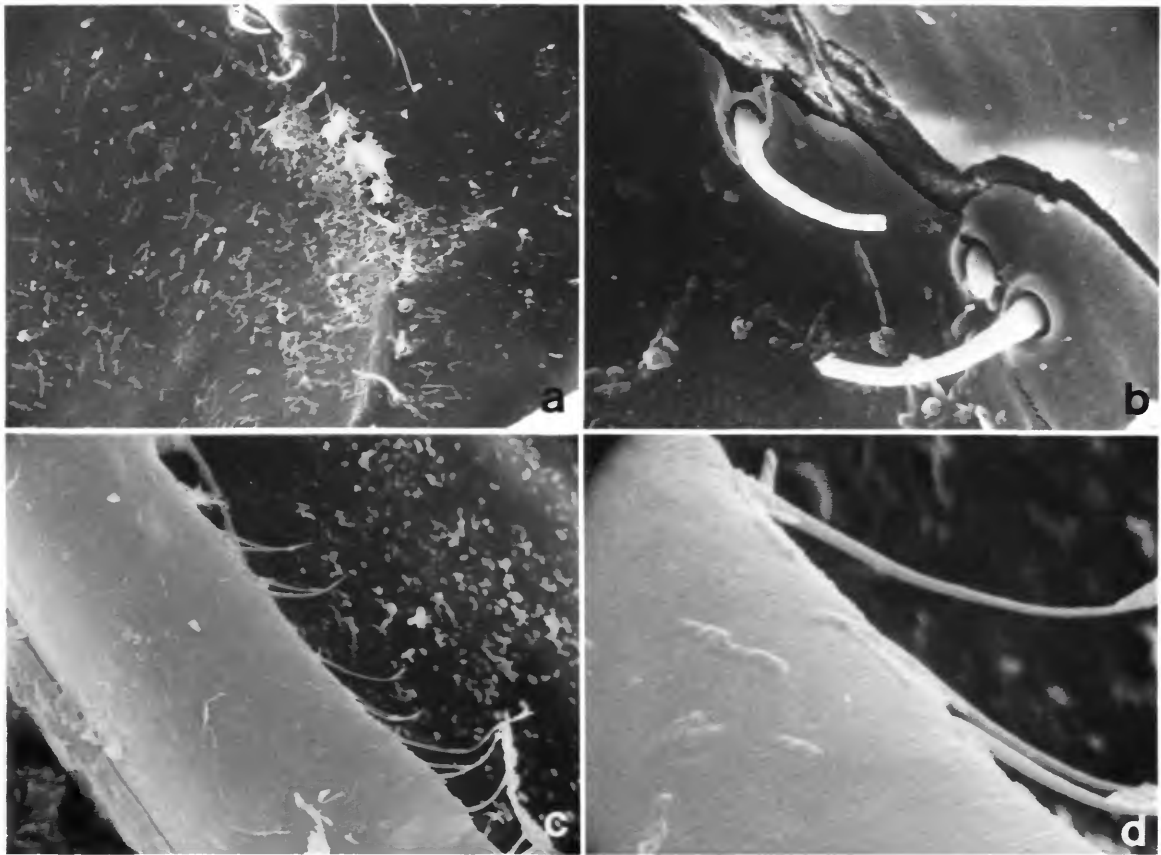


PLATE 7.—*Nealella muelleri*, holotype, USNM 157412, adult female, right valve inside views: *a*, bristles along inner margin of infold of caudal process, from Plate 6*d*, $\times 900$; *b*, detail of upper 3 bristles in *a*, $\times 4000$; *c*, selvage along anteroventral margin of valve, from Plate 6*c*, $\times 1100$; *d*, fringe along margin of selvage, from *c*, $\times 5500$. (Micrographs reduced to 82% for publication.)

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