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The cyclopoid copepod *Pseudomyicola spinosus* (Raffaele & Monticelli) from marine pelecypods, chiefly in Bermuda and the West Indies

ARTHUR G. HUMES

ABSTRACT

The myicolid copepod *Pseudomyicola spinosus* is reported from 22 new hosts (pelecypods) in Bermuda and the West Indies, from 1 new host (a pelecypod) in Madagascar, and from an ascidian (Pyuridae) in Curaçao (probably an accidental association). *P. spinosus* is redescribed, based on specimens from *Isognomon alatus* in Bermuda. Among 316 *P. spinosus* from Bermuda, Puerto Rico, Jamaica, Barbados, Brazil, Senegal, Madagascar, and Jugoslavia the dimensions of the body and caudal ramus varied widely. The ornamentation of the anal segment showed four different conditions of spination, and sometimes included an extra long ventral setule on either or both sides.

The specimens studied are regarded as one species, *P. spinosus*, without apparent subspecific differences. The following are considered as synonyms of *P. spinosus*: *P. glaber* Pearse, 1947, *Myicola tageli* Pearse, 1947, *P. anomalocardiae* Narchi, 1965, and *P. mirabilis* Humes, 1959.

INTRODUCTION

The myicolid copepod *Pseudomyicola spinosus* (Raffaele & Monticelli, 1885) has been found in several species of pelecypods in various European localities. Published citations of this species in Europe are as follows:

Lichomolgus (*Sabelliphilus*) *spinosus* Raffaele & Monticelli, 1885: 302—307, figs. 1—12. In mantle cavity and among the branchial lamellae of *Mytilus galloprovincialis* Lamarck at Naples, Italy.

Anthessius spinosus; Canu, 1894: 4 *et passim*.

Anthessius spinosus; Monod & Dollfus, 1932: 151.

Pseudomyicola spinosus; Korringa & Lambert, 1951: 18—19, 23. In intestine of mussels (*Mytilus galloprovincialis*) at Toulon and Etang de Thau, France.

Pseudomyicola spinosus; Lambert, 1951: 44, figs.

Pseudomyicola spinosus; Stock, 1959: 52—53, figs. 4 and 5. In intestine of *Ostrea stentina* Payraudeau in the Gulf of Naples.

Pseudomyicola spinosus; Stock, 1960: 254, fig. 19 e-f. In intestine of *Mytilus galloprovincialis* at Banyuls, France.

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Pseudomyicola spec., subadult; Stock, 1960: 254—255, fig. 19 a-d, g-h. In washings of *Pteria hirundo* (L.) dredged at Banyuls. (This single subadult specimen probably represents *P. spinosus*.)

Pseudomyicola spinosus; Porumb & Andriescu, 1964, 93—100, pls. IV-VII. In mantle cavity of *Mytilus galloprovincialis* in the Black Sea.

Pseudomyicola spinosus spinosus Laubier & Reyss, 1964: 291—308, figs. In *Mytilus galloprovincialis* at Split, Jugoslavia (collected by J. H. Stock).

Pseudomyicola spinosus petiti Laubier & Reyss, 1964: 291—308, figs. In *Pinna pectinata* L. (and perhaps also *Pinna pernula* Chemnitz), in a depth of 60—120 m, at Banyuls.

Pseudomyicola spinosus stocki Laubier & Reyss, 1964: 291—308, figs. In *Pteria hirundo* (L.), in a depth of 60—120 m, at Banyuls.

Pseudomyicola spinosus; Kleeton, 1964: 171—177, figs. 1—3. In *Mytilus edulis* L. at Arcachon, on the Atlantic coast of France.

An examination of various pelecypods in Bermuda, Puerto Rico, Jamaica, Barbados, and Curaçao has shown that *Pseudomyicola spinosus* occurs there as well as in Europe.

The observations and measurements have been made in all cases on specimens cleared in lactic acid. All figures have been drawn with the aid of a camera lucida. The letter after the explanation of each figure refers to the scale at which it was drawn.

Acknowledgements

The specimens from Puerto Rico, Jamaica, and Barbados were collected by A. G. Humes and R. U. Gooding in 1959 during field work supported by a grant (G-8628) from the National Science Foundation of the U.S. Those from Bermuda were collected by the same investigators in 1962 under another grant (G-15911) from NSF. The collection by the author in 1960 of specimens from Madagascar was made possible with the support of the Academy of Natural Sciences of Philadelphia. The specimens from Curaçao were collected by Dr. J. H. Stock in 1958 while working with the support of the Netherlands Foundation for the Advancement of Research in Surinam and the Netherlands Antilles (WOSUNA). I am greatly indebted to Dr. Stock for his generosity in allowing me to include his material in this paper.

The study of the specimens has been aided by a grant (G-5838) from NSF. I would like to express my appreciation to Mr. Victor J. E. Mc Cauley, who made several dissections and drawings of specimens from Bermuda.

The identifications of the molluscan hosts from Bermuda, Puerto Rico, Jamaica, and Barbados were made by the late Richard W. Foster of the Museum of Comparative Zoology, Harvard University. The pelecypods from Curaçao were identified by Drs. H. E. Coomans, now at the Zoölogisch Museum, Amsterdam.

I wish to thank Dr. Walter Narchi of the Universidade de São Paulo for providing me with a syntype of *Pseudomyicola anomalocardiae* Narchi, 1965, Dr. Stock for sending specimens of *P. spinosus* from the collection of the Zoölogisch Museum, Amsterdam, and Dr. R. F. Cressey for sending me Pearse's slides of *P. glaber* Pearse, 1947, and *Myicola tageli* Pearse, 1947, from the collection of the United States National Museum.

Pseudomyicola spinosus FROM BERMUDA

Collections in 1962:

1) From *Isognomon alatus* Gmelin: 33 ♀♀ and 37 ♂♂ from 40 hosts, in 1 m, Mill Creek, north of Mill Shares, Aug. 5 (these specimens being used as the basis for the following description); 10 ♀♀ and 8 ♂♂ from 156 hosts, in 0.5 m, Ely's Harbor, in bay near Wreck Road, Aug. 4; and 4 ♀♀ and 1 ♂ from 35 hosts, same locality, July 30.

2) From *Isognomon* sp.: 101 ♀♀, 44 ♂♂, and 11 copepodids from 150 hosts, on mangroves, northwestern shore of Mangrove Lake, July 27.

3) From *Pinctada radiata* Leach: 7 ♀♀ and 1 ♂ from 65 hosts, in 2—6 m, northern shore of Trunk Island, Harrington Sound, July 18; 6 ♀♀, 6 ♂♂, and 1 copepodid, from 181 hosts, same locality, July 31; and 1 ♀ from 5 hosts, in 1 m, Shelly Bay, July 28.

4) From *Anadara notabilis* Röding: 2 ♀♀ and 1 ♂ from 35 hosts, in 2—3 m, northern shore of Trunk Island, Harrington Sound, July 31.

5) From *Macrocallista maculata* L.: 3 ♀♀ from 5 hosts, in 3—4 m, off Abbott's Cliff, Harrington Sound, Aug. 1.

6) From *Brachidontes exustus* L.: 2 ♀♀ from 50 hosts, on intertidal rocks at dock, Biological Station, Ferry Reach, Aug. 3; and 1 ♀ from 100 hosts, on rocks at southern edge of mouth of Richardson's Creek, Ferry Reach, Aug. 10.

7) From *Ostrea equestris* Say: 8 ♀♀, 12 ♂♂, and 1 copepodid from 15 hosts, in 1 m, Mill Creek, north of Mill Shares, Aug. 5.

8) From *Laevicardium laevigatum* (L.), immature: 2 copepodids from 12 hosts, in 10 m, southeast of Trunk Island, Harrington Sound, Aug. 7.

9) From *Chama congregata* Conrad: 2 ♀♀ and 1 ♂ from 35 hosts, in 20 m, Harrington Sound, Aug. 7.

Description of specimens from *Isognomon alatus:*

Female. — The body (fig. 1) is highly variable in size, even among specimens from the same species of host (such variation having been already noted by Stock, 1959, in material from Naples). The length is 1.90 mm (1.68-2.04 mm) and the greatest width 0.44 mm (0.41-0.48 mm), based on 10 specimens (not the same specimens as those whose measurements are given in table I below). The ratio of length to width of the prosome is 2.9: 1. The ratio of the length of the prosome to that of the urosome is 2.0: 1. In the specimen drawn the egg sacs measured 550 × 240 μ, with each sac containing 5 eggs. In other females the egg sacs contained as many as 12 eggs.

The segment of leg 5 (fig. 2) is 65 × 229 μ, the genital segment 185 × 226 μ (a little wider than long), and the three postgenital segments 96 × 153, 65 × 138, and 86 × 133 μ from anterior to posterior. The area of attachment of each egg sac (fig. 3) shows four blunt spines (or spiniform processes?) each about 5—6 μ long. The anal segment (fig. 4) has a variable posterolateral and posteroventral ornamentation. On each side of the segment there may be either one or two long ventral setules (similar to those shown in figs. 33 and 34), the posterolateral spines may be present or absent, and the posteroventral group of spines may be present or absent (compare figs. 29, 30, 31, and 32).

The caudal ramus (fig. 4) is somewhat variable in length, but in the specimen drawn measured 146 × 31 μ in greatest dimensions. The seta on the dorsal

surface is pedicellate and doubtless corresponds to the usual dorsal seta seen in other poecilostomes. The seta on the ventral surface probably corresponds to the outermost terminal seta in other copepods.

The rostrum (fig. 5) in weakly developed. The first antenna (fig. 6) is 6-segmented, the lengths of the segments (measured along their posterior non-setiferous margins) being 36, 20, 39, 25, 25, and 32 μ from proximal to distal. The formula for the armature is 5, 15, 9, 4 + 1 aesthete, 2 + 1 aesthete, and 7 + 1 aesthete. (In one female six setae were present on the first segment of one of the first antennae, the extra seta being indicated by the arrow in the figure.) The posteriorly directed spine on the first segment is 36 μ long. All setae are naked.

The second antenna (fig. 7) has a variable number (12—20) of spinules in the row on the first segment. (The number may differ on the two second antennae of one individual, as in a female which had 12 on one side but 14 on the other.) The number of minute spinules along the convex margin of the third segment is also variable, and the surface of this segment bears minute sensilla. The terminal claw (fig. 8) is 36 μ long (measured along its axis).

The labrum (fig. 9), mandible (fig. 10), first maxilla (fig. 11), second maxilla (figs. 12 and 13), and maxilliped (fig. 14) are as illustrated. The paragnath apparently consists of a small unornamented process internal to the bases of the mandible and the first maxilla. The oral area is shown in figure 15. The subcircular area between the maxillipeds is slightly protuberant.

The spine and setal formula for legs 1—4 (figs. 16, 18, 19, and 20) is as follows (the Roman numerals indicating spines, the Arabic numerals setae):

P_1 protopod	0—1	1—I	exp	I—0;	I—1;	IV,4
			end	0—1;	0—1;	II,4
P_2 protopod	0—1	1—0	exp	I—0;	I—1;	IV,5
			end	0—1;	0—2;	III,3
P_3 protopod	0—1	1—0	exp	I—0;	I—1;	IV,5
			end	0—1;	0—2;	IV,2
P_4 protopod	0—1	1—0	exp	I—0;	I—1;	IV,5
			end	0—1;	0—2;	IV,1

The small setules on the outer margin of the coxa in all four legs are here considered as part of the ornamentation and not the armature. On the exopod of leg 1 (fig. 17) one palmate process occurs on the second segment and four such processes (becoming successively smaller distally) on the third segment. Vestiges of these processes occur on the exopod of leg 2 (fig. 18).

Leg 5 (figs. 21, 22, and 23) has a subcircular distal segment about 146 μ in diameter. (The true shape of this segment is difficult to see in an undissected specimen. The leg should be removed from the body and examined in flat view.) The four naked setae are 104, 61, 80, and 78 μ in length from dorsal to ventral. Along the ventral edge of the segment there is a row of spinules which proximally extends around to the outer surface. Adjacent to this row there is a second row on the inner surface of the segment, this ventro-inner row having 5—9 spinules. The dorsal seta on the first segment is naked and 65 μ long.

Leg 6 is probably represented by the spines near the area of attachment of each egg sac (see fig. 3).

The color in life in transmitted light is slightly opaque, the ovary dark greyish black, the intestine orange-tan or brown, the eye red, the egg sacs dark gray. In reflected light the egg sacs may be reddish orange.

Male. — The body (fig. 24) resembles that of the female, but is more slender. The length is 1.54 mm (1.37—1.68 mm) and the greatest width 0.36 mm (0.33—0.41 mm), based on 10 specimens (not the same specimens as those whose measurements are given in Table I below). The ratio of length to width of the prosome is 2.54 : 1. The ratio of the length of the prosome to that of the urosome is 1.54 : 1.

The segment of leg 5 (fig. 25) is 36 × 161 μ, the genital segment is 177 × 220 μ (wider than long), and the four postgenital segments are 77 × 153, 80 × 127, 61 × 120, and 66 × 120 μ from anterior to posterior. The anal segment has a variable ornamentation as in the female.

The caudal ramus resembles that of the female, but is smaller, 112 × 26 μ.

The rostrum is like that of the female. The first antenna resembles that of the female, but four aesthetes are added (their positions indicated by dotted lines in fig. 6), two on the second segment and two on the third segment, so that the formula is 5, 15 + 2 aesthetes. 9 + 2 aesthetes, 4 + 1 aesthete, 2 + 1 aesthete, and 7 + 1 aesthete. (From the arrangement of the setae and aesthetes it would appear that the third segment of the first antenna in *Pseudomyicola* represents a fusion of two segments.)

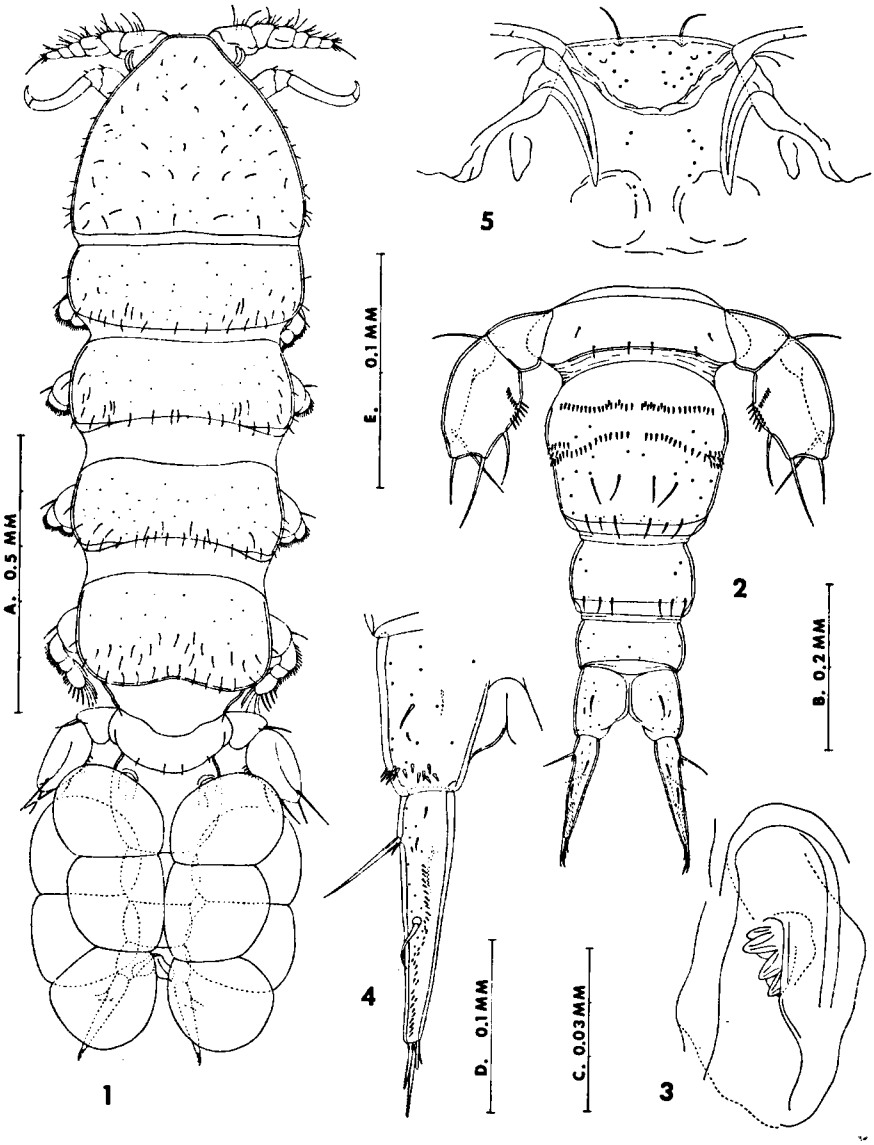
The second antenna, labrum, mandible, paragnath, first maxilla, and second maxilla are like those in the female. The maxilliped (fig. 26) has an inner patch of spinules on the first segment; an inner naked seta, an inner patch of spinules, and a distal anterior patch of spinules on the second segment. The boundary between the small unarmed third segment and the claw is difficult to determine because of strong sclerotization. The claw is about 120 μ long and bears proximally two unequal naked setae and a minute spinule (process?).

Legs 1—4 are like those of the female, with the same spine and setal formula. There is, however, a slight sexual dimorphism in the lengths of the spines on the last segment of the endopod of leg 1. In the male (fig. 27) this segment is 29 μ long and the two spines from outer to inner are 24 and 36 μ; in the female (fig. 16) the segment is 32 μ and the spines 17 and 22 μ. (In both sexes the innermost seta is spiniform.)

Leg 5 (fig. 28) has a subrectangular distal segment 55 × 42 μ, a little longer than wide, armed with three fringed spines and a naked seta, the lengths of these elements from dorsal to ventral being 23, 24, 56, and 33 μ. A few spinules occur on the ventral edge of the segment near the ventralmost spine. The seta on the first segment is 53 μ long and naked.

Leg 6 (fig. 25) consists of the usual posterolateral flap on the ventral surface of the genital segment, bearing two naked setae 52 and 55 μ long.

The color in life resembles that of the female.



FIGURES 1—5. *Pseudomyicola spinosus* (Raff. & Mont.), female, from *Isognomon alatus* in Bermuda: 1, body, dorsal (A); 2, urosome, ventral (B); 3, area of attachment of egg sac, laterodorsal (C); 4, caudal ramus and half of anal segment, ventral (D); 5, rostral area, ventral (E).

Variation in the specimens from Bermuda

The length of the females may vary as much as 1 mm. The caudal ramus may be twice as long in some females as in others.

The ornamentation of the anal segment varies considerably. For convenience in comparison four conditions of spination are here recognized. Condition I (fig. 29) has on each side of the segment two posterior groups of spines, one posterolateral, the other posteroventral just anterior to the insertion of the caudal ramus. Condition II (fig. 30) has only the posteroventral group. Condition III (fig. 31) has only the posterolateral group. Condition IV (fig. 32) lacks both groups of spines. All these conditions exist in the material from Bermuda. The right and left sides of the anal segment may show any of the four conditions in any combination.

The ornamentation of the anal segment in the female is most frequently in either condition I or IV, less often in condition II, and least frequently in condition III. Forty-two of the 54 females (78 per cent) had the same condition of ornamentation on both sides. The number of posteroventral spines near the insertion of the caudal ramus ranged from 3—13.

Males showed similar variations, though not as extreme, in the length of the body and caudal ramus and in the ornamentation of the anal segment. Thirty of the 40 males (75 per cent) had the same condition of ornamentation on both sides. The number of posteroventral spines near the insertion of the caudal ramus ranged from 1—10.

A summary of the variation in the Bermudian samples is given in table I.

Note on *Macrocallista maculata* and its *Pseudomyicola*

This pelecypod has only recently been found alive in Bermuda (though known as a fossil), having been first collected there in 1961 and now being abundant (Abbott & Jensen, 1967). It reaches a larger size in Bermuda than in Florida, according to Abbott & Jensen. It may be of interest to note that its *Pseudomyicola* are larger than those in other Bermudian hosts. Unfortunately, the number of copepods collected (3) from this host is too small for significant conclusions. Furthermore, samples of *Pseudomyicola* from *M. maculata* in Florida, where it undoubtedly occurs, are not available for comparison.

Pseudomyicola spinosus from Puerto Rico

Collections in 1959:

1) From *Crassostrea rhizophorae* Guilding: 3 ♀♀ and 1 ♂ from 65 hosts, on mangrove, intertidal, eastern shore of Magüeyes Island, near La Parguera, July 29; 1 ♀ and 1 copepodid from 108 hosts, on mangrove, northern shore of Mata Flores Island, near La Parguera, Aug. 4; and 2 ♀♀ from 44 hosts, on mangrove, at two small mangrove islands west of Magüeyes Island, near La Parguera, Aug. 22.

2) From *Chione cancellata* L.: 2 ♀♀ and 2 ♂♂ from 4 hosts, in 6 m, west of Magüeyes Island, near La Parguera, Aug. 7.

3) From *Brachidontes domingensis* Lamarck: 1 ♀ from 200 hosts, on intertidal rocks at entrance to Phosphorescent Bay, east of La Parguera, Aug. 10.

4) From *Cyclina* (*Cyclinella*) *tenuis* Récluz: 1 ♀ from 2 hosts, in 1 m, at entrance to lagoon at Bocqueron, Aug. 21.

TABLE I. The dimensions of the body and caudal ramus and the ornamentation of the anal segment in *Pseudomyicola spinosus*.

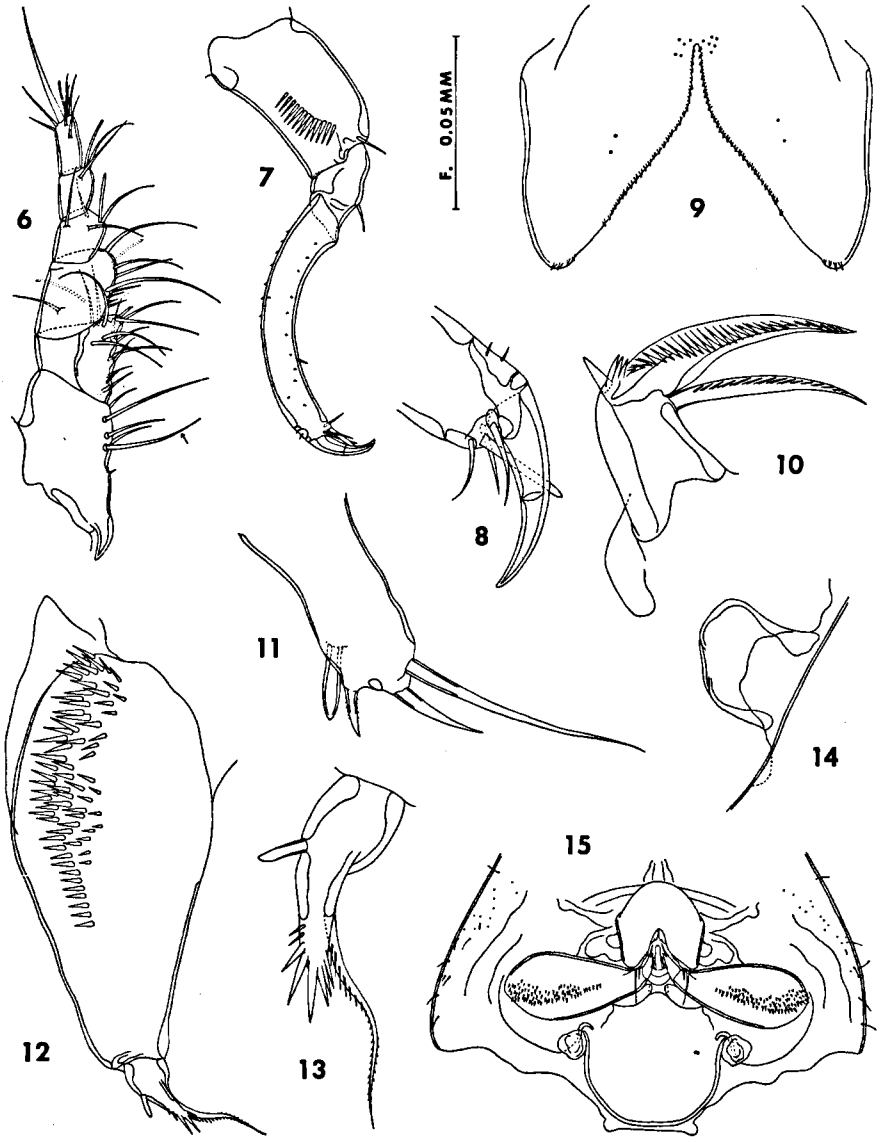
Host	Sex	Number	Body length μ	Body width μ	Caudal ramus length μ	Caudal ramus width μ	Number with spines on anal segment in conditions I—IV: right side I	right side II	right side III	right side IV	left side I	left side II	left side III	left side IV
BERMUDA														
Isognomon alatus	♀	13	1922 (1824—2080)	414 (374—451)	121 (99—148)	29.6 (29—31)	7	3	—	3	9	1	1	2
„	♂	9	1469 (1380—1585)	363 (330—396)	102 (91—121)	24 (22—27)	6	—	1	2	6	2	1	—
Isognomon sp.	♀	10	1531 (1408—1700)	417 (374—473)	113 (96—135)	26 (23—29)	1	6	1	2	1	8	—	1
„	♂	10	1233 (1120—1440)	340 (297—396)	94 (80—101)	21.5 (20—26)	5	2	—	3	5	3	—	2
Pinctada radiata	♀	14	1893 (1615—2112)	498 (407—572)	149 (114—174)	33 (26—39)	12	—	—	2	11	—	1	2
„	♂	7	1537 (1408—1710)	382 (308—462)	123 (99—143)	25.5 (23—29)	4	1	—	2	4	1	—	2
Anadara notabilis	♀	2	1618 (1525—1710)	435 (385—484)	141 (122—161)	32 (29—35)	—	1	1	—	—	1	1	—
„	♂	1	1600	345	122	23	1	—	—	—	1	—	—	—
Macrocallista maculata	♀	3	2108 (1900—2300)	534 (480—572)	157 (138—174)	35 (31—37)	—	—	2	1	1	—	—	2
Brachidontes exustus	♀	3	1621 (1344—1856)	418 (396—429)	107 (104—109)	28 (27—29)	1	—	—	2	1	—	—	2
Ostrea equestris	♀	7	1855 (1728—2016)	402 (363—451)	120 (104—140)	28 (24—31)	4	—	—	3	2	—	1	4
„	♂	12	1441 (1240—1585)	332 (308—374)	104 (86—120)	24 (21—27)	8	—	2	2	8	2	1	1
Chama congregata	♀	2	1616 (1504—1728)	302 (290—315)	97 (86—107))	27 (24—29)	—	—	—	2	—	—	—	2
„	♂	1	1420	357	109	25	—	—	—	1	—	—	—	1
Bermuda Summary	♀	54	1804 (1344—2300)	438 (290—572)	127 (86—174)	30 (23—39)	25	10	4	15	25	10	4	15
„	♂	40	1415 (1120—1710)	350 (297—462)	105 (80—143)	24 (20—29)	24	3	3	10	24	8	2	6

PUERTO RICO														
Crassostrea rhizophorae	♀	6	1703 (1635—1888)	449 (429—484)	123 (109—146)	28 (26—31)	4	—	—	2	3	2	—	1
„	♂	1	1435	374	114	25	1	—	—	—	1	—	—	—
Chione cancellata	♀	2	1568 (1536—1600)	434 (429—440)	114 (109—120)	27 (26—29)	—	—	—	2	—	—	—	2
„	♂	2	1392 (1376—1408)	344 (330—358)	100 (94—107)	24 (23—26)	—	1	1	—	—	—	1	1
Brachidontes domingensis	♀	1	1920	550	135	31	—	1	—	—	—	—	—	1
Cyclina tenuis	♀	1	1984	572	161	39	—	—	—	1	—	—	—	1
Arca sp.?	♀	1	1728	440	130	29	—	—	—	1	—	—	—	1
Pseudochama radians	♀	2	1968 (1952—1984)	528 (528—528)	139 (138—140)	34 (34—34)	—	1	—	1	—	—	—	2
„	♂	1	1600	385	107	29	—	—	—	1	—	—	1	—
Chama sp.	♀	2	2089 (2048—2130)	484 (440—528)	136 (127—146)	35 (34—36)	—	—	—	2	—	—	—	2
„	♂	1	1760	363	130	30	—	—	—	1	—	—	—	1
Chama sinuosa	♀	1	2272	484	159	35	—	—	—	1	—	—	—	1
Puerto Rico Summary	♀	16	1835 (1536—2272)	471 (429—572)	131 (109—161)	31 (26—39)	4	2	—	10	3	2	—	11
„	♂	5	1516 (1376—1760)	362 (330—385)	110 (94—130)	26.7 (23—30)	1	1	1	2	1	—	2	2
JAMAICA														
Chione cancellata	♀	14	1713 (1485—2000)	443 (352—539)	113 (88—140)	28 (23—31)	3	1	—	10	2	1	1	10
„	♂	8	1373 (1230—1510)	322 (270—363)	91 (75—112)	23 (21—26)	3	—	1	4	2	3	2	1
Pitar albida	♀	15	1911 (1632—2272)	437 (352—495)	127 (94—169)	31 (24—36)	—	1	—	14	—	—	1	14
„	♂	3	1599 (1680—1710)	388 (360—410)	110 (91—122)	29 (26—31)	—	—	—	3	—	—	—	3
Brachidontes exustus	♀	4	1846 (1664—2060)	430 (380—506)	120 (94—143)	28 (24—31)	3	1	—	—	3	—	—	1
„	♂	1	1490	374	112	23	1	—	—	—	1	—	—	—
Chama sp.	♀	2	2320 (2304—2336)	566 (528—605)	163 (146—180)	39 (36—43)	—	—	—	2	—	—	—	2

Host	Sex	Number	Body length μ	Body width μ	Caudal ramus length μ	Caudal ramus width μ	Number with spines on anal segment in conditions I—IV: right side I	right side II	right side III	right side IV	left side I	left side II	left side III	left side IV
Jamaica	♀	35	1847 (1485—2336)	446 (352—605)	123 (88—180)	30 (23—43)	6	3	—	26	5	1	2	27
Summary														
„	♂	12	1439 (1230—1710)	343 (270—410)	98 (75—122)	25 (21—31)	4	—	1	7	3	3	2	4
BARBADOS														
Brachidontes citrinus	♀	17	1657 (1312—1920)	402 (325—473)	98 (80—117)	27 (21—31)	4	4	1	8	2	4	1	10
„	♂	13	1365 (1170—1490)	316 (264—363)	87 (68—99)	22 (20—25)	1	2	3	7	1	4	1	7
CURAÇAO														
Isognomon alatus	♀	2	1616 (1600—1632)	385 (385—385)	102 (100—104)	28 (28—28)	—	1	—	1	—	—	—	2
„	♂	4	1515 (1440—1568)	325 (297—335)	101 (88—107)	23 (21—24)	1	—	—	3	1	1	—	2
Cardium muricatum	♀	2	1952 (1920—1984)	506 (506—506)	151 (151—151)	36 (36—36)	—	—	1	1	—	—	—	2
„	♂	3	1355 (1312—1440)	345 (341—352)	119 (117—120)	30 (25—26)	2	—	—	1	1	1	—	1
Pinna carnea	♂	1	1376	396	104	24	1	—	—	—	1	—	—	—
Arca zebra	♂	1	1504	319	94	25	—	—	1	—	1	—	—	—
Arca imbricata	♀	2	1785 (1770—1800)	473 (451—495)	140 (133—148)	31 (29—34)	2	—	—	—	2	—	—	—
„	♂	1	1504	396	101	26	1	—	—	—	1	—	—	—
Spondylus americanus	♂	1	1710	418	130	30	—	—	—	1	—	—	—	1
Diplodonta punctata	♀	2	1696 (1664—1728)	445 (440—451)	113 (101—125)	30 (29—31)	—	—	—	2	—	—	—	2
„	♂	1	1376	330	117	26	1	—	—	—	1	—	—	—

Chione cancellata	♀	4	1512 (1472—1536)	354 (351—363)	91 (78—101)	26 (23—29)	—	1	—	3	—	—	—	4
„	♂	4	1267 (1184—1325)	291 (275—308)	87 (68—130)	23 (22—23)	1	—	2	1	—	1	—	3
Chione sp.	♀	1	1312	370	96	27	—	—	—	1	—	—	—	1
„	♂	3	1220 (1156—1320)	297 (286—319)	87 (83—91)	24 (23—25)	—	—	—	3	—	—	—	3
Brachidontes exustus	♀	1	1760	517	135	34	1	—	—	—	1	—	—	—
„	♂	5	1294 (1184—1376)	352 (340—374)	93 (83—99)	23 (21—26)	2	2	—	1	1	2	—	2
Crassostrea rhizophorae	♀	20	1732 (1408—1952)	472 (418—530)	123 (91—166)	29 (26—34)	10	2	3	5	6	7	4	3
„	♂	20	1423 (1190—1710)	351 (275—410)	111 (78—156)	23 (21—26)	10	3	3	4	7	3	3	7
Pyuridae	♀	1	1984	495	130	31	—	—	—	1	1	—	—	—
Curaçao Summary	♀	35	1710 (1196—1984)	453 (319—517)	120 (78—166)	29.7 (23—36)	13	4	4	14	10	7	4	14
„	♂	44	1392 (1156—1710)	342 (275—418)	105 (68—156)	24 (21—36)	19	5	6	14	14	8	3	19
BRAZIL *Anomalocardia brasiliana*	♀	1	2048	517	148	34	—	1	—	—	—	—	—	1
MADAGASCAR *Arca decussata*	♀	3	1786 (1632—2030)	450 (418—470)	129 (114—132)	31 (29—32)	2	—	—	1	1	—	1	1
„	♂	3	1335 (1220—1408)	341 (330—352)	98 (83—112)	25 (23—26)	3	—	—	—	3	—	—	—
Chama iostoma	♀	7	2240 (1984—2560)	550 (506—594)	155 (135—172)	37 (35—42)	—	—	2	5	—	—	2	5
Madagascar Summary	♀	10	2104 (1632—2560)	520 (418—594)	147 (114—172)	35 (29—42)	2	—	2	6	1	—	3	6
„	♂	3	1335 (1220—1408)	341 (330—352)	98 (83—112)	25 (23—26)	3	—	—	—	3	—	—	—

Host	Sex	Number	Body length μ	Body width μ	Caudal ramus length μ	Caudal ramus width μ	Number with spines on anal segment in conditions I—IV: right side I	right side II	right side III	right side IV	left side I	left side II	left side III	left side IV
SENEGAL														
Arca senilis	♀	10	2046 (1632—2304)	510 (455—561)	160 (125—195)	35 (31—42)	8	—	2	—	9	—	1	—
„	♂	10	1535 (1408—1640)	377 (352—429)	117 (107—138)	25 (23—29)	8	—	2	—	6	—	3	1
JUGOSLAVIA														
Mytilus cf. *edulis*	♀	4	2088 (1568—2336)	544 (505—565)	154 (127—172)	33 (29—36)	4	—	—	—	3	1	—	—
„	♂	2	1648 (1440—1856)	445 (440—451)	138 (130—146)	26 (25—26)	1	1	—	—	1	1	—	—
Mytilus sp.	♀	4	2168 (1824—2400)	572 (517—616)	154 (138—180)	35 (30—39)	2	2	—	—	1	3	—	—
„	♂	1	1650	440	125	26	1	—	—	—	1	—	—	—
Jugoslavia Summary	♀	8	2128 (1568—2400)	552 (505—616)	154 (127—180)	34 (29—39)	6	2	—	—	4	4	—	—
„	♂	3	1648 (1440—1856)	443 (440—451)	133 (125—146)	26 (26—26)	2	1	—	—	2	1	—	—
GRAND SUMMARY	♀	186	1828 (1196—2560)	456 (290—616)	127 (78—195)	30 (21—43)	68	26	13	79	59	28	15	84
„ „	♂	130	1421 (1120—1856)	348 (264—462)	104 (68—156)	24 (20—36)	62	12	16	40	54	24	13	39



FIGURES 6—15. *Pseudomyicola spinosus* (Raff. & Mont.), female, from *Isognomon alatus* in Bermuda: 6, first antenna, an extra sixth seta on first segment indicated by the arrow, the position of the four aesthetes added in the male shown in dotted lines, ventral (D); 7, second antenna, anterior (D); 8, tip of second antenna, anterior (C); 9, labrum, ventral (F); 10, mandible, posterior (C); 11, first maxilla, posterior (C); 12, second maxilla, posteroventral (E); 13, second segment of second maxilla, posteroventral (C); 14, maxilliped, lateral (F); 15, oral area, ventral (B).

5) From *Arca* sp.?: 1 ♀ from 1 host, in 0.5 m, at entrance to lagoon at Bocqueron, Aug. 21.

6) From *Pseudochama radians* Lamarck: 1 ♂ and 1 copepodid from 3 hosts, in 0.5 m, Corona del Diablo, a small reef south of Magüeyes Island, near La Parguera, July 31; and 2 ♀♀ from 8 hosts, in 1 m, Caballo Ahogado, south of Magüeyes Island, Aug. 19.

7) From *Chama* sp.: 1 ♂ and 3 copepodids from 2 hosts, in 3 m, Laurel Reef, southwest of La Parguera, Aug. 13; and 2 ♀♀ from 12 hosts, in 0.5 m, Caballo Ahogado, south of Magüeyes Island, Aug. 19.

8) From *Chama sinuosa* Broderip: 1 ♀ from 17 hosts, in 0.5 m, Caballo Ahogado, south of Magüeyes Island, Aug. 11.

Variation in the Puerto Rican specimens

A summary of the variation in the dimensions of the body and caudal ramus and in the ornamentation of the anal segment is given in table I. The degree of variation is similar to that in the Bermudian specimens. Twelve of the 16 females (75 per cent) had the same condition of ornamentation on both sides of the anal segment. The number of posteroventral spines near the insertion of the caudal ramus ranged from 2—6. Two of the 5 males (40 per cent) had the same condition of ornamentation on both sides of the anal segment, and the number of posteroventral spines ranged from 2—6.

Pseudomyicola spinosus FROM JAMAICA

Collections in 1959:

1) From *Chione cancellata* L.: 1 ♀ and 2 ♂♂ from 1 host, in 0.5 m, at entrance to channel through mangroves, near Palisadoes Airport, Kingston, Sept. 5; and 13 ♀♀, 6 ♂♂, and 1 copepodid from 34 hosts, in 0.5 m, in small boat channel east of hurricane anchorage, Port Royal, Sept. 10.

2) From *Pitar albida* Gmelin: 15 ♀♀, 3 ♂♂, and 1 copepodid from 73 hosts, in 0.5 m, in small boat channel east of hurricane anchorage, Port Royal, Sept. 10.

3) From *Brachidontes exustus* L.: 4 ♀♀ and 1 ♂ from 1 host, in 0.5 m, Bogue Island, Montego Bay, Sept. 9.

4) From *Chama* sp.: 2 ♀♀ from 19 hosts, intertidal, Rackham's Cay, off Kingston Harbor, Sept. 3.

Variation in the Jamaican specimens

A summary of the variation in the dimensions of the body and caudal ramus and in the ornamentation of the anal segment is given in table I, the degree of variation being similar to that in the Bermudian and Puerto Rican specimens. Thirty of the 35 females (86 per cent) had the same condition of ornamentation on both sides of the anal segment. The number of posteroventral spines near the insertion of the caudal ramus ranged from 2—8. Eight of the 12 males (66 per cent) had the same condition of ornamentation on both sides of the anal segment, and the number of posteroventral spines ranged from 2—6.

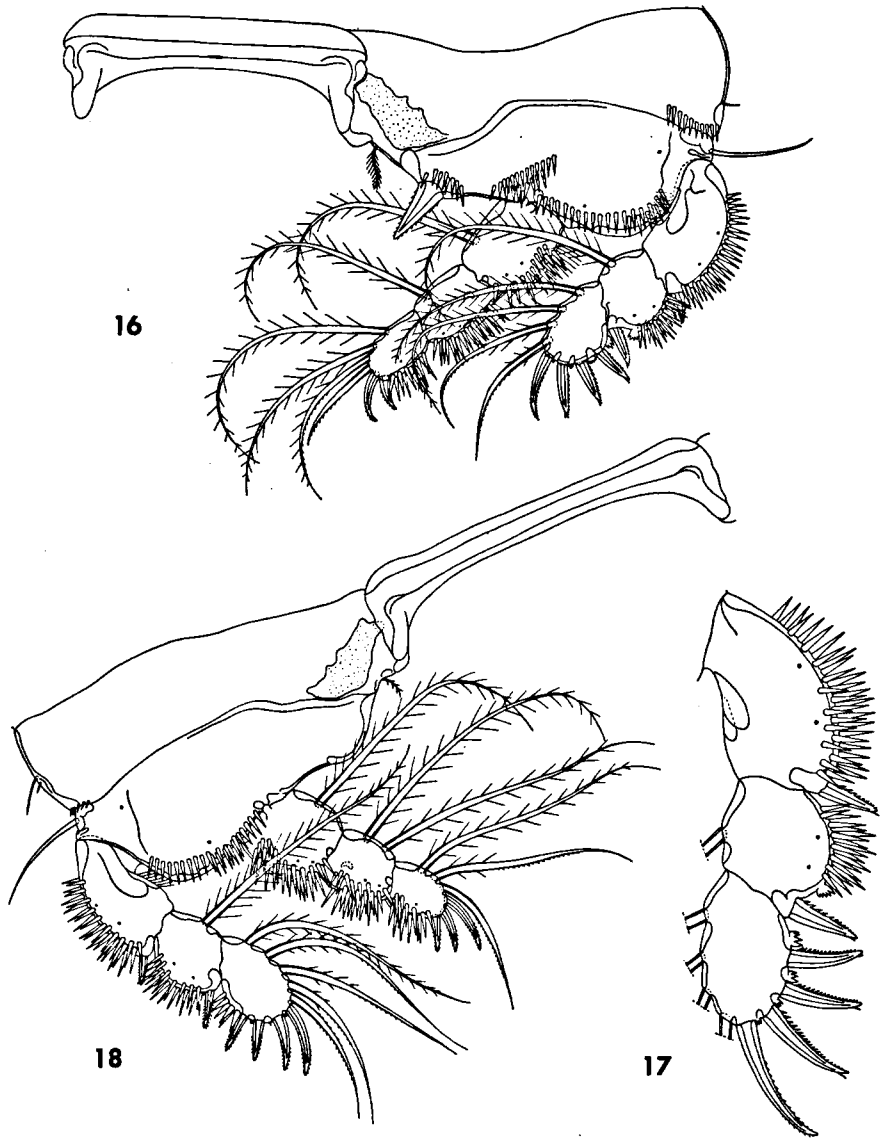
Pseudomyicola spinosus FROM BARBADOS

Collections in 1959:

1) From *Brachidontes citrinus* Röding: 10 ♀♀ and 5 ♂♂ from 124 hosts, in 0.5 m, Carlisle Bay, Bridgetown, July 16; and 28 ♀♀, 13 ♂♂, and 1 copepodid from 390 hosts, in 0.5 m, Carlisle Bay, July 20.

Variation in the specimens from Barbados

A summary of the variation in the dimensions of the body and caudal



FIGURES 16—18. *Pseudomyicola spinosus* (Raff. & Mont.) female, from *Isognomon alatus* in Bermuda: 16, leg 1, anterior (E); 17, exopod of leg 1, anterior (F); 18, leg 2, anterior (E).

ramus and in the ornamentation of the anal segment is given in table I. The degree of variation is similar to that seen in the previous specimens. Fourteen of the 17 females (82 per cent) had the same condition of ornamentation on both sides of the anal segment. The number of posteroventral spines near the insertion of the caudal ramus ranged from 3—8. Nine of the 13 males (69 per cent) had the same condition of ornamentation on both sides of the anal segment, and the number of posteroventral spines ranged from 2—6.

Pseudomyicola spinosus FROM CURAÇAO

Collections in 1958 (by J. H. Stock):

1) From *Isognomon alatus* Gmelin: 8 ♀♀, 11 ♂♂, and 2 copepodids from 24 hosts, on mangrove, Piscadera Inner Bay, Oct. 11.

2) From *Cardium muricatum* L.: 3 ♀♀, 10 ♂♂, and 2 copepodids from 48 hosts, in 50 cm, in eelgrass field, entrance to Piscadera Inner Bay, Oct. 14.

3) From *Pinna carnea* Gmelin: 3 ♂♂ from 1 host, in about 2 m, Piscadera Bay, Oct. 21.

4) From *Arca zebra* Swainson: 1 ♂ from 3 hosts, in 1—2 m, Piscadera Bay, Nov. 6.

5) From *Arca imbricata Bruguière:* 2 ♀♀ and 1 ♂ from 2 hosts, in 3 m, Piscadera Inner Bay, near former turtle hatchery, Dec. 17.

6) From *Spondylus americanus* Hermann: 1 ♂ from 1 host, in 50 cm, entrance to Piscadera Inner Bay, Nov. 29.

7) From *Diplodonta punctata* (Say): 2 ♀♀ and 1 ♂ from 1 host, in 2 m, Piscadera Inner Bay, near brick factory, Dec. 16.

8) From *Chama* sp.: 1 copepodid from 4 hosts, in 1—2 m, Piscadera Bay, Nov. 6.

9) From *Chione cancellata* L.: 4 ♀♀ and 4 ♂♂ from 20 hosts, in 50 cm, in eelgrass field, entrance to Piscadera Inner Bay, Oct. 14; and 2 ♀♀ and 1 ♂ from 8 hosts, entrance to Piscadera Inner Bay, Oct. 25.

10) From *Chione* sp.: 1 ♀, 3 ♂♂, and 2 copepodids from 27 hosts, in 50 cm, Piscadera Inner Bay, near sewage pipe of Julianadorp, Nov. 27.

11) From *Brachidontes exustus* L.: 4 ♀♀ and 9 ♂♂ from 125 hosts, in 3 m, Piscadera Inner Bay, near former turtle hatchery, Dec. 17.

12) From *Crassostrea rhizophorae* Guilding: 17 ♀♀, 26 ♂♂, and 5 copepodids from an unknown number of hosts, on mangroves, Piscadera Inner Bay, Oct. 6; and 16 ♀♀, 21 ♂♂, and 9 copepodids from an unknown number of hosts, on mangroves, Piscadera Inner Bay, Oct. 6.

13) From Pyuridae (ascidians): 1 ♀ from an unknown number of hosts, in about 3 m, Piscadera Inner Bay, near former turtle hatchery, Dec. 17.

Variation in the specimens from Curaçao

A summary of the variation in the dimensions of the body and caudal ramus and in the ornamentation of the anal segment is given in table I. The degree of variation is similar to that in previous specimens. Twenty-two of the 35 females (63 per cent) had the same condition of ornamentation on both sides of the anal segment. The number of posteroventral spines near the insertion of the caudal ramus ranged from 2—16. Twenty-nine of the 44 males (66 per cent) had the same condition of ornamentation on both sides of the anal segment, and the number of posteroventral spines ranged from 2—7.

SYNONYMY OF *P. anomalocardiae* NARCHI, 1965, FROM BRAZIL, WITH *P. spinosus*

Through the kindness of Dr. Walter Narchi I have been able to study one syntypic female of his *Pseudomyicola anomalocardiae* from the stomach of *Anomalocardia brasiliana* Gmelin from São Vicente, State of São Paulo, Brazil.

The dimensions of this specimen and the ornamentation of the anal segment are shown in table I. The spine and setal formula for legs 1—4 is the same as in all specimens of *P. spinosus* which I have seen. (The formula in Narchi's paper should apparently read 1—0, 1—1, 4—4 for the exopod of leg 1, and 0—1, 0—2, 3—3 for the endopod of leg 2.) The second segment of leg 5 of

the female is almost exactly like that in specimens from Bermuda. (The more elongated shape in Narchi's fig. 10 is probably due to the angle at which it was drawn.) Other parts, including the caudal ramus, mouthparts, and second antenna, correspond very closely to those of *P. spinosus* from Bermuda and the West Indies.

Since the characters of this Brazilian copepod and those of West Indian *P. spinosus* are nearly identical, the Brazilian *P. anomalocardiae* should be considered as a synonym of *P. spinosus*.

Synonymy of *P. mirabilis* Humes, 1959, from Madagascar, with *P. spinosus*

Paratypic specimens of *Pseudomyicola mirabilis* have been restudied. Their dimensions and the ornamentation of the anal segment are given in table I. The very close similarity of these specimens from *Arca decussata* in Madagascar with *P. spinosus* in Bermuda and the West Indies has led me to conclude that *P. mirabilis* is synonymous with *P. spinosus*.

P. spinosus is now reported from a new host in Madagascar, *Chama iostoma* Conrad. The collections made from this host are as follows: 1 ♀ from 3 hosts, intertidal, Pte. Lokobe, Nosy Bé, Aug. 5, 1960; 1 ♀ from 31 hosts, intertidal, Pte. Lokobe, Aug. 12, 1960; 5 ♀ ♀ from 38 hosts, intertidal, Pte. Lokobe, Aug. 22, 1960; and 1 ♀ from 53 hosts, intertidal, Ambariobe, a small island nearly between Nosy Komba and Nosy Bé, June 25, 1967.

Pseudomyicola spinosus (= *P. mirabilis*) from Senegal

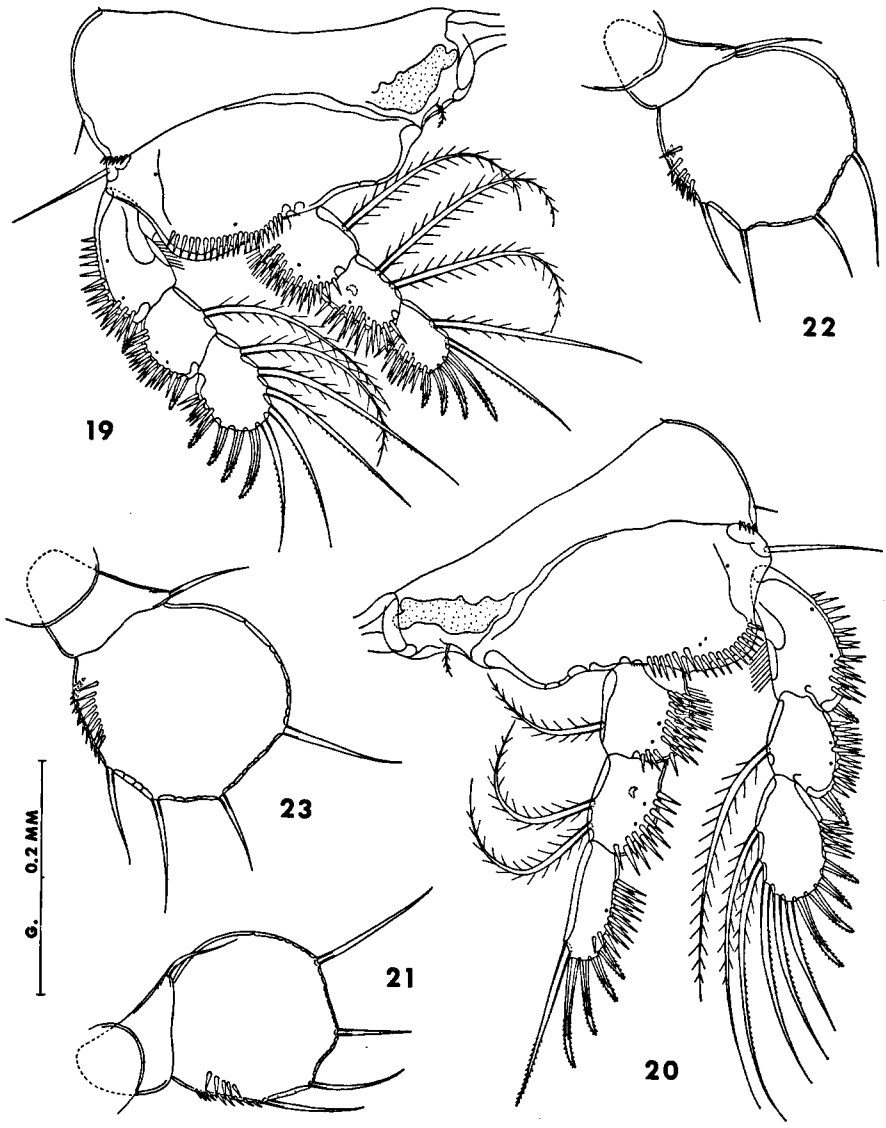
P. spinosus (= *P. mirabilis*) was reported by Humes & Cressey (1958) from *Arca senilis* L., *Ostrea tulipa* Lamarck, and *Pitar tumens* Gmelin in Senegal. Twenty of the specimens from *Arca senilis* have been restudied and their dimensions and ornamentation of the anal segment are given in table I. There are no apparent significant differences between these specimens and *P. spinosus* from Bermuda, the West Indies, Brazil, and Madagascar.

Seven of the 10 females (70 per cent) had the same condition of ornamentation on both sides of the anal segment. The number of posteroventral spines near the insertion of the caudal ramus ranged from 5—11. Five of the 10 males (50 per cent) had the same condition of ornamentation on both sides of the anal segment, and the number of posteroventral spines ranged from 1—8.

Pseudomyicola spinosus from Europe

Dr. J. H. Stock has very kindly sent me for study certain *P. spinosus* in the collection of the Zoölogisch Museum, Amsterdam, among them specimens from *Ostrea stentina* Payraudeau at Naples, Italy, *Mytilus edulis* L. at Arcachon, France, and *Mytilus galloprovincialis* L., *Mytilus* cf. *edulis* L., and *Mytilus* sp., all from Split, Jugoslavia. A comparison of these European *P. spinosus* with the specimens from Bermuda, the West Indies, Brazil, Senegal, and Madagascar showed no significant differences.

The dimensions and the ornamentation of the anal segment of eleven of the Adriatic specimens are included in table I. Six of the 8 females (75 per



FIGURES 19—23. *Pseudomyicola spinosus* (Raff. & Mont.), female, from *Isognomon alatus* in Bermuda: 19, leg 3, anterior (E); 20, leg 4, anterior (E); 21, leg 5, inner (G); 22, leg 5, inner (G); 23, leg 5, inner (G).

cent) had the same condition of ornamentation on both sides of the anal segment. The number of posteroventral spines near the insertion of the caudal ramus ranged from 2—9. One of the 3 males had the same condition of ornamentation on both sides of the anal segment, and the number of spines ranged from 4—7.

SYNONYMY OF *Pseudomyicola glaber* PEARSE, 1947, AND *Myicola tageli* PEARSE, 1947, WITH *P. spinosus*

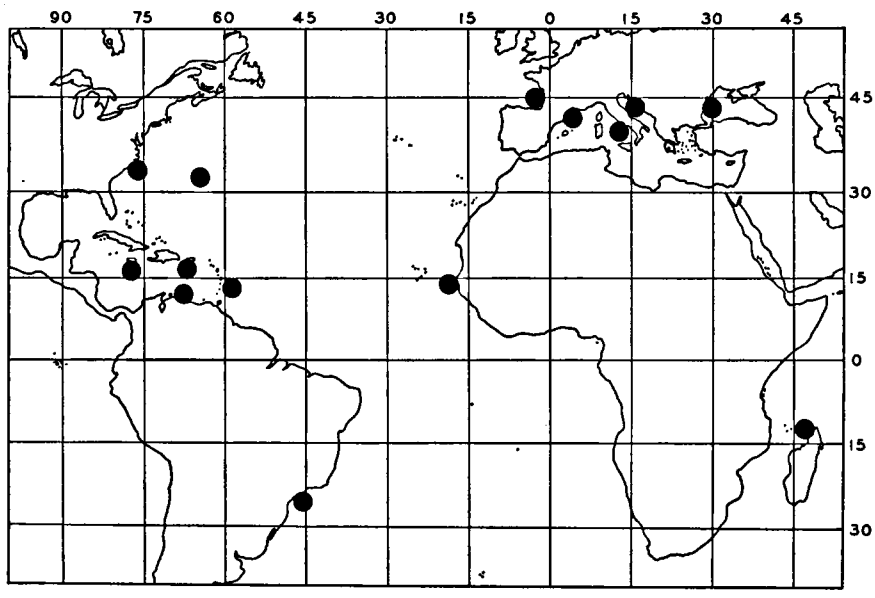
(Pearse, 1947, originally spelled the name as *glabra*, but as Kleeton, 1964, has pointed out the correct form should be *glaber).*

Stock (1959) suggested the synonymy of *P. glaber* with *M. tageli*, and both with *P. spinosus*. Kleeton (1964) supported the synonymy of *P. glaber* with *P. spinosus*. After studying Pearse's slides, including his types, in the collection of the U.S. National Museum, I can only support their conclusions. Most of the mounted specimens are badly distorted and therefore impossible to measure accurately. As far as can be determined from a study of the slides, these North Carolinian specimens are identical with *P. spinosus* from Europe, Bermuda, the West Indies, etc.

A female *Pseudomyicola* collected in 1963 by J. H. Stock from *Pecten irradians* Lamarck at Beaufort, North Carolina, deposited in the Zoölogisch Museum, Amsterdam, shows all the characters of *P. spinosus*.

GEOGRAPHICAL DISTRIBUTION OF *Pseudomyicola spinosus*

Pseudomyicola spinosus has been found in the Black Sea, the Adriatic, the Mediterranean, on the Atlantic coast of France, in North Carolina, Bermuda, Puerto Rico, Jamaica, Barbados, Curaçao, Brazil, Senegal, and Madagascar. Its range, indicated on the accompanying map, includes the Mediterranean and Black Seas and both sides of the Atlantic Ocean. How far it extends into the Indian Ocean is uncertain, since it is at present known only from Madagascar.

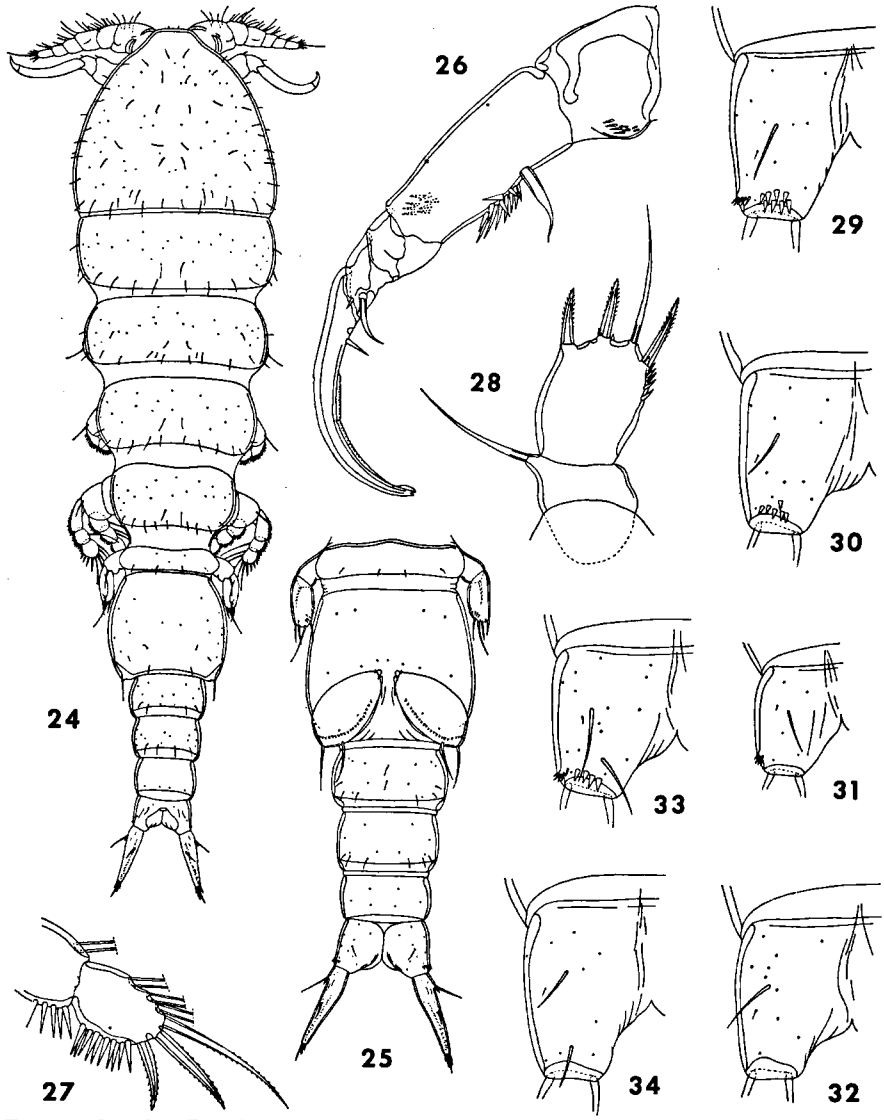


Distribution of *Pseudomyicola spinosus* (Raff. & Mont.)

HOSTS OF *Pseudomyicola spinosus*

This copepod is known to live in 39 species of pelecypods, not including the uncertain record from *Pinna pernula* Chemnitz (reported by Laubier & Reyss, 1964). The 23 new hosts reported in this paper are indicated by an asterisk. Arranged by families, the hosts are:

Arcidae	
* *Anadara notabilis* Röding	Bermuda
Arca decussata Sowerby	Madagascar
* *Arca imbricata* Bruguière	Curaçao
Arca senilis L.	Senegal
* *Arca zebra* Swainson	Curaçao
Noetia ponderosa Say	North Carolina
Pinnidae	
* *Pinna carnea* Gmelin	Curaçao
Pinna pectinata L.	southern France
(*Pinna pernula* Chemnitz	southern France)
Atrina rigida Dillwyn	North Carolina
Pteriidae	
Pteria hirundo (L.)	southern France
* *Pinctada radiata* Leach	Bermuda
* *Isognomon alatus* Gmelin	Bermuda, Curaçao
Ostreidae	
* *Ostrea equestris* Say	Bermuda
Ostrea stentina Payraudeau	Gulf of Naples
Ostrea tulipa Lamarck	Senegal
Ostrea virginica Gmelin	North Carolina
* *Crassostrea rhizophorae* Guilding	Puerto Rico, Curaçao
Spondylidae	
* *Spondylus americanus* Hermann	Curaçao
Pectinidae	
Pecten irradians Lamarck	North Carolina
Mytilidae	
Mytilus edulis L.	Atlantic coast of France, North Carolina
Mytilus galloprovincialis Lamarck	Naples, southern France, Jugoslavia, Black Sea
Modiolus demissus (Dillwyn)	North Carolina
* *Brachidontes citrinus* Röding	Barbados
* *Brachidontes domingensis* Lamarck	Puerto Rico
* *Brachidontes exustus* L.	Bermuda, Jamaica, Curaçao
Chamidae	
* *Chama congregata* Conrad	Bermuda
* *Chama iostoma* Conrad	Madagascar
* *Chama sinuosa* Broderip	Puerto Rico
* *Pseudochama radians* Lamarck	Puerto Rico
Diplodontidae	
* *Diplodonta punctata* (Say)	Curaçao
Cardiidae	
* *Cardium muricatum* L.	Curaçao
* *Laevicardium laevigatum* (L.)	Bermuda
Veneridae	
* *Macrocallista maculata* L.	Bermuda
* *Pitar albida* Gmelin	Jamaica
Pitar tumens Gmelin	Senegal
* *Chione cancellata* L.	Puerto Rico, Jamaica, Curaçao
Anomalocardia brasiliana Gmelin	Brazil
* *Cyclina* (*Cyclinella*) *tenuis* Récluz	Puerto Rico
Sanguinolariidae	
Tagelus gibbus (Spengler)	North Carolina



FIGURES 24—28. *Pseudomyicola spinosus* (Raff. & Mont.), male, from *Isognomon alatus* in Bermuda: 24, body, dorsal (A); 25, urosome, ventral (B); 26, maxilliped, posterior (E); 27, last segment of endopod of leg 1, anterior (F); 28, leg 5, inner (E).

FIGURES 29—32. *Pseudomyicola spinosus* (Raff. & Mont.), from *Isognomon alatus* in Bermuda: 29, ornamentation of anal segment of female, condition I, ventral (D); 30, ornamentation of anal segment of female, condition II, ventral (D); 31, ornamentation of anal segment of male, condition III, ventral (D); 32, ornamentation of anal segment of female, condition IV, ventral (D).

FIGURE 33. *Pseudomyicola spinosus* (Raff. & Mont.), female from *Chione cancellata,* ornamentation of anal segment, ventral (D).

FIGURE 34. *Pseudomyicola spinosus* (Raff. & Mont.), female from *Pinctada radiata,* ornamentation of anal segment, ventral (D).

The occurrence of a single female in an ascidian of the family Pyuridae in Curaçao is the only instance of a host other than pelecypods. Until more extensive search for these copepods in ascidians is made, this record should be regarded as probably accidental.

Summary of variation in *Pseudomyicola spinosus*

For 316 *P. spinosus* (186 females and 130 males) the variation in the dimensions of the body and caudal ramus and in the ornamentation of the anal segment is given in table I. The average length of the females was 1.828 mm (1.196—2.560 mm), and of the males 1.421 mm (1.120—1.856 mm). In both sexes the ornamentation of the anal segment was more frequently condition I or IV and paired, rather than condition II or III and unpaired. The instances where this ornamentation was paired (that is, the same condition, I-IV, on both sides of the anal segment) were: females, I = 50, II = 17, III = 4, IV = 70, males, I = 49, II = 8, III = 4, and IV = 28. Thus 230 of the 316 specimens examined had paired ornamentation.

The caudal ramus of the females varied considerably in size, its average dimensions being 127 × 30 μ, but ranging from 78—195 μ in length and 21—43 μ in width. In the males the caudal ramus had average dimensions of 104 × 24 μ, ranging from 68—156 μ in length and 20—36 μ in width.

The occurrence of an extra long ventral setule on either or both sides of the anal segment (as in figs. 33 and 34) seems to be sporadic. Such setules were observed in 16 specimens from Bermuda, Jamaica, and Jugoslavia.

In those individuals dissected (and where an accurate count could be made) the number of spinules in the row on the first segment of the second antenna was variable (12—20). The number of spinules in the ventro-inner row on the second segment of leg 5 of the female was also variable (5—9).

Subspecies in *Pseudomyicola spinosus*

Laubier & Reyss (1964) considered Mediterranean *P. spinosus* as consisting of three subspecies: *P. spinosus spinosus*, *P. spinosus petiti* Laubier & Reyss, 1964, and *P. spinosus stocki* Laubier & Reyss, 1964. These subspecies are characterized by the ornamentation and chaetotaxy of the second antennae, leg 1, leg 5, the anal segment, and the caudal rami. Both *P. s. petiti* and *P. s. stocki* occur at Banyuls in pelecypods in rather deep water (60—120 m), while *P. s. spinosus* is found in hosts living intertidally or in shallow water.

In the large numbers of specimens of *P. spinosus* from littoral hosts available to me, I have been unable to recognize subspeciation either on a geographical basis or in relation to the hosts. Instead, the specimens appear to constitute a single species with considerable variability, but without subspecific differentiation.

The species in the genus *Pseudomyicola*

Three species are recognized in the genus: *P. spinosus* (Raffaele & Monticelli, 1885), *P. levis* Humes, 1959, from *Arca decussata* Sowerby in Madagas-

car, and *P. ostreae* Yamaguti, 1936, from *Ostrea* (*Ostrea*) *denselamellosa* Lischke in Japan. (*P. ostreae* has also been reported by Hoshina & Sugiura, 1954, from *Laternula kamakurana* Pilsbry in Japan).

P. glaber Pearse, 1947, *Myicola tageli* Pearse, 1947, *P. anomalocardiae* Narchi, 1965, and *P. mirabilis* Humes, 1959, are synonyms of *P. spinosus*. (The name *P. decorata* which appeared in the work of Humes, 1959, resulted from failure of the printer to emend the text from corrected proofs, as indicated in the note by Humes, 1961, and should have no standing).

Dudley (1966: 158) mentioned a *Pseudomyicola* from the pelecypod genus *Compsomyax* in the Puget Sound area of Washington, but nothing is known of its specific identity.

Pseudomyicola belongs to the Myicolidae, not to the Lichomolgidae as previously suggested by Humes (1953). (The family name Pseudomyicolidae appearing in Humes & Cressey, 1958, is a *lapsus* and should be ignored).

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Dr. A. G. HUMES
Boston University
Department of Biology
2, Cummington Street
Boston, Massachusetts, 02215 — U.S.A.

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