# DISTRIBUTION, VARIATION, AND SUPPLEMENTAL DESCRIPTION OF THE OPOSSUM SHRIMP, *NEOMYSIS AMERICANA* (CRUSTACEA: MYSIDACEA)

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## ABSTRACT

*Neomysis americana* ranges from the Gulf of St. Lawrence to northeastern Florida in estuaries and nearshore ocean and to depths of 100 m on Georges Bank. Samples studied from localities between Nova Scotia and Georgia show no consistent geographic variation. Specific characters are illustrated and discussed.

*Neomysis americana* (S. I. Smith, 1873) is the most common mysid in shallow marine waters of eastern North America. In his monograph, W. M. Tattersall (1951) gave the range as "from the Gulf of St. Lawrence to the coast of Virginia in shallow water." Since then its known distribution has been extended south to North Carolina (Wigley and Burns, 1971) and recently to South Carolina and Georgia (Sikora, Heard, and Dahlberg, 1972; Williams, 1972). Further details of its distribution are given below.

Published and unpublished distributional data available to us before the present study was undertaken suggested the possible existence of two isolated populations of *Neomysis*: 1) a population north of Cape Henry, Va., mostly in coastal waters but also occurring in large numbers on Georges Bank; 2) a population confined mainly to sounds and estuaries from North Carolina to Georgia. We suspected that there might be taxonomic differences between these or other populations, a likelihood that had occurred independently to other investigators (Bousfield, in litt.; Heard, in litt.). *Neomysis americana* develops two or more generations per year, at least in the United States (Hopkins, 1965), small summer animals and large winter animals. The latter from North Carolina estuaries showed apparent differences that we felt merited further investigation. We decided to determine variation and geographic distribution more precisely in *N. americana*.

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The study is a complement to current ecological investigations in coastal environments. *Neomysis americana* is probably an omnivore like its near relative *N. integer* (Mauchline, 1971) or *Mysis relicta* (Lasenby and Langford, 1973), consuming organic detritus, smaller crustaceans, and diatoms and fitting the trophic role attributed to other mysids preyed upon by fishes in Florida estuaries (Odum and Heald, 1972) and Japan (Ii, 1964). It is known to be a significant element in the diet of fishes such as flounder, shad, mackerel, and anchovy (Hopkins, 1965), *Paralichthys dentatus* and *P. lethostigma* (Powell, in litt.), and the hakes, *Urophycis regius* and *U. floridanus* (Sikora et al., 1972) as well as other fishes (Taylor, in litt.).

## MATERIALS AND METHODS

Our materials for study were both reliable literature records and museum specimens. Canadian occurrences have been reported by Bousfield (1955, 1956a, b, 1958, 1962), O. S. Tattersall (1955a), Bousfield and Leim (1960), Préfontaine and Brunel (1962), and Brunel (1970). Records from the United States included those of Whiteley (1948), Hulbert (1957), Herman (1963), and Wigley and Burns (1971) in addition to others cited previously. Southern range limits and offshore distribution were partly established by examination of plankton samples taken in waters between Cape Hatteras, N.C., and Jupiter Inlet, Fla., during cruises 4, 5, 7, 8, 9 of MV *Theodore N. Gill* (October 1953-December 1954), concentrating on nearshore samples where the species was expected to occur (station data in Anderson, Moore, and Gordy, 1961a, b). Specimens studied for variation were from collections in the National Museum of Natural History (USNM), including new collections acknowledged below.

Measurements and counts used in assessing variation were: 1) carapace length from rear edge of orbit to posterolateral margin, 2) length and width of antennal scale (ventral view), 3) lengths of inner and outer uropods, 4) number of spines in ventral comblike row on inner uropod near distomesial margin of statocyst vesicle, 5) length of this row of spines, 6) number of spines per 0.01 mm in this row, 7) number of spines on margin of telson, and 8) relative widths of cornea and eyestalk. External morphology of representative specimens from over the range was studied and compared.

Specimens measured for comparisons were mature adults (mainly females) from the following collections: USNM 89736, St. Andrews, near Atlantic Biological Station, N.B.; USNM 82658 and 82651, Woods Hole, Mass., received 2 January 1907, Vinal N. Edwards, collector; USNM 78734, Amityville, Long Island, N.Y., 6 August 1938, H. K. Townes, collector; USNM 143770, York River below West Point, Va., 14 January, 1964, W. A. Van Engel, collector; USNM 143771, Garbacon Shoal, 6 May 1964, W. C. Noe, collector, and USNM 143772, Wilkinson Point, 17 June 1964, Frank Holland, collector, Neuse River, N.C.; USNM 143773, Wassau Sound, Ga., 29 August 1972, and USNM 143774, mouth of St. Catherines Sound, Ga., 30 January 1970, Richard W. Heard, Jr., collector. All specimens were large winter animals except the samples of summer animals from Amityville, N.Y., and Wassau Sound, Ga.

## RESULTS AND DISCUSSION

### Morphological Analysis

Proportional and meristic characters were evaluated for variation in different parts of the range. Mean carapace length in millimeters (rear edge of orbit to posterolateral margin) for the samples analyzed were: (Figure 1) New York, 2.95; (Figures 1, 2) New Brunswick, 3.03; Massachusetts, 3.25; Virginia, 3.51; North Carolina, 3.03; Georgia, St. Catherines Sound, 3.91 - Wassau Sound, 2.09; (Figure 3) New Brunswick, 3.01; North Carolina, 2.74; Georgia, as above. There is no detectable difference in size between males and females of assumed comparable age.

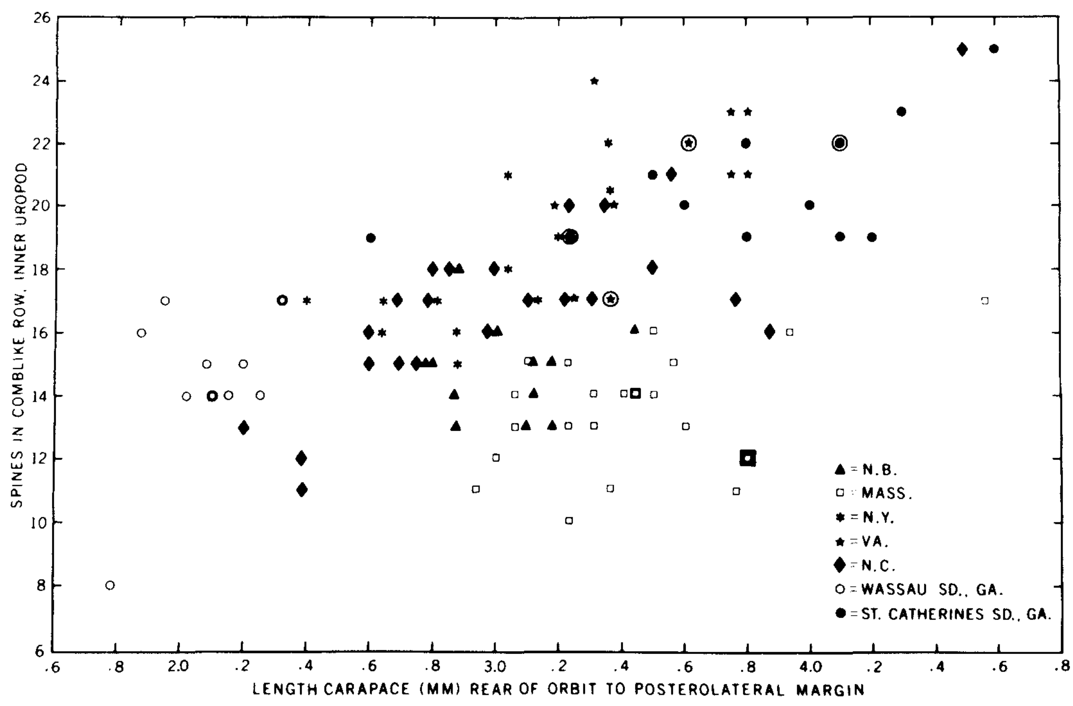


FIGURE 1.—Relation between number of spines in comblike row on inner uropod and length of carapace from rear edge of orbit to posterolateral margin in seven populations of *Neomysis americana*. Framed points = replicates.

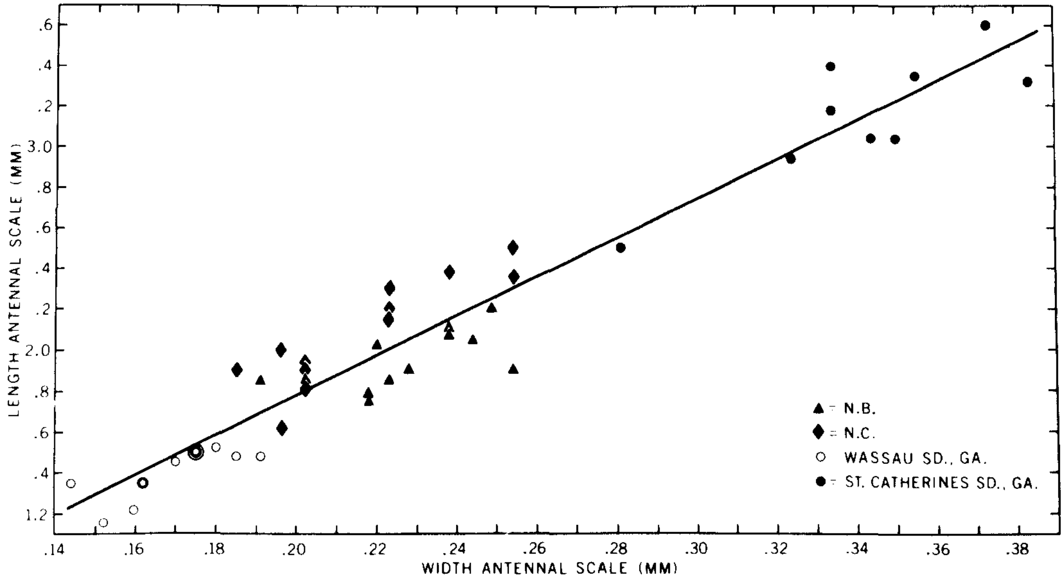


FIGURE 2.—Relation between length and width of antennal scale in four populations of *Neomysis americana*. Framed points = replicates

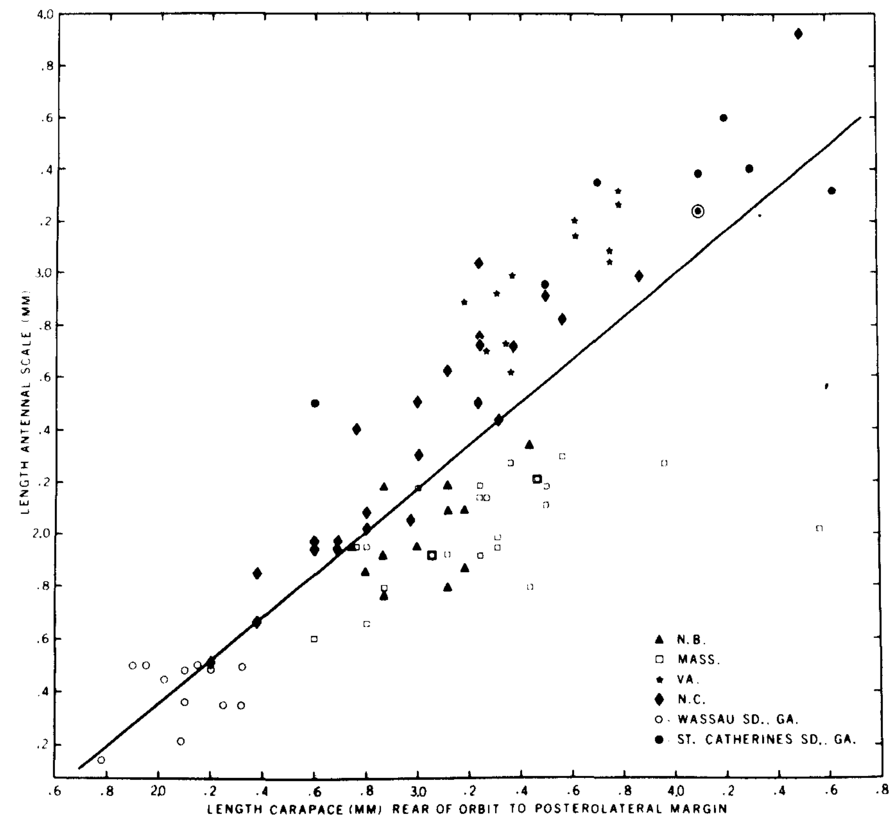


FIGURE 3.—Relation between length of antennal scale and length of carapace from rear edge of orbit to posterolateral margin in six populations of *Neomysis americana*. Framed points = replicates.

The number of spines in the ventral comblike row on the inner uropod first suggested that northern populations might have fewer spines than those in the south. This proves not to be true; rather, the number of spines is apparently a function of body size (Figure 1). A regression analysis shows that the relationship is nonlinear ($Y = 3.39X + 6.08$, $r = 0.579$, $z = 0.661$, $P>0.05$), falling short of statistical significance. Inspection of the scatter of points indicates that number of spines more or less levels off at upper size limits, but distribution is fairly broad at all sizes.

Two other relationships do yield statistically significant correlations but show no geographic association. Length of the antennal scale is correlated with its width (Figure 2) ($Y = 9.726X - 0.177$, $r = 0.967$, $z = 2.043$, $P<0.05$) and with carapace length (Figure 3) ($Y = 0.813X - 0.264$, $r = 0.822$, $z = 1.162$, $P<0.05$).

Other plots analyzed but not discussed in detail here show similar relationships which further substantiate the facts given above: length of comblike row of spines on inner uropod plotted against length of carapace; length of comblike row of spines on inner uropod plotted against longest spine in row; length of inner uropod plotted against length of carapace; number of spines per 0.01 mm in comblike row of spines on inner uropod plotted against length of carapace. Size of cornea, shape of rostrum, shape of antennal scale, spination of telson, and relative lengths of uropods on specimens from throughout the range were compared. No constant differences were noted that would define geographic races.

## Supplemental Description

Despite its abundance, *Neomysis americana* has not been described and illustrated fully. The reason for this omission is obvious: of the 16 known species of *Neomysis*, it is the only one that occurs in the western North Atlantic and is not likely to be confused with any other mysid within its range. Three mysid genera are similar to *Neomysis*: *Acanthomysis*, *Paracanthomysis*, and *Proneomysis*. The last two are confined to the North Pacific, and the only Atlantic representative of the 13 known species of *Acanthomysis*, *A. longicornis* (Milne Edwards), is limited to European waters.

However, the lack of an adequate description of *N. americana* gave Ii (1964) some difficulty before he decided not to identify a *Neomysis* from Korea as *N. americana* but to describe it as a new species, *N. orientalis*. To obviate problems such as this, we offer Figures 4A-K and 5A-J and comments on some characters for which adequate illustrations are not available.

The rostrum (Figure 4A) is broadly rounded as in *N. intermedia* and *N. japonica*. The eyes are as described by W. M. Tattersall (1951), with a broad cornea occupying half the eyestalk. Medially, just before the eyestalk narrows, it is produced into a low protuberance armed with short setae. W. M. Tattersall described the telson (Figure 4K) as having about 40 spines on each lateral margin; the number of spines depends on the body size and ranges from about 20 to 40. The peduncle of antenna 1 is shown in Figure 4B, C, D, the latter showing the male lobe. W. M. Tattersall's (1951) Figure 77A shows the antennal scale without a suture, which would be unique for the genus. Our specimens have a distinct suture (Figure 4D) setting off a short distal segment. As in other species of *Neomysis* the labrum is produced anteriorly into a spiniform process (Figure 4E, F), and the terminal segment of the mandibular palp (Figure 4G) is relatively slender.

According to W. M. Tattersall (1951) the "tarsus" of pereopods 2-7 is 8-9 segmented. We find that the number of segments increases with body size (Figure 5A, C) as in *N. patagona* (O. S. Tattersall, 1955b; Holmquist, 1957). The proximal suture may be incomplete, not present medially; in such pereopods an additional tarsal segment would be counted when viewed laterally. Our counts are in lateral view and include both partly fused proximal segments. Small juveniles have 6 segments; small adults from Pamlico Sound, N.C., 7 segments; large adults from Woods Hole, Mass., 8 segments; and large adults from the York River, Va., 9 segments. The number appears to be rather constant among the pereopods of an individual, but may differ by 1 segment in one or two of the pereopods.

The genus *Neomysis* is unique in having median fingerlike papillae on the last two or three pereonal sterna of gravid females (W. M. Tattersall, 1932). W. M. Tattersall (1951) found these papillae on the last two sternae of *N. americana*, and we show them in Figure 4J. Their function is unknown. Other characters of *Neomysis* are the presence of a bailing lobe on the posterior margin of the oostegite of pereopod 6 (Figure 5E) and a rudimentary oostegite on pereopod 5 (Figure 5D).

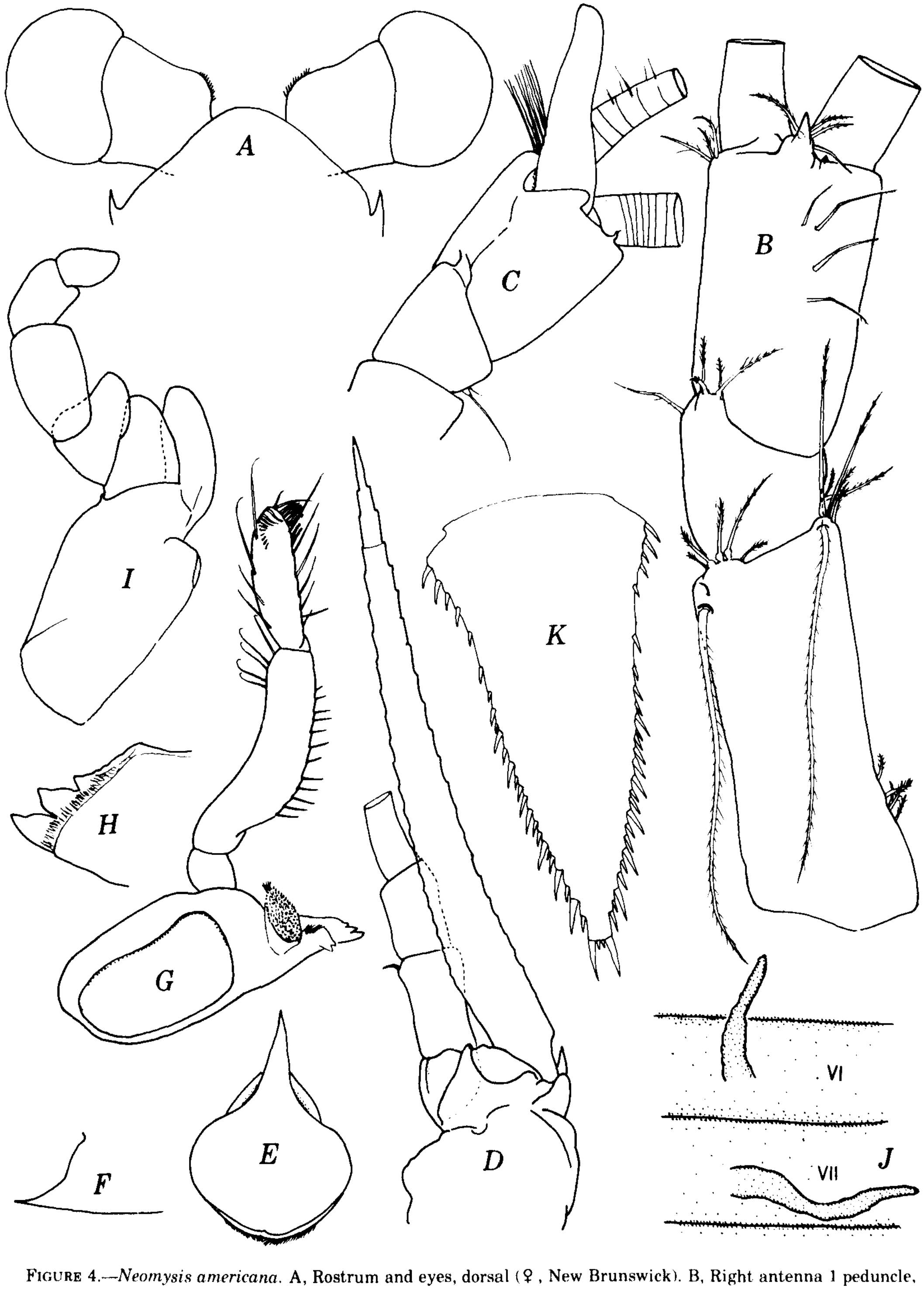


FIGURE 4.—*Neomysis americana*. A, Rostrum and eyes, dorsal (♀, New Brunswick). B, Right antenna 1 peduncle, dorsal, (♀, New Brunswick). C, Antenna 1 peduncle, ventral, (♂, York River, Va.). D, Antenna 2, ventral (♂, Adams Creek, N.C.). E, Labrum, ventral (♀, Pamlico Sound, N.C.). F, Same, lateral. G, Left mandible (♀, New Brunswick). H, Incisor of same. I, Right maxilliped, posterior, setae omitted (♂, York River). J, Sternal processes of pereonites VI and VII. K, Telson, dorsal (♂, Adams Creek).


FIGURE 5.—*Neomysis americana.* A, Endopod of pereopod 6 (♀, New Brunswick). B, Apex of same. C, Endopod of pereopod 7 (♀, New Brunswick). D, Oostegite of pereopod 5. E, Oostegite of pereopod 6 (arrow points to bailing lobe). F, Pleopod 4, ♂. G, Apex of same. H, Uropod, ventral (♀, Pamlico Sound, N.C.). I, Spine row of inner uropod (♂, Nova Scotia). J, Same, (♂, Adams Creek, N.C.).

## Distribution

*Neomysis americana* inhabits estuaries and nearshore ocean from mesohaline reaches of the St. Lawrence River near St. Joachim on the north shore and Montmagny on the south, downstream around the Gaspé Peninsula, and from southern Newfoundland southward through the maritime provinces of Canada, along the United States to St. Augustine, Fla. Collections south of St. Augustine yielded no specimens, but the species may range as far southward as Cape Canaveral.

Prominent in estuaries, *N. americana* is also found at sea. Whiteley (1948) recorded it on Georges Bank inside the 100-m margin but most abundantly in water 75 m deep or less. Wigley and Burns (1971) showed essentially this pattern in their distribution summary. It was partly the distribution shown by these samples produced with the aid of grab samplers and dredges at a great number of stations to depths beyond 100 m between Nova Scotia and southern Florida that suggested an oceanic population north of Cape Henry, Va., separated from a southern estuarine one. None of their southern samples contained *N. americana*.

*Neomysis americana* was found in only four samples (total of 10 specimens) from the *Theodore N. Gill* material. These were: Cruise 4, 5 October-4 November 1953, Station 56 off Myrtle Beach, S.C. (2) - Cruise 9, 3 November-12 December 1954, Station 22 off St. Augustine, Fla. (1); Station 23 off mouth of St. Johns River, Fla. (6); Station 56 (1). All these stations were in water 10 m deep or less.

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