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On Copepods associated with marine Pelecypods in Kyushu

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There have several species of the poecilostome Cyclopoida been recorded from the marine clams in Japan. They are:

Pseudomyicola ostreae Yamaguchi, 1936, from *Ostrea denselamellosa* Lischke,

Myicola ostreae Hoshina and Sugiura, 1953 from *Ostrea gigas* Thunberg,

Philoconcha amygdalae Yamaguchi, 1936, from *Venerupis* (*Amygdala*) *philippinarum*, Adams and Reeve,

Philoconcha paphiae Yamaguchi, 1936, from *Paphia englypta* (Philippi),

Paraphiloconcha meretricis Yamaguchi, 1936, from *Meretrix lamarcki* Deshayes,

Lichomolgus spondyli Yamaguchi, 1936, from *Spondylus japonicus* Kuroda.

The species described in this paper fall into the genera *Myicola* Wright, *Ostrincola* C.B. Wilson, *Conchyliurus* Bocquet and Stock, *Lichomolgus* Thorell, *Modiolicola* Aurivillius, and *Anthessius* Della Valle.

The material here dealt with was mainly collected from Sasebo Bay by Mr. Y. Ko of the Department of Fisheries, Nagasaki University. I wish to tender my most sincere thanks to him for having placed the very interesting copepods at my disposal. My sincere thanks are also due to Dr. R. U. Gooding of the Department of Zoology, Washington University who helped me much in preparing the references on the taxonomic study of Cyclopoida Poecilostoma. It is also my greatest pleasure to express my gratitude to him for giving me the opportunity to compare the specimens of *Ostrincola* of the U. S. A. with those of Japan. I am also much indebted to Dr. Paul Illg of the Washington

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University and Dr. A. G. Humes of the Boston University who have facilitated me much in preparing references on poecilostome Cyclopoida.

Family *Myicolidae*

Wright (1885) established the genus *Myicola* to accomodate *M. metisiensis* obtained from *Mya arenaris* and believed that the genus stood between *Ergasilus* Nordman and Lichomolgidae Claus. Sars (1918), however, referred *Myicola* to the family Clausiidae, and C. B. Wilson (1932) to Lichomolgidae. Yamaguchi (1936) erected without diagnosis a family Myicolidae and referred *Pseudomyicola* Yamaguchi to the family. The systematic position of *Myicola* is still in question. Illg (1960) states that Myicolidae is perhaps avairable in Cyclopoida Poecilostoma among the families in the complex containing Clausiidae and Lichomolgidae. The definition of the family Myicolidae is, according to Dr. Gooding's personnel communication, now being undertaken by Illg, M. S. Wilson and Gooding. It is well known that *Myicola*, *Ostrincola*, and *Pseudomyicola* are very closely related but among which *Pseudomyicola* differs from *Myicola* and *Ostrincola* in the structure of the 1st antenna, mandible, and 2nd maxilla. Humes and Cressey (1958) referred *Pseudomyicola* to Myicolidae but the genus was afterwards transfered to *Pseudomyicola* by Humes (1658) who described the following two species, *Pseudomyicola mirabilis* and *P. levis*. In the same paper he referred *Ostrincola* to the family Ergasilidae. But it is inacceptable to me. Indeed, *Ostrincola* has similar characters as defined in *Ergasilus* but, on the other hand, the genus is distinguished from the latter in the structure of the 4th leg, the setal formula of the natatory legs, and the structure of the 5th pair of legs. *Ostrincola* should be, in my opinion, referred to Myicolidae.

The family Myicolidae will have the following characters: Anterior region of the body more or less expanded. Posterior region of the body composed of the usual number of segments. Anterior antenna 7-segmented. Posterior antenna 3-segmented, prehensile with a strong claw on the distal segment. Labrum short and broad, bears on each side a group of spinules. Labium small. Mandible with 4 elements on the distal margin of the segment. First maxilla simple and small with 3 marginal setae. Second maxilla with a robust base, the distal segment small with 2 lashes. Maxilliped wanting in the female, that of the male transformed into a strong grasping organ. First to 4th legs with 3-segmented exopod and endopod. Fifth leg 2-segmented, the distal segment more less lamellar with 4 marginal setae.

Genus *Myicola* Wright, 1885

According to R. R. Wright the genus has the following diagnosis: Cephalothorax of the female oblong, of the male pyriform, composed of six segments, the last of which is reduced in size and carries a pair of uniramous appendages. Abdomen as in *Lichomolgus* Thorell. Anterior antennae of seven joints, posterior of four, robust, the basal joint tumid, the terminal one converted into a single strong claw. Mandible with triangular base and several setose lobes. First maxilla as in *Lichomolgus*. Second maxilla robust, 3-segmented, the basal joint tumid, the terminal one carrying 2 setose filaments. Maxilliped absent in the female, resembling those of *Lichomolgus* in the male. Natatory legs as in *Anthessius* and *Modiolicola*. Fifth pair of legs uniramous, with 3 joints, the two proximal of which carry each a distal seta, while the distal segment is not expanded has 2 apical setae and a subapical setae and a subapical group of spines.

However, Wright's description of the 5th pair of legs is inaccurate. It is composed of 2 segments, of which the distal segment is not expanded the lateral margins of the segment nearlly parallel, and carries 4 marginal setae and groups of spinules on the lateral margins. C. B. Wilson (1944) has described *Ostrincola gracilis* by the specimen taken from common oyster, *Ostrea virginica*, and states that the genus *Ostrincola* is closely related to Ramsay Wright's genus *Myicola*, but it differs, however, in the actual and relative sizes of the two sexes, the details of the body regions, the two pairs of antennae, and the 1st and 5th legs. On comparing these two genera there are fairy remarkable differences in the female in the shape of the anterior and posterior regions of the body, the proportional lengths of the segments of the 1st antenna, the shape of the 2nd antenna, and the 5th pair of legs. However, the male specimens of both *Myicola* and *Ostrincola* resemble closely each other in general appearance and in the structure of the oral appendages as well as the 1st to 5th legs that it seems quite reasonable to regard both genera as synonymous. But at present it seems to be justifiable to retain both *Myicola* and *Ostrincola* as distinct genera.

Myicola ostreae Hoshina and Sugiura

(Plate 22, figs. 1–8; Plate 23, figs. 1–8)

Myicala ostreae Hoshina and Sugiura, 1953, p. 27, pl. 2, figs. 7–14.

Occurrence :—One female and two males from *Ostrea gigas* Thunberg (40 individuals) taken from Tsushima, Nagasaki Prefecture February, 1961.

Descriptive Notes.—Female. Length, 18.5 *mm.*

The body elongate. The anterior and posterior regions of the body have the proportional lengths as 68 to 32. The head separates from the 1st thoracic segment. The thoracic segments increasing gradually in size distally. The lateral margins of the 2nd thoracic segment irregular in shape. The following two segments have each rounded lateral margins. The 2nd, 3rd and 4th thoracic segments carry each a trace of carapace on the dorsal surface (Fig. 1). The rostrum lamellar, rounded on the posterior margin (Figs. 2, 3).

The posterior region of the body has the segments in the proportional lengths:

Segment	Th. 5	Abd. 1–2	3	4	5	Furca
	13	36	16	10	6	19=100

The genital segment about as long wide as (23:22) tapers posteriorly. The genital and following two segments are furnished each with rows of fine spinules on the ventral surface. The furcal rami 6 times as long as it is wide at the distal. The terminal furcal setae are small.

The 1st antenna 7-segmented, the segments are in the following proportional length:

Segment	1	2	3	4	5	6	7
	30	25	8	7	12	7	11=100

The anterior distal margin of the 1st segment produced, furnished with 3 marginal setae (Fig. 4).

The 2nd antenna (Fig. 6) 3-segmented. The 3rd segment is the longest, carries on the distal margin a strong claw and a small spine on the inner distal corner. The labrum (Fig. 5) large, furnished with a row of spinules on either side of the lateral posterior margins. The mandible (Fig. 7) has a lash on the distal margin. The 1st maxilla (Fig. 7) simple with 3 marginal setae. The 2nd maxilla Fig. 8) with 2 lashes. The maxilliped absent in the female.

The 1st to 4th swimming legs with 3-segmented exopod and endopod. The setal formula as follows:

	1		2		3			1		2		3		
	Si	Se	Si	Se	Si	St	Se	Si	Se	Si	Se	Si	St	Se
P 1	1	0	1	0	3	I	II	0	I	1	I	4	I	III
P 2	1	0	2	0	2	I	II	0	I	1	I	5	I	III
P 3	1	0	2	0	3	I	II	0	I	1	I	1	I	II
P 4	1	0	2	0	2	I	II	0	I	1	I	5	I	II

The 5th leg (Fig. 9) 2-segmented. The 1st segment rounded in shape, serrated on the outer margin, and is furnished with a seta on the outer distal margin. The 2nd segment twice as long as broad, nearlly parallel on the lateral margins; the distal margin carries 2 spines and 2 setae. The inner distal margin of the segment is fringed with spinules.

Male. Length, 0.92 mm.

The body cyclopoid. The anterior and posterior regions of the body are in the proportional lengths as 52 to 48. The head separates from the 1st thoracic segment. The rostrum as in the female (fig. 1).

The posterior region of the body has the segments in the proportional lengths:

Segment	Th. 5	Abd. 1	2	3	4	5	Furca
	12	30	12	9	7	7	23=100

The genital segment about as long as wide, has lateral swellings. The ventral surface of the segment is furnished with rows of spinules as shown in the figure (Fig. 5). The following 3 segments are striated each with a row of fine teeth on the distal margin. The furcal rami (Fig. 4) slightly asymmetrical, the left ramus is longer than the right. The rami are about 12 times as long as it is wide at the distal.

The 1st antenna (Fig. 3) 7-segmented; the segments are in the proportional lengths:

Segment	1	2	3	4	5	6	7
	23	26	8	10	13	9	11=100

The 2nd antenna (Fig. 2) 3-segmented, slender in structure compared with that of the female. The mouth parts (Fig. 2) are as in the female. The maxilliped (Fig. 2) 3-segmented, the terminal segment has a strong claw.

The 1st to 5th legs (Figs. 6-8) as in the female. The 6th leg is represented by 2 small spines situated on the distal lateral corners of tae genital segment (Fig. 5).

Remarks.—The present specimen agrees quite well with *Myicola ostreae* Hoshina and Sugiura taken from *Ostrea gigas* in Chiba Prefecture. The male resembles in general appearance to the males of *Myicola* or *Ostrincola* but the 5th leg, maxilliped, and mouth parts are the main characteristics which distinguish the present male from the others.

Genus ***Ostrincola*** C. B. Wilson

C. B. Wilson (1944) described *Ostrincola gracilis* from the mantle cavity of the common oyster, *Ostrea virginica*. A. G. Humes (1958) described two species of *Ostrincola*, *O. clavator* and *O. simplex* from *Mytilus*, *Crassostrea*, *Venus*, and *Modiolus*. The genus is closely allied to *Myicola* Wright in the armature of the 1st to 4th legs. On the other hand, it is also closely related to *Pseudomyicola* Yamaguchi in the slender structure of the 2nd antenna. *Ostrincola* stands, as Humes says, between *Myicola* and *Pseudomyicola*. According to Gooding's personnel communication there is another undescribed species of *Ostrincola* in the east coast of the U. S. A. But the species appears

to be more closely related to *Myicola* in the robust second antenna and in the form of the distal segment of the 5th leg. And it is the same with *Ostrincola clavator* Humes.

The genus has the following characters: Body more or less cyclopoid. Head separates from the 1st thoracic segment; the segments 2 to 5 varying in lengths but diminishing regularly in width. Genital segment longer than wide with convex lateral margins in the female, and parallel margins in the male. Caudal rami much elongated and cylindrical. First antenna 7-segmented in both sexes. Second antenna uniramose and 4-segmented, the end segment is a curved claw. First four pairs of legs biramose, rami 3-segmented. Fifth pair of legs uniramose, 2-segmented, the end segment enlarged into a circular disk in the female. The male has the 5th leg composed of two segments but the end segment is not enlarged as in the female.

Ostrincola koe sp. nov.

(Plate 24, figs. 1–9; Plate 25, figs. 1–7; Plate 26, figs. 1–6)

Occurrence.—Many females and males from the mantle cavity of *Paphia* (*Paratapes*) *undulata* (Born) collected in the intertidal zone of Sakibe near Sasebo on October, 1959 and November, 1959; several females and males from *Paphia* in Tsuyazaki near Fukuoka in May, 1960 and February, 1961.

Descriptive Notes.—Female. Length, 1.06—1.18 mm.

The body elongate ovate. The anterior and posterior regions of the body are in the proportional lengths as 53 to 47. The head separates from the 1st thoracic segment. The thoracic segments diminish in width distally. In dorsal view the lateral margins of the 1st segment is squarish in shape, those of the 2nd, 3rd, and 4th rounded. The frontal margin of the head evenly rounded in dorsal aspect but narrowly rounded when viewed from the lateral (Figs. 1, 3). The rostrum low, rounded on the posterior margin (Figs. 3, 4). There is a transversal fold on the dorsal surface about the middle of the head. The body kept in glycerine pellucid, eye spot bluish, intestine content bluish. Some of the female specimens ovigerous. The egg sacs dorso-lateral, egg relatively few in number. Some of the specimens were infected with *Stentor polymorphus* O. F. Müller.

The posterior region of the body has the segments in the following proportional lengths:

Segment	Th. 5	Abd. 1–2	3	4	5	Furca
	8	35	13	11	9	24=100

The genital segment is rectangular in shape, slightly longer than wide. The lateral margins of the segment have each a slight knotch on the

anterior one fourth of the segment. The dorsal as well as the ventral surfaces of the segment is provided with two groups of minute spinules (Fig. 2). The following 2 segments are furnished each with a row of minute spinules on the ventral distal margin. The furcal rami slender, tapers posteriorly, about 8 times as long as it is wide at the proximal or 13 times as it is wide at the distal end. The distal margin of the ramus is furnished with 3 setae, of which the inner one is very small, the middle one is fairly long. The outer margin of the ramus bears 3 setae, of which two arise about the middle of the ramus.

The 1st antenna (Fig. 5) 7-segmented. The segments are in the proportional lengths:

Segment	1	2	3	4	5	6	7
	27	16	7	11	14	10	15=100

The demarcation between the 2nd and 3rd segments feeble.

The 2nd antenna (Fig. 6) robust, consists of 3 segments of which the 3rd is the longest and the 2nd is the shortest. The distal segment is furnished with a single strong curved claw which is slightly knotched on the inner margin about one third of the claw, a small seta about the middle, and a small triangular process near the proximal one third of the segment; the outer margin of the segment is fringed coarsely with spinules. The segment has a small inner marginal seta. The labrum as shown in the figure (Fig. 4).

The mandible (Fig. 7) has a somewhat elongated base to which the following elements are attached: 2 small denticulated lobes, a long lash-like blade, and a slender seta. The outer margin of the lash is fringed with fine spinules.

The 1st maxilla (Fig. 7) small with 3 apical setae of which the outer marginal one is the longest. The 2nd maxilla (Fig. 8) 2-segmented. The basal segment is very conspicuous. The terminal segment is small and carries 2 lashes of which the outer one is slender and long, finely furnished with minutes spinules along the inner margin; the inner one is blade-like with rather coarse spinules on the inner margin. A small seta arises from the base of the 2nd segment. The maxilliped absent in the female.

The 1st leg (Fig. 1) has 3-segmented exopod and endopod. The 1st basal segment has an inner marginal seta. The 2nd basal segment has a spine near the base of the endopod. The spine is fringed with

	Endopod							Exopod						
	1		2		3			1		2		3		
	Si	Se	Si	Se	Si	St	Se	Si	Se	Si	Se	Si	St	Se
P 1	1	0	1	0	3	I	II	0	I	1	I	4	I	III
P 2	1	0	2	0	3	I	II	0	I	1	I	5	I	III
P 3	1	0	2	0	3	I	II	0	I	1	I	5	I	II
P 4	1	0	2	0	2	I	II	0	I	1	I	5	I	II

fine denticles along the lateral margins. The 2nd to 4th legs (Fig. 2, 3, 4) have each 3-segmented exopod and endopod. The setal formula of the four pairs of legs as above listed.

The 5th leg (Pl. 24, fig. 9) 2-segmented. The 1st segment is small, has an outer marginal seta. The 2nd segment is oval in shape with 4 marginal setae of which the 2nd outer one is about as long as the innermost one; the lateral margins of the segment is furnished with rows of spinules as shown in the figure.

Male. Length, 0.99 mm.

General appearance as in the female. The anterior and posterior regions of the body have the proportional lengths as 51 to 49. The segments of the posterior region have the proportional lengths:

Segment	Th. 5	Abd. 1	2	3	4	5	Furca
	6	30	10	11	10	8	25=100

The ventral surface of the segment is furnished with groups of spinules as shown in the figure (Fig. 5).

The mouth appendages as those of the female except the maxilliped composed of 3 segments of which the distal one is furnished with a long curved claw (Fig. 6).

The 1st to 4th legs as in the female. The 5th leg 2-segmented. The distal segment not expanded; the lateral margins of the segment more or less parallel and has 2 spines and a small seta on the apical and a seta on the outer margin (in situ) about the middle. The 6th leg is represented by 2 small spines on the distal lateral corner of the genital segment.

Remarks.—The present species is very closely allied to *Myicola metisiensis* Wright or to *Ostrincola gracilis* C. B. Wilson. But the specimen comes nearer to *O. gracilis* in its general appearance and in the structure of the cephalic appendages with the exception of the robust 2nd antenna. The 5th leg of the present species is not so expanded as in the species of *Ostrincola* but more enlarged than that of *Myicola metisiensis*. In this respect the species appears to be intermediate form between those of *Myicola* and *Ostrincola*.

Ostrincola japonica sp. nov.

(Plate 26, fig. 1–11; Plate 27, figs. 1–6)

Occurrence.—Two females and two males from the mantle cavity of *Ostrea echinata* Quoy et Gaimard from Sasebo November, 1960.

Descriptive Notes.—Female. Length, 1.02 and 1.08 mm.

The body cyclopoid. General appearance as in *Ostrincola gracilis* C. B. Wilson. The anterior and posterior regions of the body have the proportional lengths as 51 to 49. The head separates from the 1st thoracic segment. There is an intersegmental region between the 4th

and 5th thoracic segments (Fig. 1). The frontal margin of the head slightly produced. The rostrum very small, lamellous, slightly produced on the anterior margin of the head (Figs. 2, 3). The specimens had each two egg sacs containing 2 eggs (0.15×0.12 mm).

The posterior region of the body slender, has the segments in the proportional lengths:

Segment	Th. 5	Abd. 1–2	3	4	5	Furca
	17	32	13	11	6	21=100

The 5th thoracic segment is indistinctly separated from the genital segment which is 1.5 times as long as wide. There is a slight knotch on the proximal one fourth of the lateral margins of the genital segment; the ventral surface of the segment is furnished with 4 transverse rows of minute spinules (Fig. 4). The following 2 segments are striated each with spinules on the ventral distal margin. The furcal rami slender, about 9 times as long as it is wide at the proximal (Fig. 5). The distal margin of the ramus is furnished with 3 minute setae of which the middle one is the longest. The outer margin of the ramus is furnished with 3 marginal setae.

The 1st antenna (Fig. 6) 7-segmented. The segments are in the following proportional lengths:

Segment	1	2	3	4	5	6	7
	28	21	7	11	13	11	9=100

The 2nd antenna (Fig. 7) 3-segmented. The 3rd segment is slender and long. The terminal claw is slender and curved. The mandible, (Fig. 8) 1st, and 2nd maxillae (Figs. 8, 9) as in *O. gracilis* Wilson. The maxilliped wanting in the female. The labrum large (Fig. 10).

The 1st to 4th swimming legs as in *O. gracilis*. The 5th leg 2-segmented (Fig. 11). The distal segment expanded, 1.5 times as long as broad, the lateral margins are each furnished with spinules, and the distal margin with spines and 2 setae as shown in the figure.

Male. Length, 0.88 mm.

General appearance as in the female. The anterior and posterior regions of the body have the proportional lengths as 50 to 50. The posterior region (Fig. 2) has the segments in the following proportional length:

Segment	Th. 5	Abd. 1	2	3	4	5	Furca
	9	30	11	11	11	5	23=100

The genital segment oval in shape, 1.5 times as long as wide. The ventral surface of the segment is provided with groups of spinules as shown in the figure. The distal lateral margins of the segment have each 2 small spines which represent the 6th legs. The following three segments are striated each with fine spinules near the distal margin. The furcal rami slender and long, about 8 times as long as it is wide at the proximal.

The 1st antenna (Fig. 3) 7-segmented. The proportional lengths of the segment as follows:

Segment	1	2	3	4	5	6	7
	26	22	7	10	15	10	10=100

The 2nd antenna (Fig. 4) slender as in the female. The maxilliped (Fig. 5) well developed and prehensile.

The four pairs of swimming legs are identical in structure with those of the female. The 5th leg (Fig. 7) 2-segmented. The distal segment slender, with parallel lateral margins and is furnished with two spines, a long seta on the distal margin, and a seta about the middle of the inner margin. The outer margin of the 2nd segment with spinules near the distal end.

Remark.—There have three species of *Ostrincola* been reported, *gracilis* C. B. Wilson, *simplex* Humes, and *clavator* Humes, among which *clavator* appears to be properly referred to the genus *Myicola* Wright. The species belonging to *Ostrincola* have each a greatly expanded distal segment in the 5th leg, whereas, in *Myicola* the distal segment is slender and the lateral margins more or less parallel. In the 2nd anntenna the 3rd segment is more slender in *Ostrincola* compared with that of *Myicola*. Moreover, the terminal segment of the 1st antenna is shorter in proportional lengths in *Ostrincola* than that of *Myicola*. These three characteristics are important in distinguishing *Ostrincola* from *Myicola*. The present species comes nearest to *Ostrincola simplex* Humes gathered from *Ostrea* sp. in Madagascar. But the present species is much larger in size than *simplex* (0.766 mm.), and differs slightly in the arrangement of the marginal setae and spines on the distal segment of the 5th leg.

Family **CLAUSIDIIDAE**

Genus ***Conchyliurus*** Bocquet and Stock, 1957

Bocquet and Stock (1957) erected the genus *Conchyliurus* to accomodate a species, *solenis* which was found on the gills of *Solen marginatus*. Gooding (1957) recorded the occurrence of *C. cardii* from the digestive tract of *Cardium echinatum* Linn. In 1958 Humes and Cressey added two more species, *C. torosus* and *C. lobatus* from the pelecypods in the West Africa.

Conchyliurus quintus sp. nov.

(Plate 27, figs. 7–9; Plate 28, figs. 1–8; Plate 29, figs. 1–7)

Occurrence.—Two females and two males from the mantle cavity of *Paphia* (*Paratapes*) *undulata* (Born) collected in Sakibe, near Sasebo.

Descriptive Notes.—Female. Length, 1.38 mm and 1.44 mm.

The body (Fig. 8) cyclopoid, but rather elongated. The anterior and posterior regions of the body are in the proportional lengths as 48 to 52 in the specimen measured 1.44 mm in total length. The head fused with the 1st thoracic segment. The anterior region not so expanded, about 1.6 times as long as it is wide at the middle section. The rostrum produced anteriorly, visible from the dorsal, nearly square in shape. There is an intersegmental region between the 5th thoracic segments and the genital segment.

The posterior region of the body (Fig. 9) has the segments in the following proportional lengths:

Segment	Th. 5	Abd. 1–2	3	4	5	Furca
	8	45	9	8	15	15=100

The genital segment rectangular in shape, about 1.6 times as long as broad. The segment is elevated dorsally in lateral view. The lateral distal corners of the segment complicated in shape, carry on each side spermatophores (perhaps 4 spermatophores as is found in *Conchyliurus torosus* Humes). The spermatophore is pear-shaped, 0.2 mm in length, 0.08 mm in width. The segment bears dorsally a pair of spines near the distal margin, which is concealed beneath the complicated structure of the genital area (Plate 28, fig. 1). The following segments are not striated with a row of spinules except the 5th abdominal segment (Fig. 9). The furcal rami divergent, more than 3 times as long as it is wide at the distal (10 : 3). The distal margin of the ramus carries 4 setae of which the 2nd inner marginal is slightly longer than the combined length of the distal 3 abdominal segments and furca taken together.

The 1st antenna (Fig. 10) 6-segmented, 0.2 mm in total length. The segments are in the proportional lengths measured along the anterior margin:

Segment	1	2	3	4	5	6
	24	23	14	11	12	16=100

The 1st segment has a row of spinules on the anterior margin. In the 2nd segment a line of fusion is observed on the posterior margin about the middle of the segment. The 5th and 6th segments have each an aesthetask.

The 2nd antenna 4-segmented (Fig. 2). The distal segment is furnished with 5 slender claw-like spines. The 3rd segment with a slender curved spine and a seta; the outer margin of the segment with rows of spinules. The 2nd segment with a seta and several spinules on the outer margin. The 1st segment has a long seta on the outer distal corner.

The mandible (Fig. 3) has 3 lappets of which the outer two are setose on the outer margin. The paragnatha leaf-like in shape fringed

finely with minute spinules on the outer margin.

The 1st maxilla (Fig. 4) 1-segmented, with 2 outer marginal setae, and a small distal lobe furnished with 3 setae. The inner distal corner of the segment is produced into a spine accompanied by a single seta. The 2nd maxilla (Fig. 3) 2-segmented. The distal segment terminates into two slightly curved spines, of which the larger one bears 2 setae. The maxilliped (Fig. 3) 1-segmented, bears a strong and slightly curved spine on the distal margin. The inner distal margin of the segment is furnished with a small seta, and the outer distal margin with spinules.

The 1st (Fig. 5) to 4th leg (Fig. 6) are composed of 3-segmented exopod and endopod. The setal formula of the legs as follows:

	Endopod							Exopod						
	1		2		3			1		2		3		
	Si	Se	Si	Se	Si	St	Se	Si	Se	Si	Se	Si	St	Se
P 1	1	0	1	0	3	I	II	0	I	1	I	4	I	III
P 2	1	0	2	0	3	I	II	0	I	1	I	5	I	III
P 3	1	0	2	0	3	I	II	0	I	1	I	5	I	III
P 4	1	0	2	0	1	I	III	0	I	1	I	5	I	III

The 5th leg 2-segmented (Fig. 7). The basal segment is represented by an expansion of the 5th thoracic segment and is furnished with a single seta. The 2nd segment elongate, about 3 times as long as broad, and is furnished with 2 apical spines and a seta. The outer margin of the segment carries a single spine.

Male. Length, 1.19 mm and 1.11 mm.

General appearance as in the female. The anterior and posterior regions of the body are in the proportional lengths as 47 to 53 (Plate 28, fig. 8).

The posterior region of the body has the segments in the following proportional lengths:

Segment	Th. 5	Abd. 1	2	3	4	5	Furca
	9	37	14	11	9	14	14=100

The genital segment nearly quadrate in shape, produced on each side into a strong spine on the lateral distal margins (Plate 29, fig. 2). The following 4 segments are not striated with spinules on the distal border. The fucal rami 3 times as long as it is wide at the distal. The 6th leg is represented by a single seta situated on the distal margin of the lamellous process of the genital opening.

The oral parts and 1st to 5th legs as in the female except the maxilliped which is very powerful as shown in the figure (Figs. 1, 4).

Remarks.—The present species resembles very closely *Conchyliurus torosus* Humes in general appearance and in the structure of the appendages but can be distinguished from it in the strong plumose seta on the middle of the distal margin of the female 5th leg,

and in the sharpe of the genital segment of the male.

Family **LICHOMOLGIDAE**

Lichomolgidae comprises at present a number of genera which are more or less closely allied. Gurney (1927) has subdivided the family into the subfamilies, Sabelliphilinae and Lichomolginae. The former has 3-segmented enopod in the 4th leg, and in the latter the endopod is reduced to 2 or fewer segments. The following genera are included in the subfamily Sabelliphilinae: *Sabelliphilus* M. Sars, 1862, *Rhinomolgus* G. O. Sars, 1918, *Anthessius* Della Valle, 1880, *Hermannella* Canu, 1891, *Modiolicola* Aurivillus, 1883, *Paranthessius* Claus, 1889, and *Prehermannella* Sewell, 1949. Among which *Sabelliphilius* and *Rhinomolgus* are easily distinguished from the others by the characteristics found in the structure of the 2nd antenna and oral appendages. *Anthessius*, though closely related to the remaining genera, can be differentiated from them by the 3-segmented 2nd antenna. The remaining genera *Modiolicola*, *Paranthessius* and *Hermannella* (sensu lato) resemble each other so closely that a great deal of confusion has arosen in delimiting these genera. Illg (1949) has widened *Paranthessius* and included *Hermannella*, *Diogenidium* Edward, 1891, *Pseudolichomolgus* Pesta (non Thompson), 1909, *Pestalichomolgus* Wilson, 1932 in the genus *Paranthessius*. But he excluded *Modiolicola* from *Paranthessius* by the following reasons: absence of free prehensile rostrum; posession of the highly characteristic antenna with very much shortened 2nd segment accompanied by elongation of the 3rd and 4th segments; the reduction of the armature of the maxilla to a single unornamented seta. However, Reddiah and Williamson (1959) included *inermis* Canu and *maxima* (Thompson) in *Modiolicola*. These two species have the 2nd antenna differing in structure from that of *Modiolicola* defined by Illg. It is necessary, as Reddiah and Williamson pointed out the definition of the antennual character of *Modiolicola* given by Illg must be modified in order to include *inermis* and *maxima* in *Modiolicola*. On the other hand, Illg states that *Modiolicola* presents even less strong separation and it is possible that a further broadening of the definition of *Paranthessius* to include the forms now included in *Modiolicola* may become desirable. But it must be reminded that *Modiolicola* has priority over *Paranthessius*.

Several species of *Hermannella* have been transferred by Illg to *Paranthessius*. But *Hermannella* Canu is, so far as the setal formula of the swimming legs is concerned, more closely related to *Modiolicola* than to *Paranthessius*. The setal formula of the swimming legs of the genera *Modiolicola* Aurivillius, *Hermannella* Canu, and *Paranthessius* Claus are as follows:

	Endopod							Exopod						
	1		2		3			1		2		3		
	Si	Se	Si	Se	Si	St	Se	Si	Se	Si	Se	Si	St	Se
Modiolicola														
P 1	1	0	1	0	5		I	0	I	1	I	4	I	II
P 2	1	0	2	0	3		III	0	I	1	I	5	I	III
P 3	1	0	2	0	2		IV	0	I	1	I	5	I	III
P 4	1	0	1	0		II		0	I	1	I	5	I	II
Hermannella														
P 1	1	0	1	0	5		I	0	I	1	I	4	I	III
P 2	1	0	2	0	3		III	0	I	1	I	4	I	III
P 3	1	0	2	0	2		III	0	I	1	I	5	I	III
P 4	1	0	1	0		II		0	I	1	I	5	I	II
Paranthessius														
P 1	1	0	1	0	5		I	0	I	1	I	4	I	III
P 2	1	0	2	0	3		III	0	I	1	I	5	I	III
P 3	1	0	2	0	2		III	0	I	1	I	5	I	II
P 4	1	0	2	0		III		0	I	1	I	5	I	II

As seen above it is desirable to retain the genus *Hermannella* Canu or, if necessary, transfer it into *Modiolicola* with the revision of the antennual character of *Modiolicola* Aurivillius.

Sewell (1949) has separated a genus from *Hermannella* under the name *Prehermanella* on the basis of the differences found in the structure of the 2nd antenna and the number of spines on the distal segment of the endopod of the 4th leg. He has included in the genus *prehensilis* Sars, *robustus* Thompson and Scott, *serendibica* Thompson and Scott, *nicobarica* Sewell, and *adduensis* Sewell, in which the 2nd antenna is prehensile, and *finmarchia* T. Scott, *tenuicaudis* Sars, and *brevicauda* Sewell in which the 2nd antenna is non-prehensile. These species have each 5 spines on the distal segment of the endopod of the 4th leg but the 2nd antenna differs clearly in structure between prehensile and non-prehensile types. The prehensile type is provided with a stout claw on the 3rd segment of the 2nd antenna, and non-prehensile type with 3 setae and a single setiform spine on the same segment. The genus *Hermannella* has the species provided both with prehensile and non-prehensile types in the 2nd antenna. It seems to be irrational to put both types, prehensile and non-prehensile, in a same genus, but it is also undesirable to differentiate further new genera from *Hermannella* and *Prehermannella* according to the antennual character.

Illg (1949) emphasized on the structural difference of the rostrum between *Modiolicola* and *Paranthessius*. In the former the rostrum is not prehensile, whereas, it is free and prehensile in the latter. It is sometimes very difficult to distinguish to what type a rostrum belongs.

For instance, in *Paranthessius saxidomi* Illg the posterior end of the rostrum is not pointed, and resembles in shape that of *Modiolicola inermis* Canu which is according to Illg non-prehensile. It is easily recognizable that a rostrum is prehensile when it is long and pointed at the apex as is found in most of the species of *Paranthessius* described by Illg. It is, indeed, of great necessity to describe exactly the complicated structure of the cephalic appendages in delimiting the genera of Poecilostoma, on the other hand, it is also necessary to pay attention to the ornamentation of the swimming legs. The setal formula of the swimming legs is sometimes an important generic character as is found in *Paraclanus* Boeck and *Acrocalanus* Giesbrecht.

Genus ***Lichomolgus*** Thorell, 1860

There have many species of *Lichomolgus* been known from invertebrates, such as starfishes, pelecypods, and ascidians etc. The followings are reported from the pelecypods: *Lichomolgus spondyli* Yamaguchi, 1936, from the mantle cavity of *Spondylus japonicus* Kuroda from Wakayama Prefecture; *L. leptodermata* Gooding, 1957, from *Laevicardium crassum* (Gmelin) from Plymouth; *L. arcanus* Humes, 1958, from *Arca senilis* Linné from the West Africa; *L. asaphidis* Humes, 1958, from *Asaphis rugosa* Lamarck from Madagascar. These species are very closely related each other in general appearance and in the structure of the oral appendages and swimming legs.

Lichomolgus inflatus sp. nov.

(Plate 30, figs. 1–8; Plate 31, figs. 1–10; Plate 32, figs. 1–5)

Occurrence.—One female and one male from the mantle cavity of the *Paphia* from Sasebo Bay, on 14th June, 1960.

Descriptive Notes.—Female. Length, 1.30 mm.

The body cyclopoid. The anterior and posterior regions of the body are in the proportional lengths as 57 to 43. The anterior region inflated laterally, about 1.6 times as long as wide. The head separates from the 1st thoracic segment. The following segments gradually diminish in width. The 4th segment about half as broad as the head. The rostrum large (Fig. 3), produced considerably below and pointed at the apex when viewed from the lateral. In ventral aspect the posterior margin narrowly rounded and has another line of demarcation which represents the distal margin of the depressed area of the rostrum (Fig. 2)

The posterior region of the body (Fig. 4) has the segments in the following proportional lengths:

Segment	Th. 5	Abd. 1–2	3	4	5	Furca
	14	29	12	10	11	24=100

The genital segment is much inflated on its shoulders and then suddenly shrinks at the distal one third of the segment. The segment has a small seta on each side near the genital area. The distal border of the segment is devoid of spinules. The following 3 segments are not striated with spinules on the distal margin. The furcal rami a little more than 5 times as long broad. The distal margin of the ramus carries 4 setae of which the middle two articulate with the ramus as shown in the figure (Fig. 5). The specimen had a pair of egg sacs on the dorso-lateral margins of the genital segment. Each sac contained about 40–50 eggs.

The 1st antenna (Fig. 6) 7-segmented. The segments are in the following proportional length:

Segment	1	2	3	4	5	6	7
	20	26	9	17	14	9	5=100

The 1st segment has a robust seta on the outer distal corner. In the 3rd segment there is a feeble line of demarcation which divides the segment in the proportions as 1 to 3 on the posterior margin.

The 2nd antenna 4-segmented. The 3rd segment is the shortest and is furnished with 3 setae. The 4th segment has a strong curved spine and 3 setae on the distal margin. The 1st and 2 segments are each furnished with a small seta (Fig. 7). The labrum with a V-shaped indentation (Fig. 8).

The mandible (Fig. 1) with a single long tapering lappet finely spinose on either edge.

The 1st maxilla (Fig. 1) very simple with 2 apical setae slightly differing in lengths. The 2nd maxilla (Fig. 2) 2-segmented. The basal segment robust. The distal segment terminates into a long curved spine furnished with spinules which are longer and stronger towards the base. Another spine furnished with spinules in the similar way as in the larger one, and a small seta arise near the base of the curved spine.

The maxilliped (Plate 30, fig. 8) 4-segmented. The 1st segment is short and small. The 2nd and 3rd segments are of about equal lengths. The distal segment is small and pointed at the apex, and devoid of any ornamentation.

The 1st to 4th swimming legs (Figs. 3, 4, 5, 6) have each 3-segmented exopod and endopod with the exception of the endopod of 4th leg which has only 2 segments. Their setal formula as follows:

	Endopod							Exopod						
	1		2		3			1		2		3		
	Si	Se	Si	Se	Si	St	Se	Si	Se	Si	Se	Si	St	Se
P 1	1	0	1	0	3	2	I	0	I	1	I	4	I	III
P 2	1	0	2	0	3	I	II	0	I	1	I	5	I	III
P 3	1	0	2	0	2	I	II	0	I	1	I	5	I	III
P 4	1	0	II					0	I	1	I	5	I	II

The 5th pair of legs is very small and 2-segmented. The basal segment carries an inner marginal seta. The distal segment has an apical spine and a seta. The spine is fringed with a sort of lamella on the inner margin (Fig. 7).

Male. Length, 0.96 mm.

General appearance as in the female. The anterior and posterior regions of the body have the proportional lengths as 54 to 46. The head almost fused with the 1st thoracic segment. The 5th thoracic segment small. The posterior region of the body has the segments in the proportional lengths:

Segment	Th. 5	Abd. 1	2	3	4	5	Furca
	9	37	8	10	8	10	18=100

The genital segment is oval in shape, carries on each side of the distal lateral margin 2 small spines which represent the 6th leg. The 2nd segment rounded in shape (Fig. 8). The furcal rami 4 times as long as wide. The spermatophore large.

The 1st antenna 7-segmented, has the segments in the following proportional lengths:

Segment	1	2	3	4	5	6	7
	16	28	10	18	15	10	3=100

The aesthetasks are found on the 2nd, 4th, 5th, and 6th segments (Fig. 10).

The 2nd antenna (Plate 32, fig. 1), mandible, 1st and 2nd maxillae as in the female. The maxilliped (Fig. 2) is transformed into a strong clasping organ; the 1st segment is short; the 2nd segment has 2 spines on the anterior margin about the middle of the segment; the 3rd segment is furnished with a long curved claw.

The 1st (Fig. 3) to 4th legs (Fig. 4) as in the female. The 5th leg (Fig. 5) as in the female but smaller in size. The 6th leg is composed of 2 small spines.

Remarks.--Up to the present time a number of species have been reported in the genus *Lichomolgus*. Among which *L. asaphidis* Humes, 1958, *L. spondyli* Yamaguchi, 1936 are very closely related to the present species. At first glance the species appears to be identical with *L. spondyli* but on closer examination it can be distinguished from it by the shape of the genital segment, the lengths of the terminal spines

on the 2nd segment of the endopod of the 4th leg, and also by the 5th pair of legs with longer and stronger apical spine on the distal segment.

Genus *Modiolicola* Aurivillius, 1883

The genus was established by Aurivillius to accomodate *Modiolicola insignis* from the mantle cavity of *Modiola vulgaris*. In addition to the type species the followings have been reported: *inermis* Canu, 1892, *mixima* (Thompson), 1893, *jamaicensis* Wilson, 1921, *gracilis* Wilson, 1935, *trabalis* Humes, 1958. Illg (1949) excluded *Modiolicola* from *Paranthessius* (sensu lato) chiefly by the form of the rostrum and the character of the 2nd antenna. Reddiah and Williamson accomodated *inermis* Canu and *maxima* (Thompson) in the genus *Modiolicola* which otherwise ought to be included in *Hermannella* or *Paranthessius*. It is probable that some of the species now included in *Hermannella* and *Paranthessius* will be transferred to *Modiolicola* (sensu lato) when the antennual character of *Modiolicola* (sensu stricto) is refined as Reddiah and Williamson proposed. The 2nd antenna is, indeed, one of the most important generic characters but it shows a considerable degree of variation in form even in the same genus. It seems to be unjustified to adhere too much to the form of the 2nd antenna, on the other hand, non-prehensile rostrum, reduced female maxilliped, and the ornamentation of the swimming legs are the characters to be noticed in differentiating *Modiolicola* from the other closely allied genera of Lichomolgidae.

Modiloicola bifida sp. nov.

(Plate 32, figs. 6–11; Plate 33, figs. 1–12; Plate 34, figs. 1–9; Plate 35, figs. 1–10)

Occurrence.—10 females, 4 males, and 5 immature males from the mantle cavity of *Paphia* from Sasebo Bay October and November, 1959. Two of the females were ovigerous.

Descriptive Notes.—Female. Length, 1.45–1.48 mm.

The body (Fig. 6) cyclopoid. The anterior and posterior regions of the body are in the proportional lengths as 57 to 43. The anterior region ovate, about 1.5 times as long as it is wide at the 1st thoracic segment. The head separates from the 1st thoracic segment. The frontal margin of the head rounded in dorsal aspect, and reflexed ventrally forming the rostrum when viewed from the lateral. The 4th thoracic segment is short, about half as long as the preceding. The

rostrum is narrowly rounded on the posterior margin, appears to be non-prehensile (Fig. 7).

The posterior region of the body (Fig. 8) has the segments in the following proportional lengths:

Segment	Th. 5	Abd. 1–2	3	4	5	Furca
	10	27	13	13	13	24=100

The genital segment squarish in shape, slightly longer than wide. The lateral margins of the segment slightly constricted at the middle. The segment has on each side of the dorso-lateral surface a small cresent fold furnished with a small triangular process and a seta. The segment is finely striated on the dorsal distal margin. The following 2 segments are also striated in the similar way as in the genital segment. The furcal rami 5 times as long as it is wide at the proximal, and carries on the distal margin 4 marginal setae and a small dorsal seta.

The 1st antenna (Fig. 9) 7-segmented. The segments are in the following proportional lengths:

Segment	1	2	3	4	5	6	7
	14	23	8	15	16	17	7=100

The 5th and 7th segments have each an aesthetask.

The 2nd antenna (Fig. 10) is composed of 4 segments of which the 2nd is the longest. The distal segment has 3 curved claws, 2 setae, and a marginal spine as shown in the figure.

The mandible (Fig. 11) as a usual lichomolgid type, finely spinose on either side, but the inner margin is setose only on the proximal one third of the lappet. Two of the proximal teeth on the outer margin enlarged.

The 1st maxilla (Fig. 1) simple, furnished with 4 marginal stae, of which the outer one is the longest. The 2nd maxilla (Fig. 2) 2-segmented. The basal segment broad. The 2nd segment is stylet-shaped; the outer margin is fringed with slender spinules gradually decreasing in size distally. The maxilliped (Fig. 3) 3-segmented. The 2nd segment has 2 spines distally. The distal segment terminates into a slightly curved unornamented claw.

The 1st to 4th swimming legs (Figs. 4, 5, 6, 7) have each 3-segmented exopod and endopod. The ornamentation of the legs as follows:

	Endopod							Exopod						
	1		2		3			1		2		3		
	Si	Se	Si	Se	Si	St	Se	Si	Se	Si	Se	Si	St	Se
P 1	1	0	1	0	3	2	I	0	I	1	I	4	I	III
P 2	1	0	2	0	3	I	II	0	I	1	I	5	I	III
P 3	1	0	2	0	2	II	II	0	I	1	I	5	I	III
P 4	1	0	1	0		II		0	I	1	I	5	I	II

The endopod of the 4th leg has 2 apical spines subequal in lengths on the distal segment.

The 5th leg (Fig. 8) uniramous, articulated to the base represented by a slight expansion of the 5th thoracic segment. The basal seta present. The free segment is about 1.5 times as long as broad, carries 2 apical spines, of which the inner marginal is long and sickle-shaped, about 5 times as long as the free segment. The outer marginal spine is 2 times as long as the free segment. These spines are finely serrated along the outer margin.

Male. Length, 1.23 mm.

The male resembles female in general apparance (Figs. 9, 10). The anterior and posterior regions of the body are in the proportional lengths as 54 to 46. The 5th thoracic segment is narrow, less than one third the width of the 1st thoracic segment. The posterior region of the body has the segments in the following proportional lengths:

Segment	Th. 5	Abd. 1	2	3	4	5	Furca
	7	30	8	11	10	11	23=100

The genital segment nearly squarish in shape, 1.3 times as wide as long. The lateral margins of the segment slightly knotched at the proximal one third of the segment and contracts suddenly at the distal end. The 6th leg is represented as usual with 2 small spines and a process on the distal lateral margins of the segment (Figs. 9, 11). The specimen had a paired spermatophores. The 2nd to 4th segments are striated with fine spinules only on the ventral distal margin. The furcal rami 4.3 times as long as it is wide at the proximal.

The 1st antenna (Fig. 1) 7-segmented. The segments are in the proportional lengths:

Segment	1	2	3	4	5	6	7
	12	27	8	15	15	15	8=100

The 2nd, 4th, and 5th segments are each furnished with an aesthetask.

The 2nd antenna and mandible (Figs. 2, 3) are as in the female. The 1st maxilla (Fig. 4) much reduced. The 2nd maxilla (Fig. 5) as in the female. The maxilliped (Fig. 6) well developed, 3-segmented; the 1st and 2nd segments are long; the 2nd segment is furnished with rows of strong spinules as shown in the figure; the 3rd segment is transformed into a long sickles-haped claw.

The 1st to 4th swimming legs (Figs. 7, 8, 9) as in the female. The 5th leg (Plate 33, fig. 12) small in size.

Immature male. Length, 1.05 mm.

The body rather elongate. The anterior and posterior regions of the body are in the proportional lengths as 66 to 34. The head separates from the 1st thoracic segment. The lateral margins of the 2nd to 4th segments are irregular in shape (Fig. 1). The rostrum produced ventrally, rounded at the apex (Fig. 2).

The posterior region of the body has the segments in the following proportional lengths:

Segment	Th. 5	Abd. 1	2	3	4	Furca
	14	32	17	17	22	28=100

The genital segment rounded in shape, carries on each side of the distal margin a small lateral process furnished with short spines as shown in the figure (Fig. 3). The 2nd and 3rd segments are striated with fine spinules on the ventral distal margin. The 4th segment is long. The furcal rami more than 3 times as long as broad (10 : 3).

The 1st antenna (Fig. 4) 7-segmented. The segments are in the proportional lengths:

Segment	1	2	3	4	5	6	7
	15	20	8	15	18	15	9=100

The cephalic appendages and 1st to 4th swimming legs (Figs. 5, 6, 7, 8, 9) as in the female. The 5th leg (Fig. 10) as in the male.

Remark.—The present species has the 2nd antenna which differs in form from that of *Modiolicola insignis* Aurivillius. However, it seems reasonable to regards the species as a member of the genus *Modiolicola* following the examples given by Reddiah and Williamson (1959). The female 5th leg of the present species resembles that of *M. insignis* in having a long inner marginal spine but can be distinguished from it in the form of the free segment which is slender in the present species. The male resembles closely that of *insignis* except in having slender furcal rami in the present species. The immature male can be recognized by the 4-segmented abdomen and the long segment which will be divided into two in the final moult.

Genus ***Anthessius*** Della Valle, 1883

Pseudomolgus Sars, 1918, p. 181.

Sewell (1949) has recorded the occurrence of *Anthessius brevifurca* Sewell from Maladive Archipelago and *A. investigatoris* Sewell from Andaman Island by weed washings. Illg (1960) reviewed *Anthessius* and described three new species from the North Pacific Ocean. There have about 16 species of *Anthessius* been recorded of which *A. pinnae* Humes appears to be a single species associated with the pelecypods.

Anthessius pectinis sp. nov.

(Plate 36, figs. 1–10; Plate 37, figs. 1–8)

Occurrence.—2 females and 1 male from the mantle cavity of *Pecten laqueatus* Sowbery from Sasebo Bay on 4th February, 1960.

Descriptive Notes.—Female. Length, 3.17 and 2.95 mm.

The body cyclopoid. The anterior and posterior regions of the body have the proportional lengths as 45 to 55. The anterior region is 1.5 times as long as broad. The head separates from the 1st thoracic segment. The frontal margin of the head protruded in a bulge between the bases of the widely separated 1st antenna (Figs. 1, 2). This protrusion extends posteriorly in a plate-like expansion beyond the bases of the 1st antenna. The lateral margins of the 2nd to 4th thoracic segments are rounded.

The posterior region of the body has the segments in the following proportional length:

Segment	Th. 5	Abd. 1–2	3	4	5	Furca
	10	26	13	9	14	28=100

The 5th thoracic segment has lateral expansions to which the pair of legs articulated. The genital segment (Fig. 3) expands laterally with complex structure of the genital openings and sites of attachment of egg sacs on the dorso-lateral surface. The integument is furnished with small granules both on the dorsal and ventral surfaces. The furcal rami long and slender, 12 times as long as it is broad at the distal end. The rami are provided with groups of the granules.

The 1st antenna (Fig. 4) 7-segmented. The segments are in the proportional lengths:

Segment	1	2	3	4	5	6	7
	18	40	3	17	12	5	5=100

The segmentation between the 2nd and 3rd segments is complicated. The 2nd segment has on the distal margin an additional small segment though it is incompletely separated from the 2nd segment proper. This additional segment is incompletely separated from the 3rd segment on the anterior half of the segment. The distal 2 segments have each an aesthetask.

The 2nd antenna (Fig. 5) 3-segmented. The 1st segment with a strong seta. The 2nd segment with an inner marginal seta. The 3rd segment has a strong curved spine and 2 slender ones on the distal margin; the outer margin of the segment carries 2 small setae, and the inner margin with 4 setae in all; the proximal margin of the segment is furnished with a row of minute granules.

The labrum is large and widespread but not deep. The mandible (Fig. 6) has 2 lashes furnished with spinules along the anterior margin. The anterior lash is longer than the posterior one, and has 2 proximal spinules much bigger than the remainders. The 1st maxilla (Fig. 7) elongate, flaring in the apical margin which is furnished with 4 setae, of which the outer one is based on a well-defined process. The inner margin of the segment is furnished with a seta.

The 2nd maxilla (Fig. 8) is characteristic. The basal segment is broad and furnished with a strong claw on the posterior corner (in

situ). The terminal segment forms a lappet provided with about 15 strong spinules on the anterior margin, of which the proximal 3 are rather delicate. A plumose seta arises near the base of the terminal segment.

The maxilliped (Fig. 8) 3-segmented, with indistinct segmentation and poor ornamentation. The 2nd segment articulate with the following segments in almost at a right angle. The terminal segment is furnished with 2 small spines.

The maxilliped (Fig. 8) 3-segmented, with indistinct segmentation and poor ornamentation. The 2nd segment articulate with the following segments in almost at a right angle. The terminal segment is furnished with 2 small spines.

The 1st to 4th legs (Fig. 9; Plate 37, figs. 1, 2, 3) have each 3-segmented exopod and endopod. The 1st basal segment of the legs are each furnished with several spines on the outer distal margin. The 1st segment of the exopod of the 1st to 4th legs are each furnished with denticles on the outer margin. The 4th leg has 3 outer marginal spines on the 3rd segment of the exopod. The setal formula of the legs as follows:

	Endopod							Exopod						
	1		2		3			1		2		3		
	Si	Se	Si	Se	Si	St	Se	Si	Se	Si	Se	Si	St	Se
P 1	1	0	1	0	3	2	I	0	I	1	I	4	1	III
P 2	1	0	2	0	2	I	III	0	I	1	I	5	I	III
P 3	1	0	2	0	2	I	III	0	I	1	I	5	I	III
P 4	1	0	2	0	1	I	III	0	I	1	I	5	I	III

The 5th leg (Fig. 10) nearly quadrate in shape with one free segment attached to the body proper. The basal seta present. The distal margin of the free segment carries 3 strong spines of about equal lengths and a slender seta arising between the middle and inner marginal spines. The inner as well as the outer margin of the segment are furnished with spinules. The posterior surface of the segment is furnished with scattered small granules.

Male. Length, 2.00 mm.

General appearance as in the female (Fig. 4). The anterior and posterior regions of the body are in the proportional lengths as 48 to 52. The posterior region of the body has the segments in the following proportional lengths:

Segment	Th. 5	Abd. 1	2	3	4	5	Furca
	8	21	11	9	7	16	28=100

The genital segment slightly wider than long (25 : 22), carries a pair of 6th legs represented by 2 small spines. The furcal rami (Fig. 5) about 12 simes as long as it is broad at the distal end.

The 1st antenna (Fig. 6) 7-segmented. The segments are in the proportional lengths:

Segment	1	2	3	4	5	6	7
	18	38	4	18	12	5	5=100

The segmentation between the 2nd and 3rd segments is complicated as in the female. The aesthetasks are found on the 2nd (3), 4th (1), 6th (1), and 7th (1) segments.

The 2nd antenna, mandible, and 1st and 2nd maxillae (Fig. 7) are as in the female. The maxilliped (Fig. 7) is transformed into a strong clasping organ; the 1st segment has a group of spinules on the outer distal corner; the 2nd segment is furnished with rows of spinules on the outer as well as the inner margins; the distal segment is prolonged into a long claw.

The 1st to 4th legs as in the female. The 5th leg (Fig. 8) as in the female but the terminal seta arising between the middle and inner marginal spines is very small.

Remarks. The present species is very closely allied to *Anthessius lighti* Illg but is easily distinguished from the latter in the structure of the 2nd maxilla and in the shape of the 5th pair of legs.

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Explanation of Plates

Plate 22

Myicola ostreae Hoshina and Sugiura, female.

Fig. 1. Dorsal view. × 67
Fig. 2. Rostrum, ventral view. ×134
Fig. 3. Frontal margin of head, lateral view. ×135
Fig. 4. First antenna. ×200
Fig. 5. Mouth part. ×270
Fig. 6. Second antenna. ×400
Fig. 7. Mandible and 1st maxilla. ×400
Fig. 8. Second maxilla. ×400
Fig. 9. Fifth leg. ×400

Plate 23

Myicola ostreae Hoshina and Sugiura, female.

Fig. 1. Dorsal view. × 67
Fig. 2. Mouth part. ×270
Fig. 3. First antenna. ×270
Fig. 4. Furca. ×134
Fig. 5. Genital segment, ventral view. ×134
Fig. 6. First leg, anterior aspect. ×270
Fig. 7. Fourth leg. ×270
Fig. 8. Fifth leg. ×400

Plate 24

Ostrincola koe sp. nov., female.

Fig. 1. Dorsal view. × 67
Fig. 2. Abdomen, lateral view. ×134
Fig. 3. Head, lateral view. ×134
Fig. 4. Mouth part. ×134
Fig. 5. First antenna. ×270
Fig. 6. Second antenna. ×270
Fig. 7. Mandible and 1st maxilla. ×270
Fig. 8. Second maxilla. ×270
Fig. 9. Fifth leg. ×270

Plate 25

Ostrincola koe sp. nov., female (continued).

Fig. 1. First leg. ×270
Fig. 2. Second leg. ×270
Fig. 3. Endopod of 3rd leg. ×270
Fig. 4. Fourth leg. ×270

Ostrincola koe sp. nov., male.

Fig. 5. Abdomen, ventral view. ×134
Fig. 6. Maxilliped. ×270
Fig. 7. Fifth leg. ×270

Plate 26

Ostrincola japonica sp. nov., female.

Fig. 1.	Dorsal view.	× 67
Fig. 2.	Frontal margin of head, ventral view.	×134
Fig. 3.	Head, lateral view.	×134
Fig. 4.	Abdomen, lateral view.	×134
Fig. 5.	Furca.	×270
Fig. 6.	First antenna.	×270
Fig. 7.	Second antenna.	×270
Fig. 8.	Mandible and 1st maxilla.	×400
Fig. 9.	Second maxilla.	×400
Fig. 10.	Mouth part.	×270
Fig. 11.	Fifth leg.	×270

Plate 27

Ostrincola japonica sp. nov., male

Fig. 1.	Dorsal view.	× 67
Fig. 2.	Abdomen, lateral view.	×134
Fig. 3.	First antena.	×270
Fig. 4.	Second antenna.	×270
Fig. 5.	Maxilliped.	×270
Fig. 6.	First leg.	×270
Fig. 7.	Fifth leg.	×270

Conchyliurus quintus sp. nov., female.

Fig. 8.	Dorsal views.	× 67
Fig. 9.	Abdomen, lateral view.	× 67
Fig. 10.	First antenna.	×270

Plate 28

Conchyliurus quintus sp. nov., female (continued).

Fig. 1.	Genital segment, ventral view.	× 67
Fig. 2.	Second antenna.	×270
Fig. 3.	Mandible, 1st and 2nd maxillae and maxilliped	×270
Fig. 4.	First amxilla.	×270
Fig. 5.	First leg.	×270
Fig. 6.	Fourth leg.	×270
Fig. 7.	Fifth leg.	×270

Conchyliurus quintus sp. nov., male.

Fig. 8.	Dorsal view.	× 67

Plate 29

Conchyliurus quinlus sp. nov., male (continued).

Fig. 1.	Head, latersl view.	× 67
Fig. 2.	Genital segment, ventral view.	×134
Fig. 3.	Abdomen, lateral view.	× 67
Fig. 4.	Maxilliped.	×270
Fig. 5.	Second leg, endopod.	×270
Fig. 6.	Endopod of 3rd leg.	×270
Fig. 7.	Fifth leg, ventral aspect.	×270

Plate 30

Lichomolgus inflatus sp. nov., female.

Fig. 1. Dorsal view. × 67
Fig. 2. Rostrum, ventral view. ×134
Fig. 3. Head lateral view. ×134
Fig. 4. Abdomen, lateral view. × 67
Fig. 5. Furca. ×134
Fig. 6. First antenna. ×134
Fig. 7. Second antenna. ×134
Fig. 8. Mouth part. ×270

Plate 31

Lichomolgus inflatus sp. nov., female (continued).

Fig. 1. Mandible and 1st maxilla. ×270
Fig. 2. Second maxilla. ×270
Fig. 3. First leg. ×134
Fig. 4. Second leg. ×134
Fig. 5. Third leg. ×134
Fig. 6. Fourth leg. ×134
Fig. 7. Fifth leg. ×270

Lichomolgus inflatus sp. nov., male.

Fig. 8. Dorsal view. × 67
Fig. 9. Furca. ×270
Fig. 10. First antenna. ×270

Plate 32

Lichomolgus inflatus sp. nov., male (continued).

Fig. 1. Second antenna. ×270
Fig. 2. Maxilliped. ×270
Fig. 3. First leg. ×270
Fig. 4. Fourth leg. ×270
Fig. 5. Fifth leg. ×270

Modiolicola bifida sp. nov., female.

Fig. 6. Dorsal view. × 47
Fig. 7. Rostrum, ventral views. ∞134
Fig. 8. Abdomen, lateral view. × 67
Fig. 9. First antenna. ×134
Fig. 10. Second antenna. ×134
Fig. 11. Mandible. ×270

Plate 33

Modiolicola bifida sp. nov., female (continued).

Fig. 1. First maxilla. ×270
Fig. 2. Second maxilla. ×270
Fig. 3. Maxilliped. ×270
Fig. 4. First leg. ×134
Fig. 5. Endopod of 2nd leg. ×134
Fig. 6. Third leg. ×134

Fig. 7. Fourth leg. ×134
Fig. 8. Fifth leg. ×270

Modiolicola bifida sp. nov., male.

Fig. 9. Dorsal view. × 67
Fig. 10. Head, lateral view. ×134
Fig. 11. Abdomen, lateral view. × 67
Fig. 12. Fifth leg. ×270

Plate 34

Modiolicola bifida sp. nov., male (continued).

Fig. 1. First antenna. ×134
Fig. 2. Second antenna. ×270
Fig. 3. Mandible. ×270
Fig. 4. First maxilla. ×270
Fig. 5. Second maxilla. ×270
Fig. 6. Maxilliped. ×270
Fig. 7. First leg. ×270
Fig. 8. Endopod of 3rd leg. ×270
Fig. 9. Fourth leg. ×270

Plate 35

Modiolicola bifida sp. nov., male, juv.

Fig. 1. Dorsal view. × 67
Fig. 2. Head, lateral view. ×134
Fig. 3. Abdomen, lateral view. ×134
Fig. 4. First antenna. ×270
Fig. 5. Second antenna. ×270
Fig. 6. First maxilla. ×270
Fig. 7. Second maxilla. ×270
Fig. 8. Maxilliped. ×270
Fig. 9. Fourth leg. ×270
Fig. 10. Fifth leg. ×270

Plate 36

Anthessius pectinis sp. nov., female.

Fig. 1. Dorsal view. × 27
Fig. 2. Frontal margin of head, ventral view. × 67
Fig. 3. Genital segment, dorsal view. ×134
Fig. 4. First antenna. ×134
Fig. 5. Second antenna. ×270
Fig. 6. Mandible. ×270
Fig. 7. First maxilla. ×270
Fig. 8. Second maxilla and maxilliped. ×134
Fig. 9. First leg. ×134
Fig. 10. Fifth leg, anterior aspect. ×134

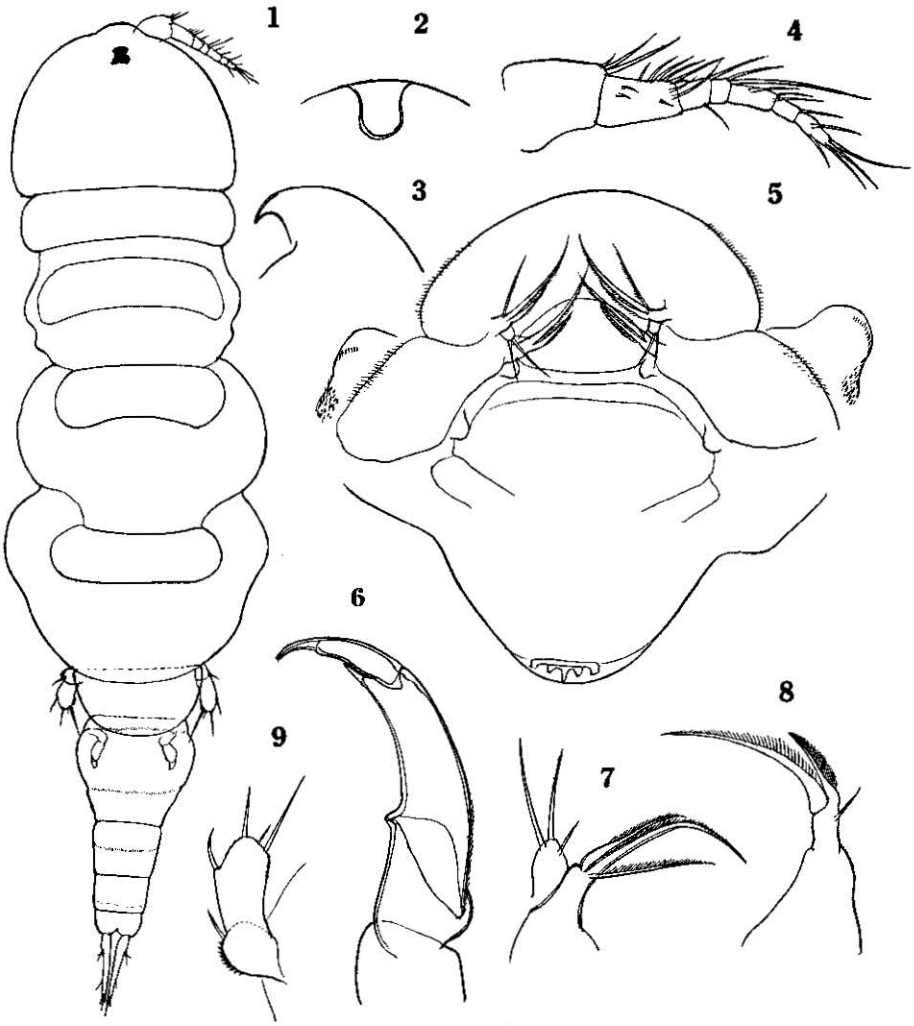
Plate 37

Anthessius pectinis sp. nov., female (continued).

Fig. 1. Second leg. ×134
Fig. 2. Exopod of 4th leg. ×134
Fig. 3. Endopod of 4th leg. ×134

Anthessius pectinis sp. nov., male.

Fig. 4. Dorsal view. × 27
Fig. 5. Furca. × 67
Fig. 6. First antenna. ×134
Fig. 7. Mouth part. ×134
Fig. 8. Fifth leg. ×134



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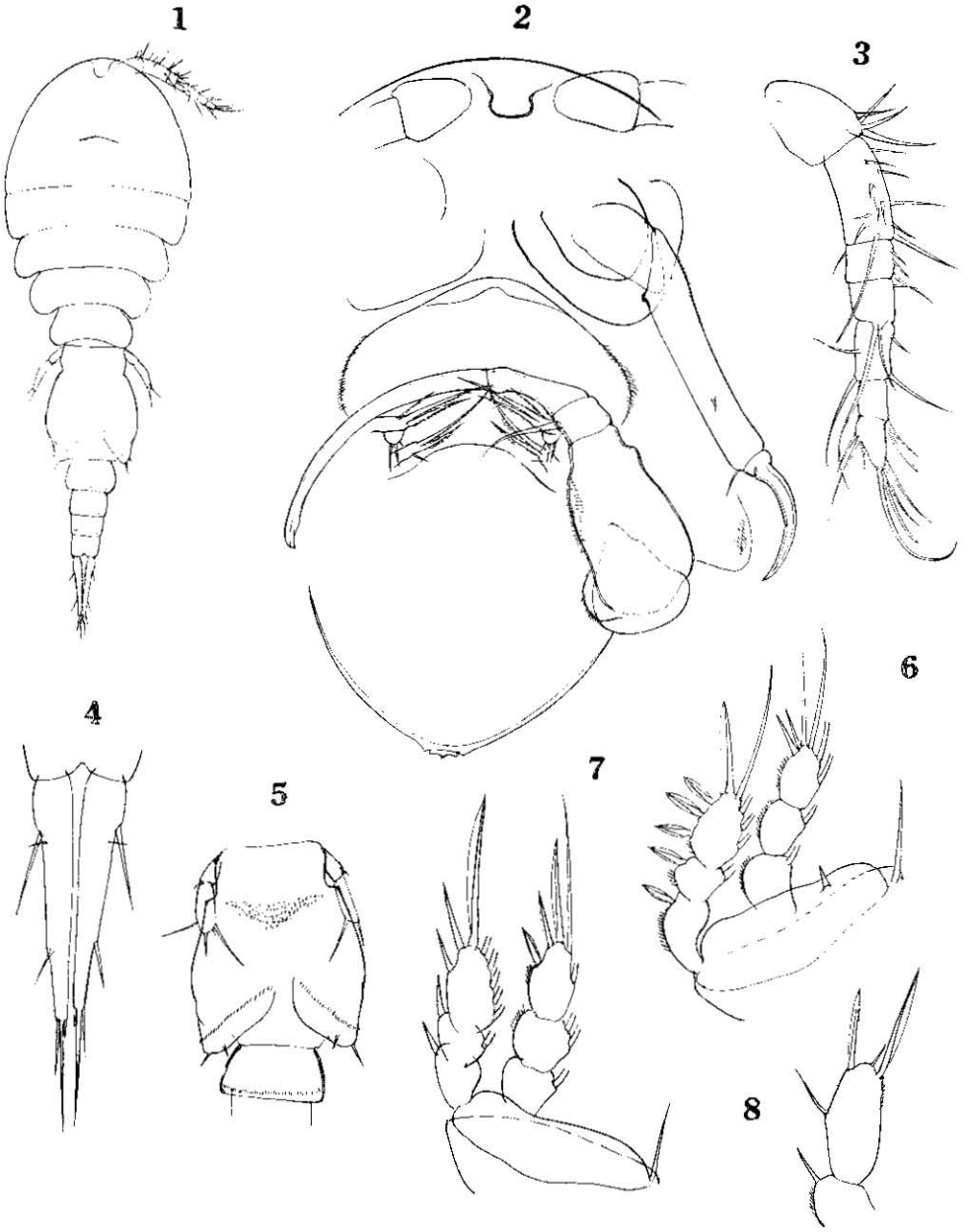

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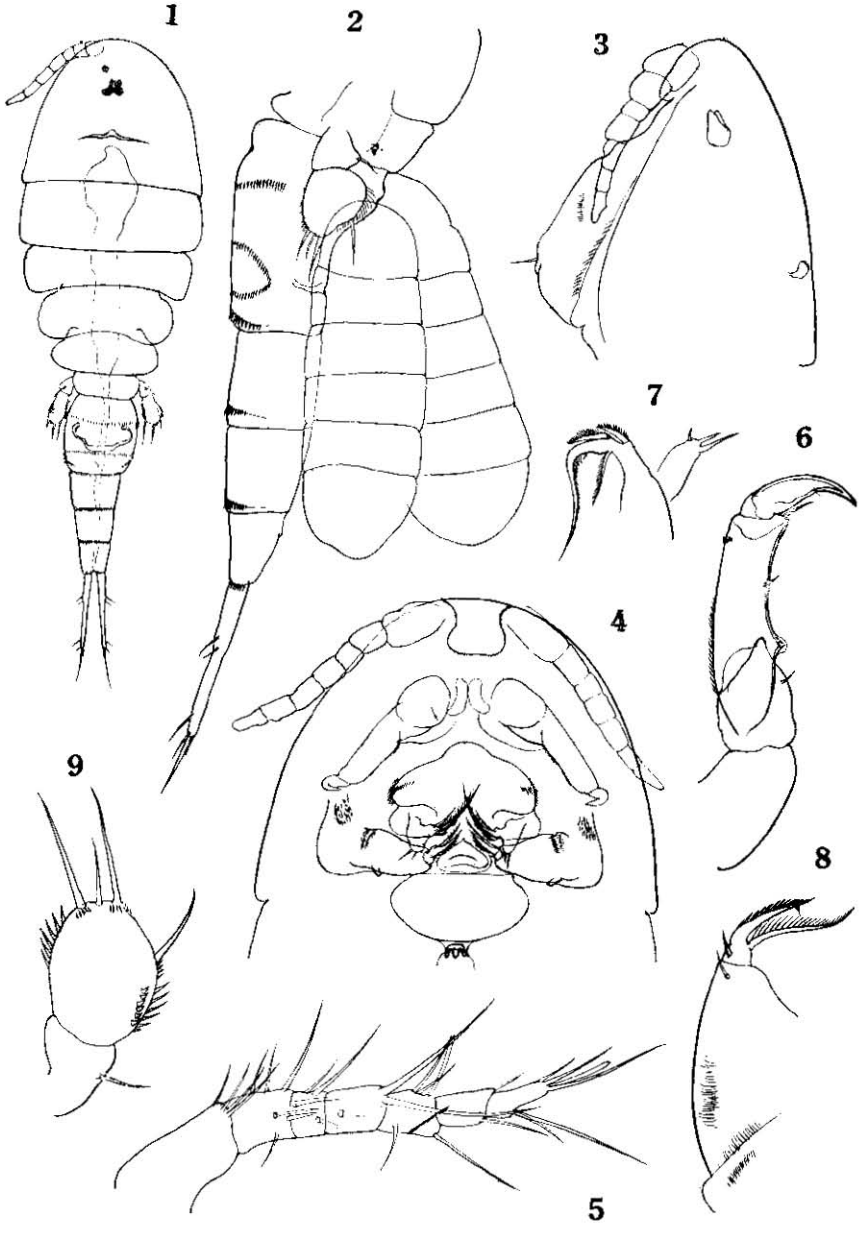

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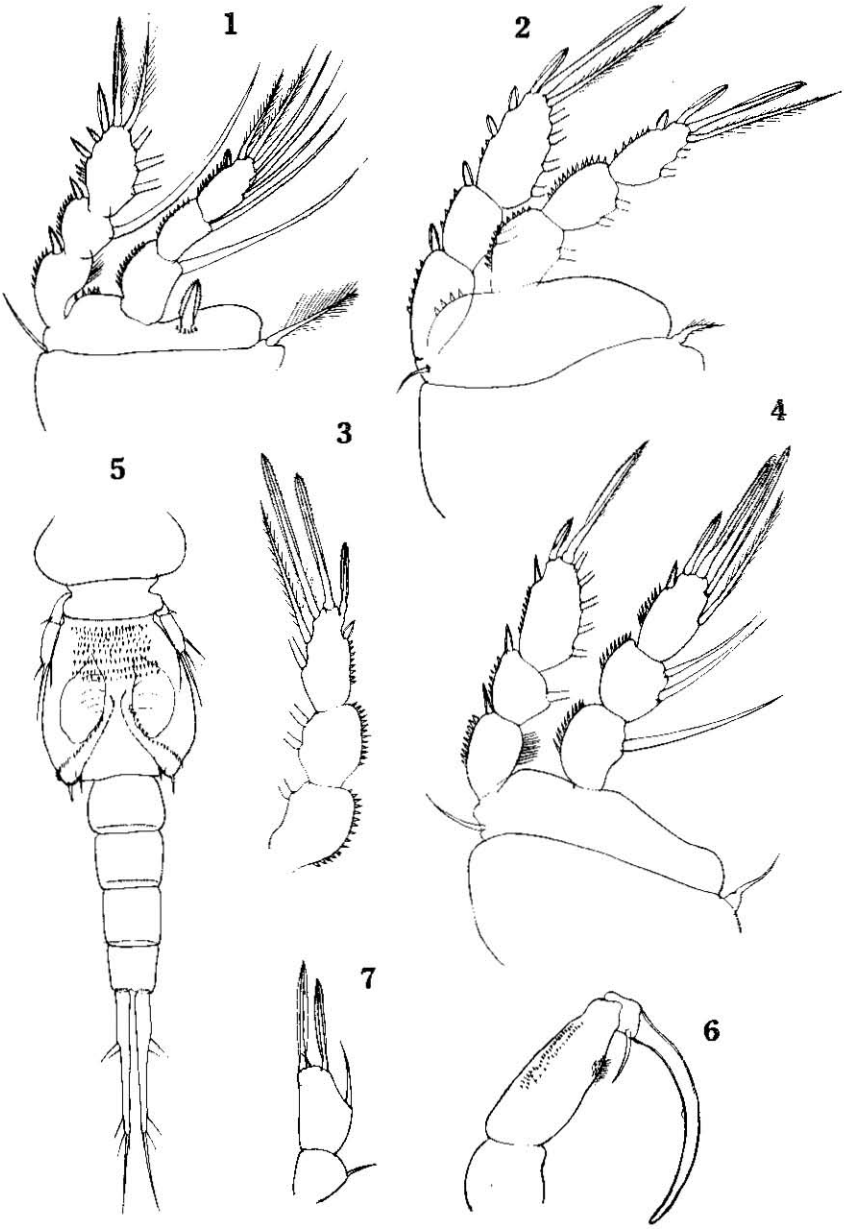

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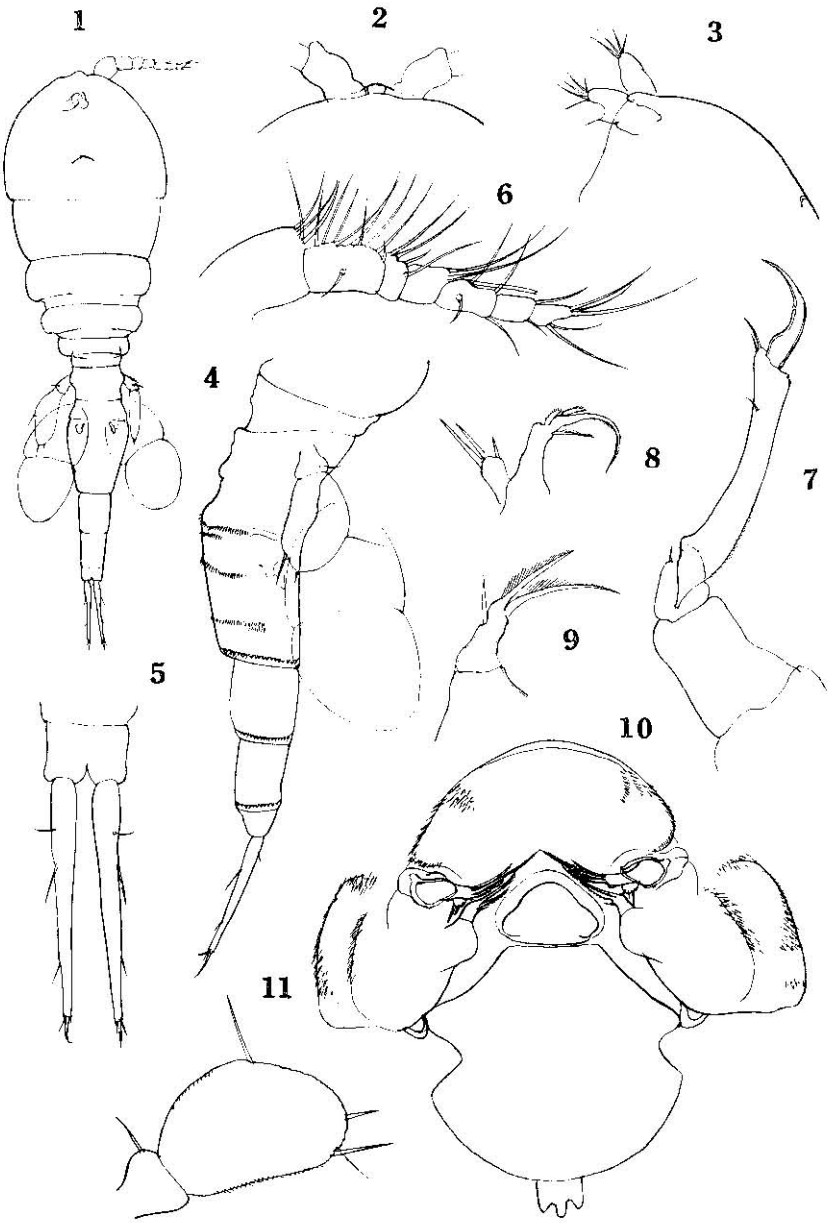

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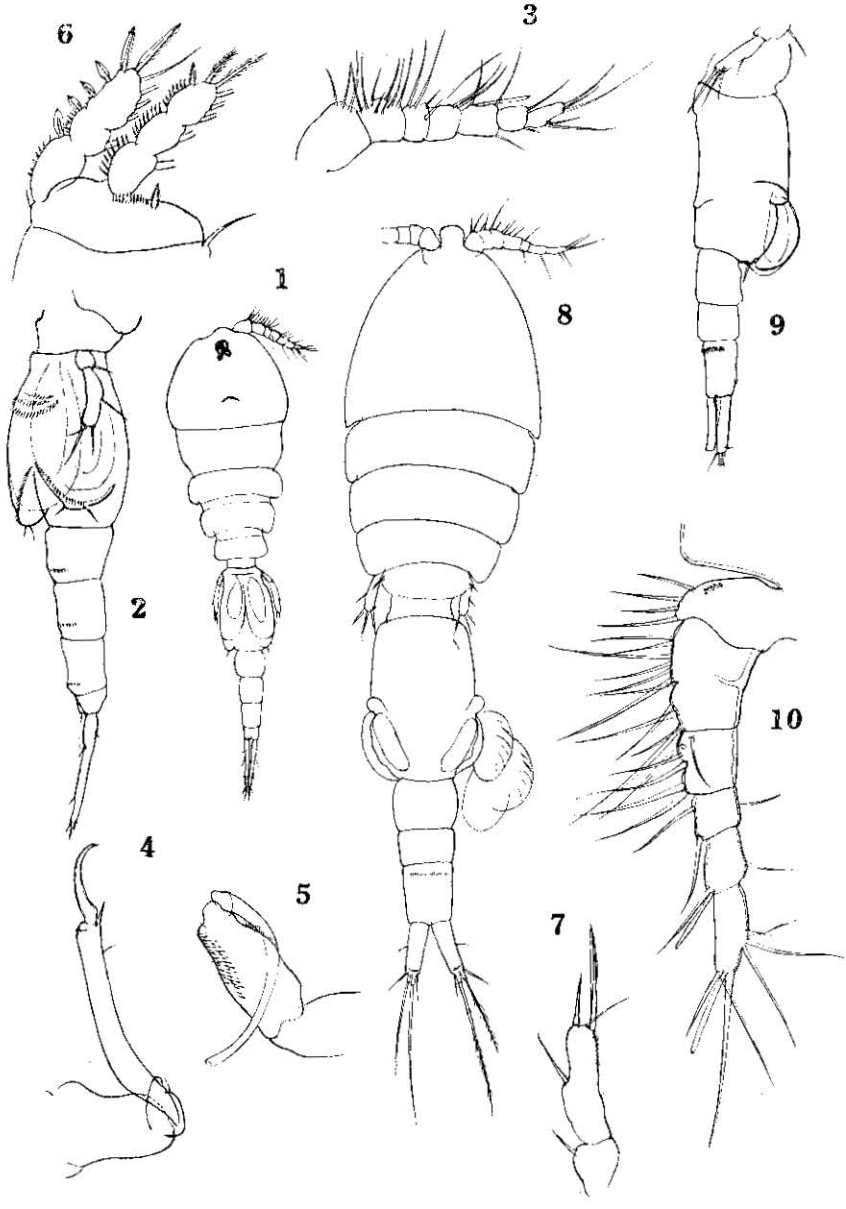

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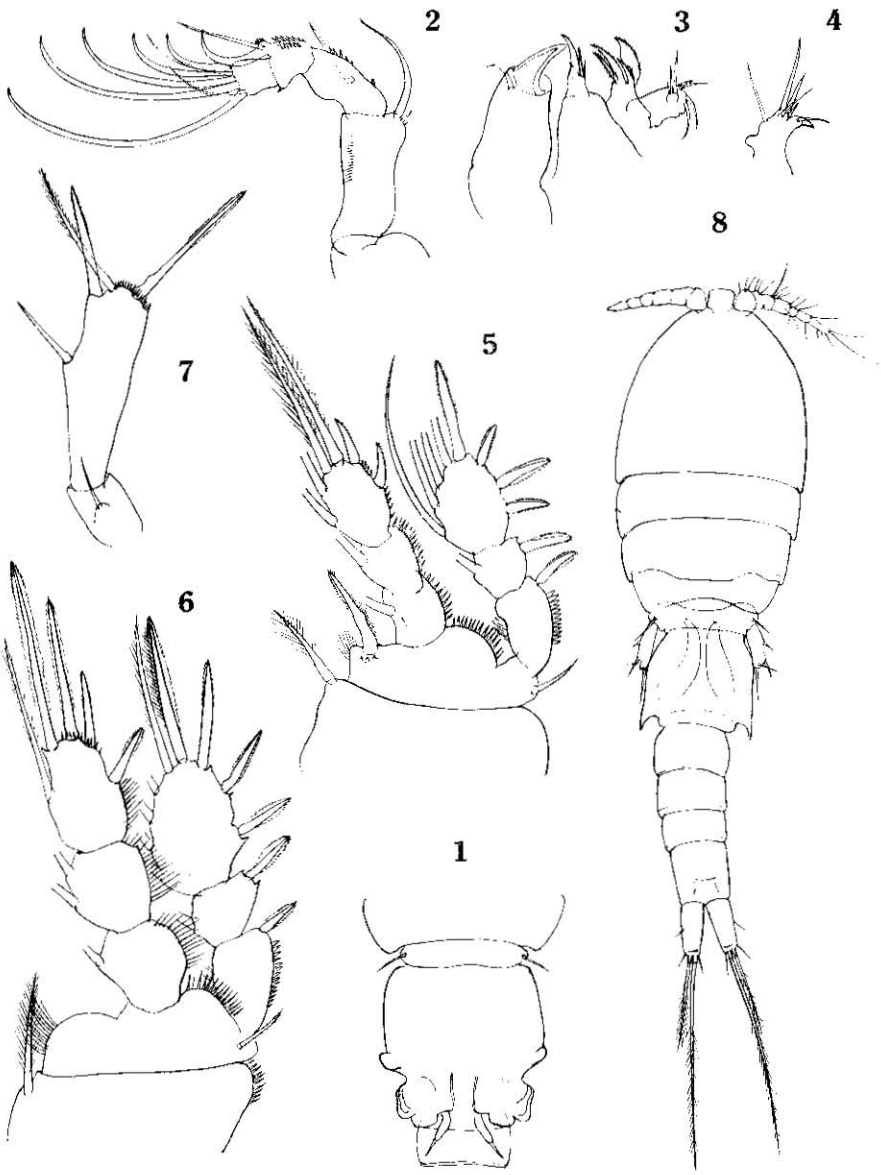

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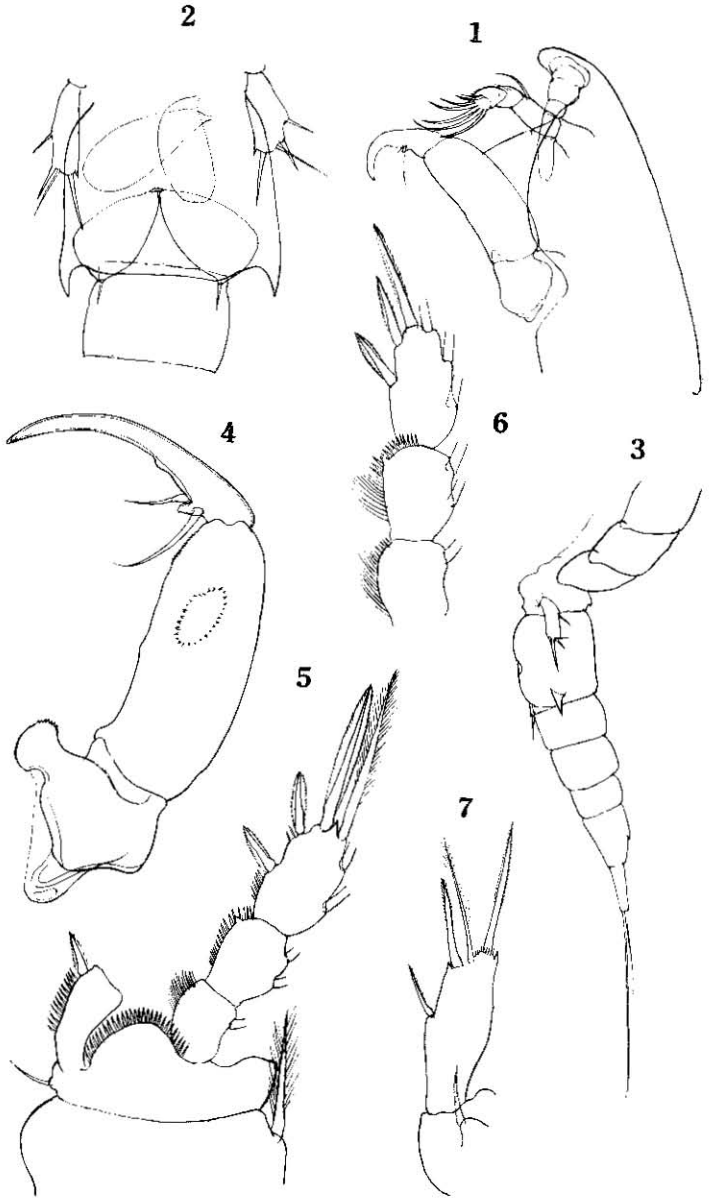
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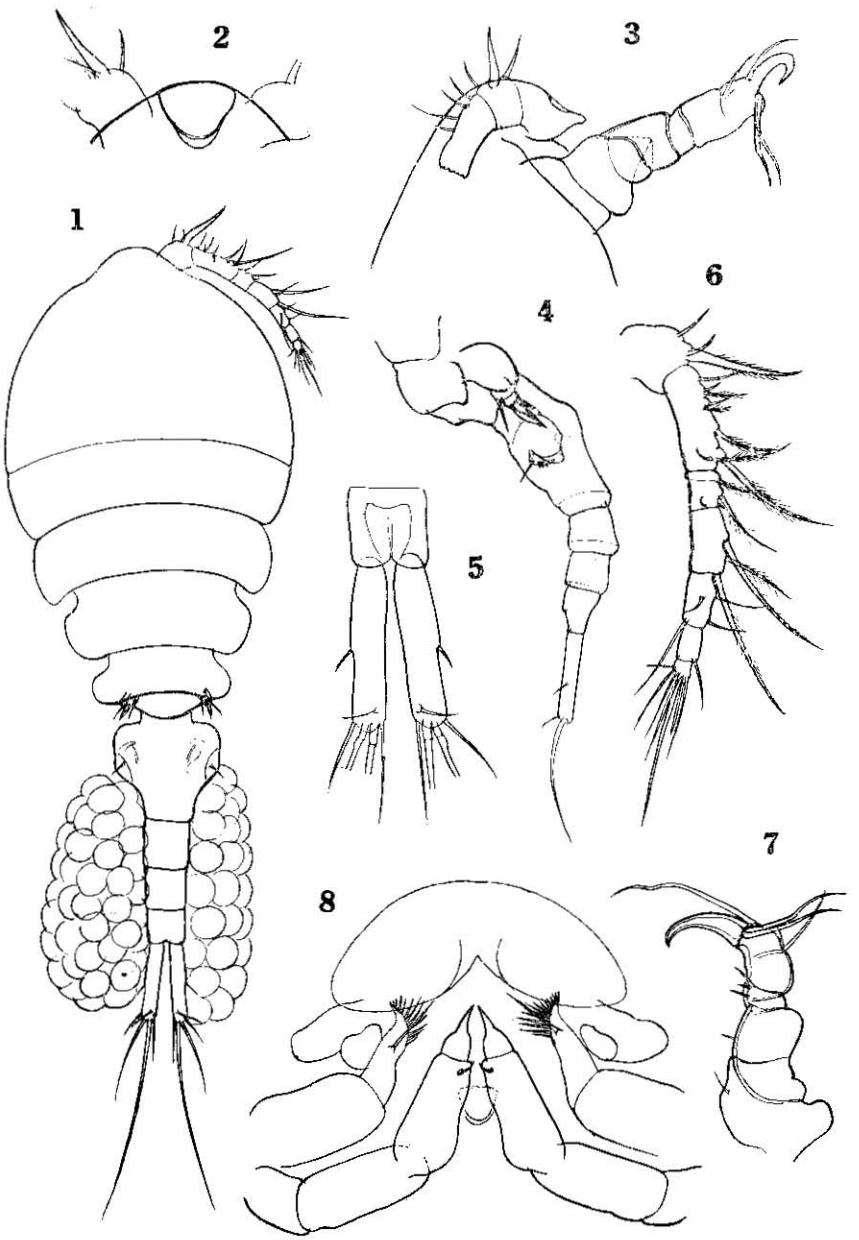

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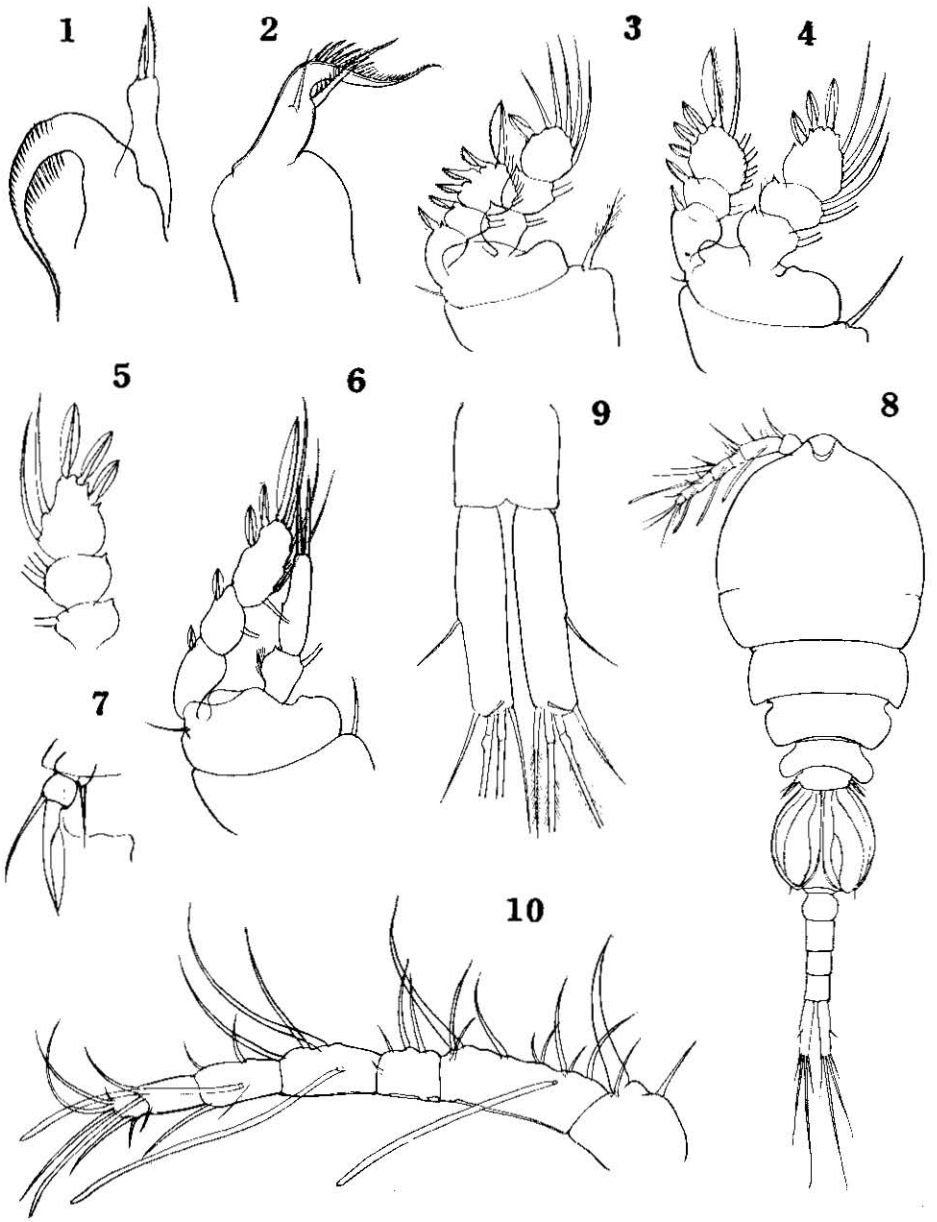

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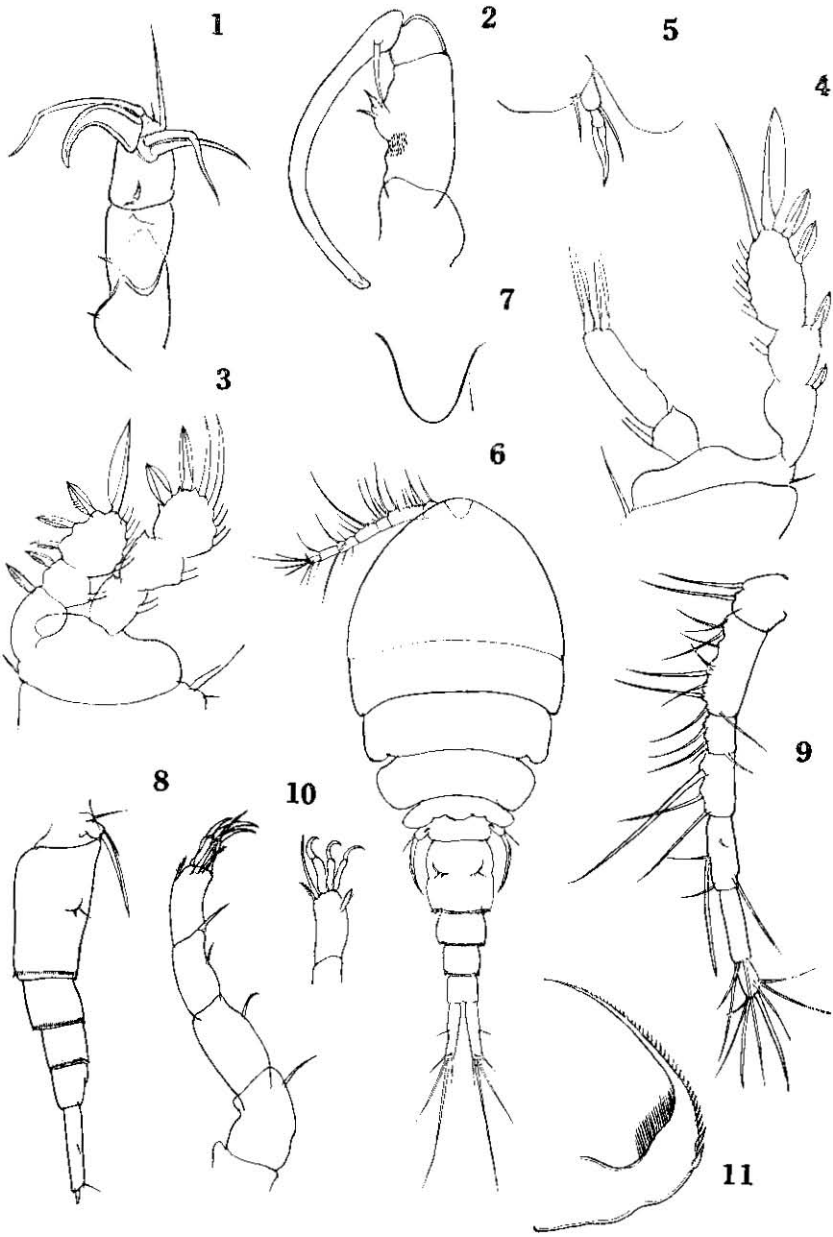

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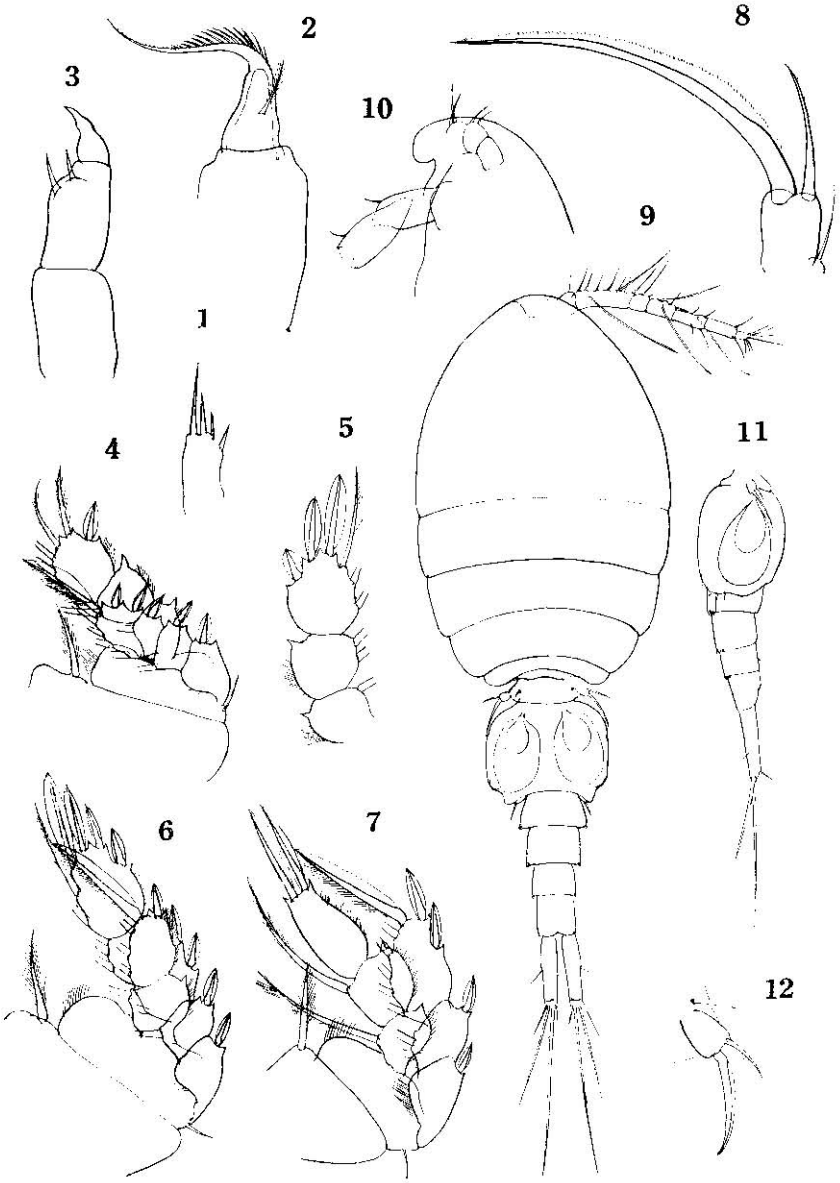

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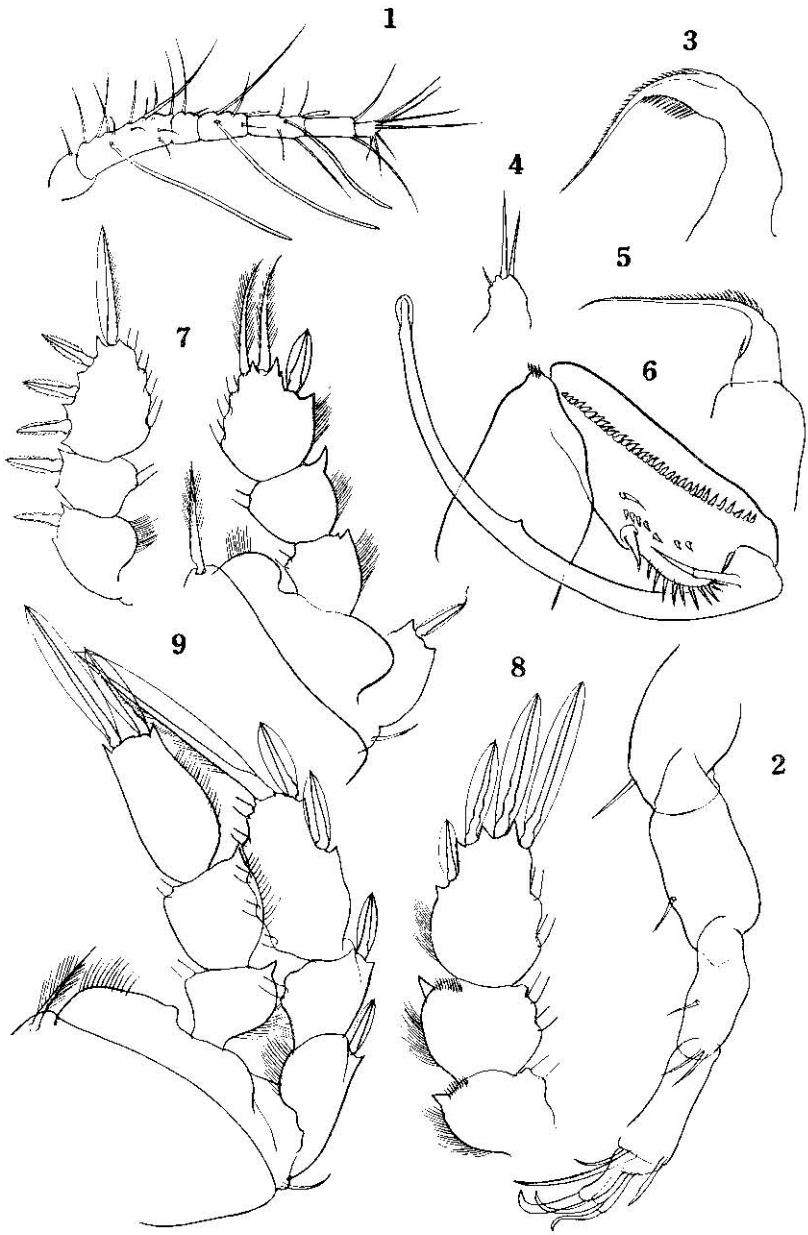

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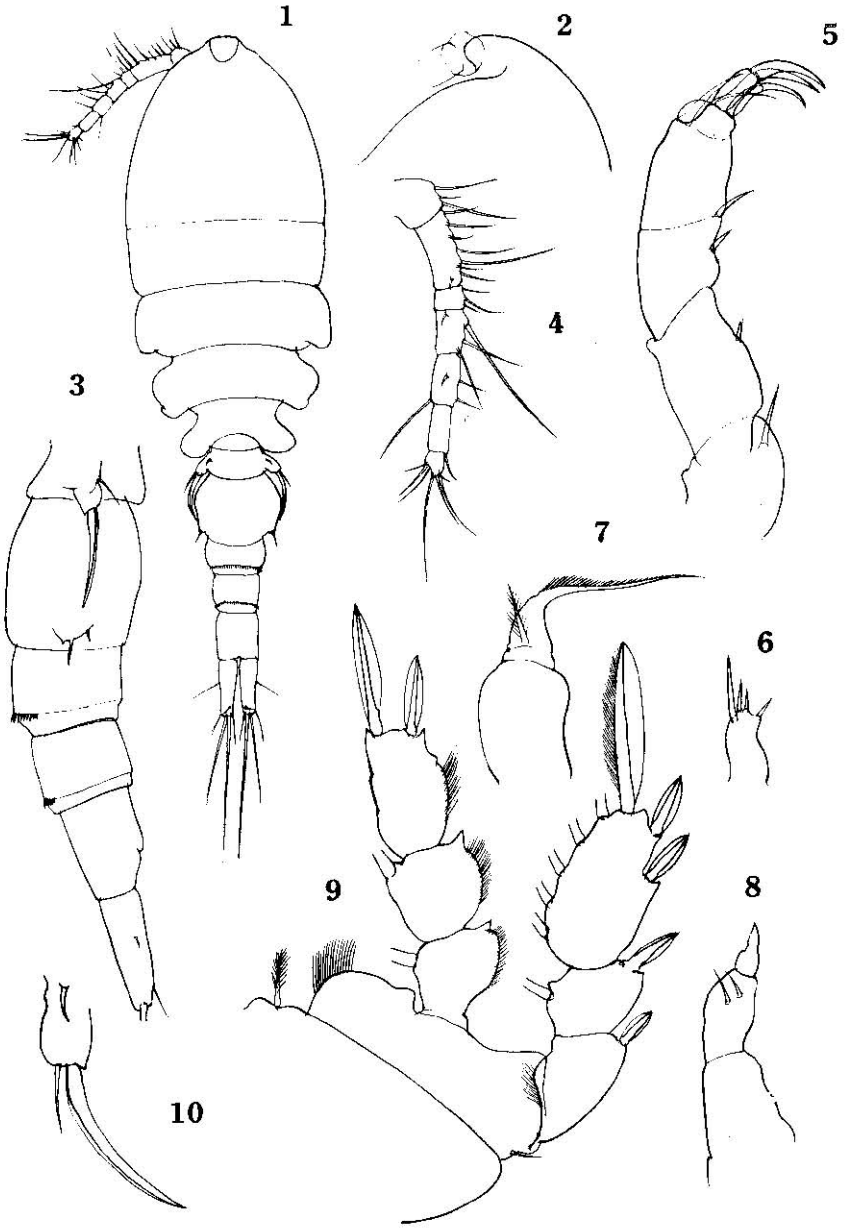

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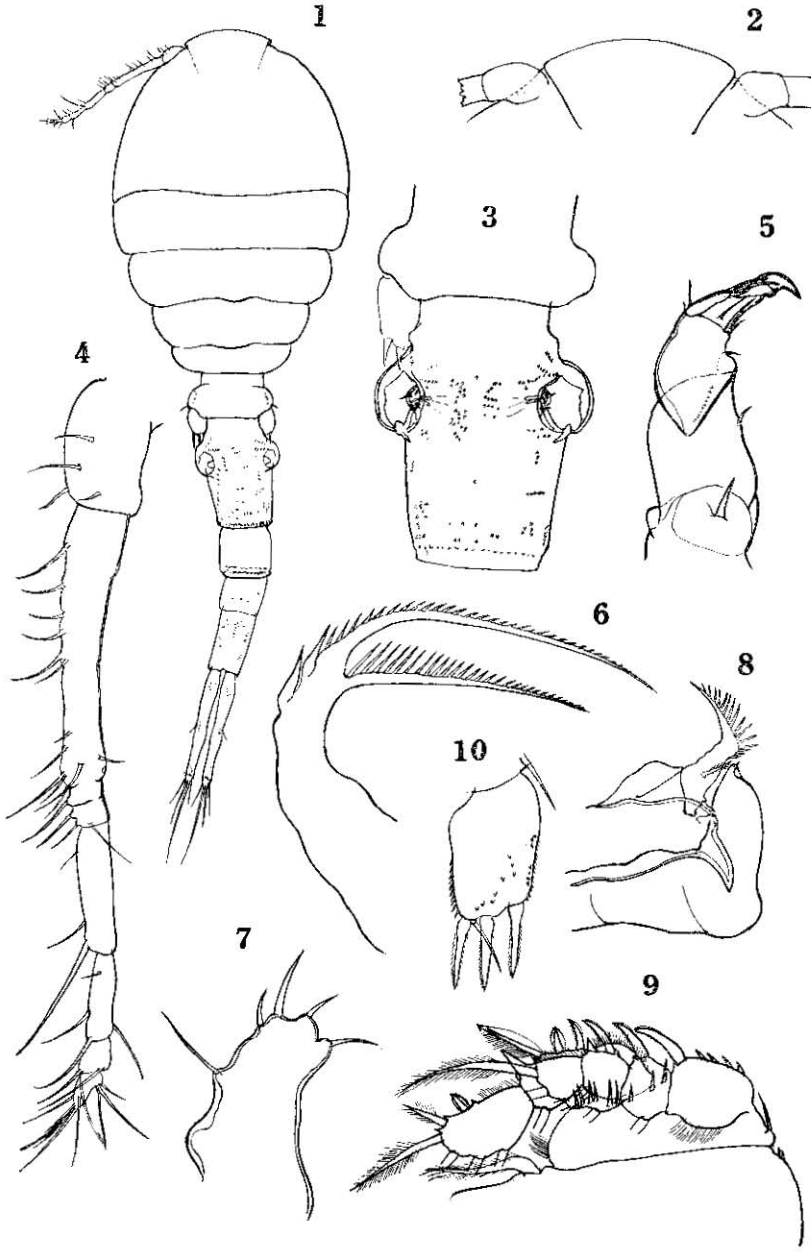
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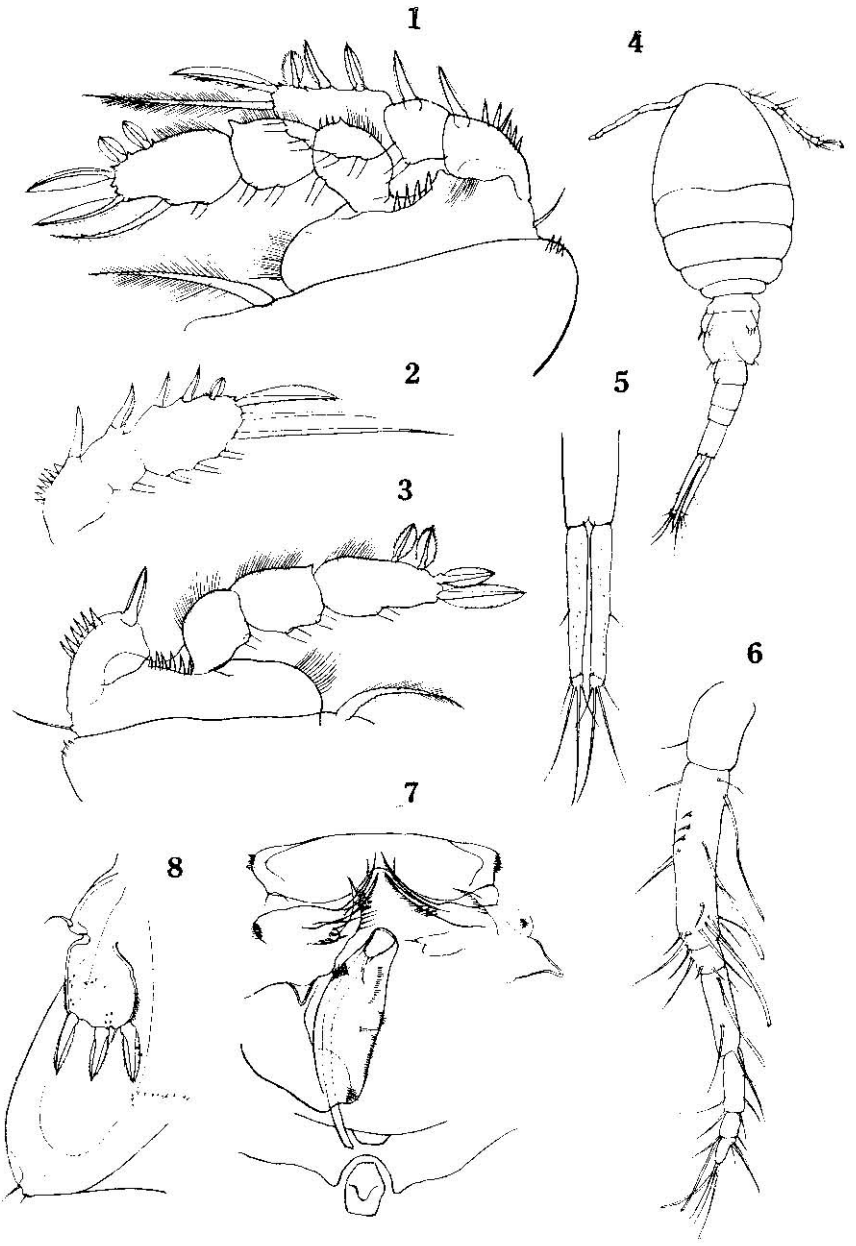

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