

**A New Gammaridean Amphipod, *Pleusymtes symbiotica*,
Ectosymbiotic with a Japanese Gorgonacean Octocoral,
Melithaea flabellifera (KÜKENTHAL)
from Sagami Bay**

by

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Résumé: Ce travail comporte la description et la figuration de *Pleusymtes symbiotica*, espèce nouvelle d'amphipode gammaride de la famille Pleustidae, un ectosymbiote du gorgonacé *Melithaea flabellifera* (KÜKENTHAL), de la baie de Sagami, Japon. Elle se confond par la coloration de leur corps semblante à la couleur des branches et des polypes du gorgonacé avec le milieu où elle vit. Cette espèce devient la deuxième représentante des amphipodes symbiotiques du gorgonacé *Melithaea*, de l'Océan Pacifique. *Maxillipius commensalis* LOWRY, 1984 (la famille Maxillipiidae) a été signalée de *Melithaea* sp. de la baie de Bootless, Nouvelle Guinée, Papuasie, dans la mer de Corail.

LOWRY (1984) described a commensal amphipod, *Maxillipius commensalis* (Maxillipiidae), living among the branches of a gorgonacean, *Melithaea* sp. from Bootless Bay, Papua New Guinea, in the Coral Sea (Fig. 1).

The present paper deals with the second ectosymbiotic amphipod, *Pleusymtes symbiotica* sp. nov. (Pleustidae), which is commonly found on the branches of the Japanese gorgonacean, *M. flabellifera* (KÜKENTHAL) (UTINOMI, 1967) from Sagami Bay. The colour of body in life is very similar to that of the branches and polyps of *M. flabellifera* (GAMÔ and SHINPO, 1992). In the genus *Pleusymtes* there have been described eighteen species from littoral to abyssal depths in the arctic boreal region (BARNARD and KARAMAN, 1991: as *Sympleustes*, BARNARD and GIVEN, 1960; GRUJANOVA, 1951; ISHIMARU, 1985; LINCOLN,

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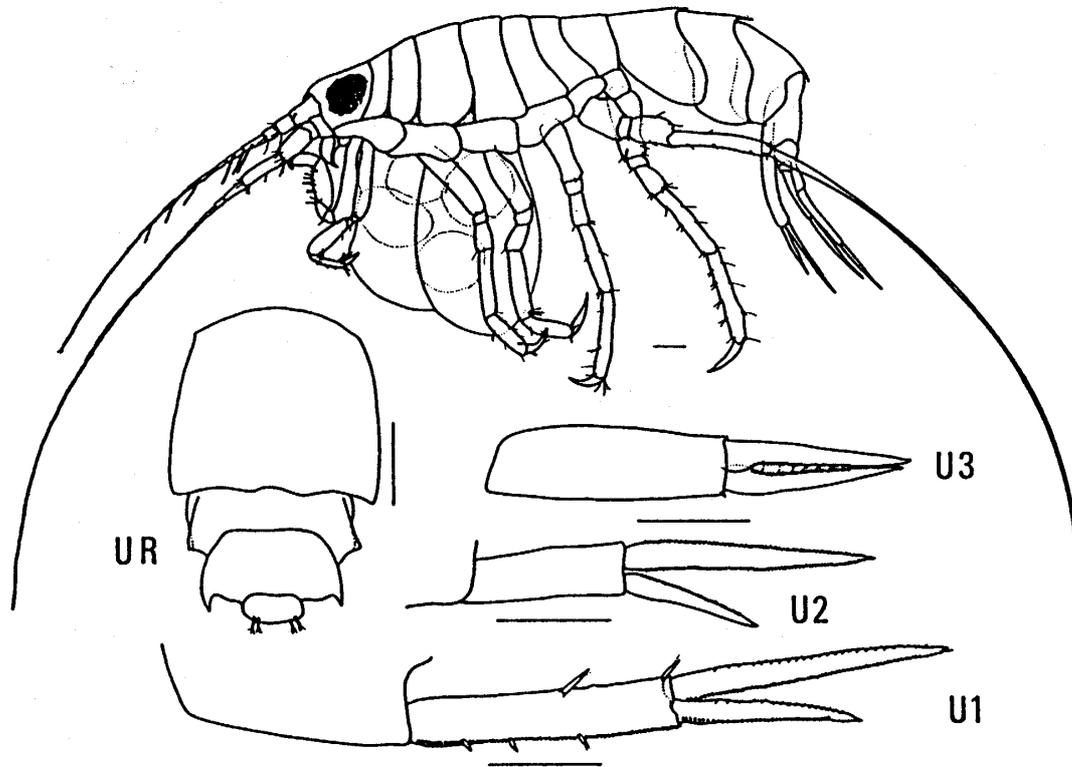


Fig. 1. *Maxillipius commensalis* LOWRY, 1984, living among a gorgonacean, *Melithaea* sp. at Bootless Bay, Papua New Guinea, in the Coral Sea. Ovigerous female, 2 mm, Lateral view. U1-U3: first to third uropods, UR: last three urosomites with telson. (after LOWRY, 1984).

1979; SARS, 1980; STEBBING, 1906). All the previously described species may be free living and none of the symbiotic species has been known.

The holotype and some paratypes are deposited in the collection of the National Science Museum, Tokyo, and the rest of them are reserved in the authors' collection.

The authors wish to express their thanks to the staff of the Shimoda Marine Research Center, University of Tsukuba and the Manazuru Marine Laboratory for Science Education, Yokohama National University, for kind assistance in collecting the materials.

Pleusymtes symbiotica sp. nov.

(Figs. 2-5)

Type materials. Holotype, ovigerous female (NSMT-Cr.11264), body length 4.7 mm, with 14 embryos in the marsupium, Manazuru, Sagami Bay, 12 July 1983.

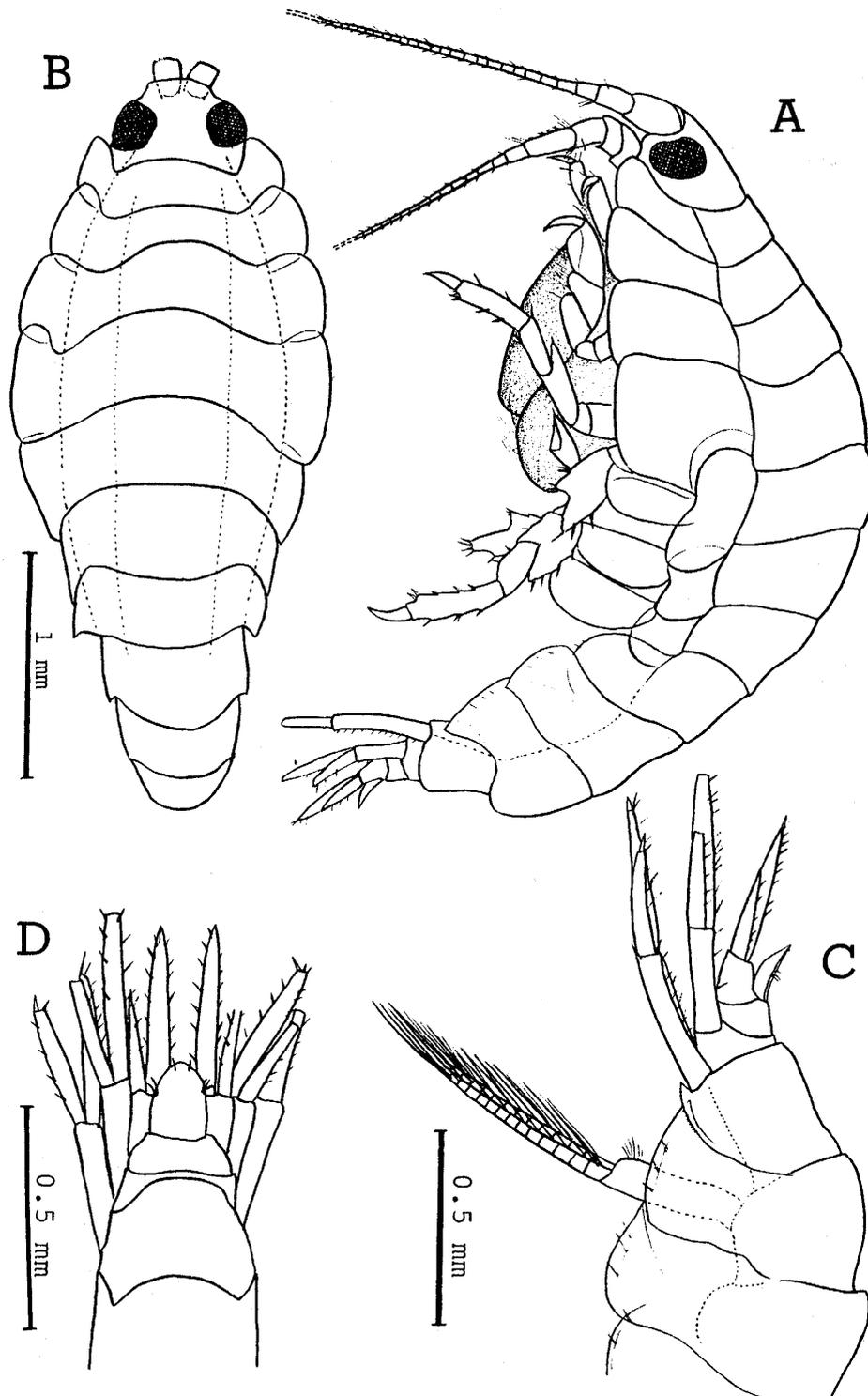


Fig. 2. *Pleusymtes symbiotica* sp. nov., holotype ovigerous female, length 4.7 mm, carrying 14 embryos (0.35×0.26 mm in diameter) from Manazuru. A: lateral view. B: dorsal view. C: urosome with telson, last pleopod and three uropods, lateral view. D: posterior portion of urosome with telson and three pairs of uropods, dorsal view.

Allotype, adult male (NSMT-Cr. 11265), 3.3 mm, dissected, Nabeta-wan Inlet, Shimoda, Sagami Bay, 17 May 1988. Many paratype females and males (NSMT-Cr. 11266 taken at Manazuru, 12 July 1983, and at Manazuru and Shimoda, May 1988 to September 1989.

Description. Adult female, holotype, 4.7 mm, carrying 14 embryos (0.35×0.25 mm in diameter), and an adult female, 4.3 mm, with 9 embryos, Manazuru; an adult female, 5.3 mm, dissected, Shimoda.

The colour of body in life is very similar to that of the branches and polyps of the host, and greatly variable from almost vermilion to reddish with yellow patches or bands (Fig. 3, E). The body (Fig. 2, A, B; Fig. 3, A, B) is smooth, a little depressed dorsoventrally; the mid-dorsal portion is a little raised; The greatest width is across the fourth pereonite, about $1/3$ or $1/4$ (including the coxal plates) as long as the body.

The head is rather small. The eyes are slightly bulged and reddish in colour. The coxae are moderately large, contiguous; the first coxa is almost rectangular in shape, and the smallest in the anterior four coxae, which are successively increasing in depth and length towards the rear. The fourth coxa is the greatest, almost square in shape, and about $1\ 1/2$ times as deep as and $1/2$ as long as the first one. The posterior three coxae are much smaller than the preceding four plates, almost rectangular in shape, about $1/3$ as deep as the fourth plate. The fifth coxal plate is the longest, and a little more than $1\ 1/2$ times as long as the sixth. The first epimeral plate has rounded apex. The posterior two epimeral plates are subquadrate in shape, and their posterodistal angle with acute apex and emphasised by a small tooth.

The antennule (Fig. 2, A; Fig. 3, A) is very long and slender, about twice as long as the antenna and about $3/4$ as long as the body. The peduncle consists of three segments; the first segment is robust, about $1/2$ as long as the second, which is much longer than the third.

The peduncle of antenna (Fig. 2, A; Fig. 3, A) is composed of five segments; the first two segments are subequal, about $1/2$ as long as the third, which is about $2/3$ as long as the fourth; the fifth segment is $1/3$ as long as the fourth. The flagellum is moderately short, about $1\ 2/3$ times as long as the peduncle.

The labrum and labium are as shown in Fig. 4, D and E.

The mandible (Fig. 4, A) is normal type of the genus.

The maxillule (Fig. 4, B) bears a plumose seta on the apex of small inner plate. The outer plate has eight short spines. The palp is two-segmented, much exceeding the end of outer plate; the proximal segment is about $1/2$ as long as the distal one, and provided with two setae on its distal outer angle; the distal segment

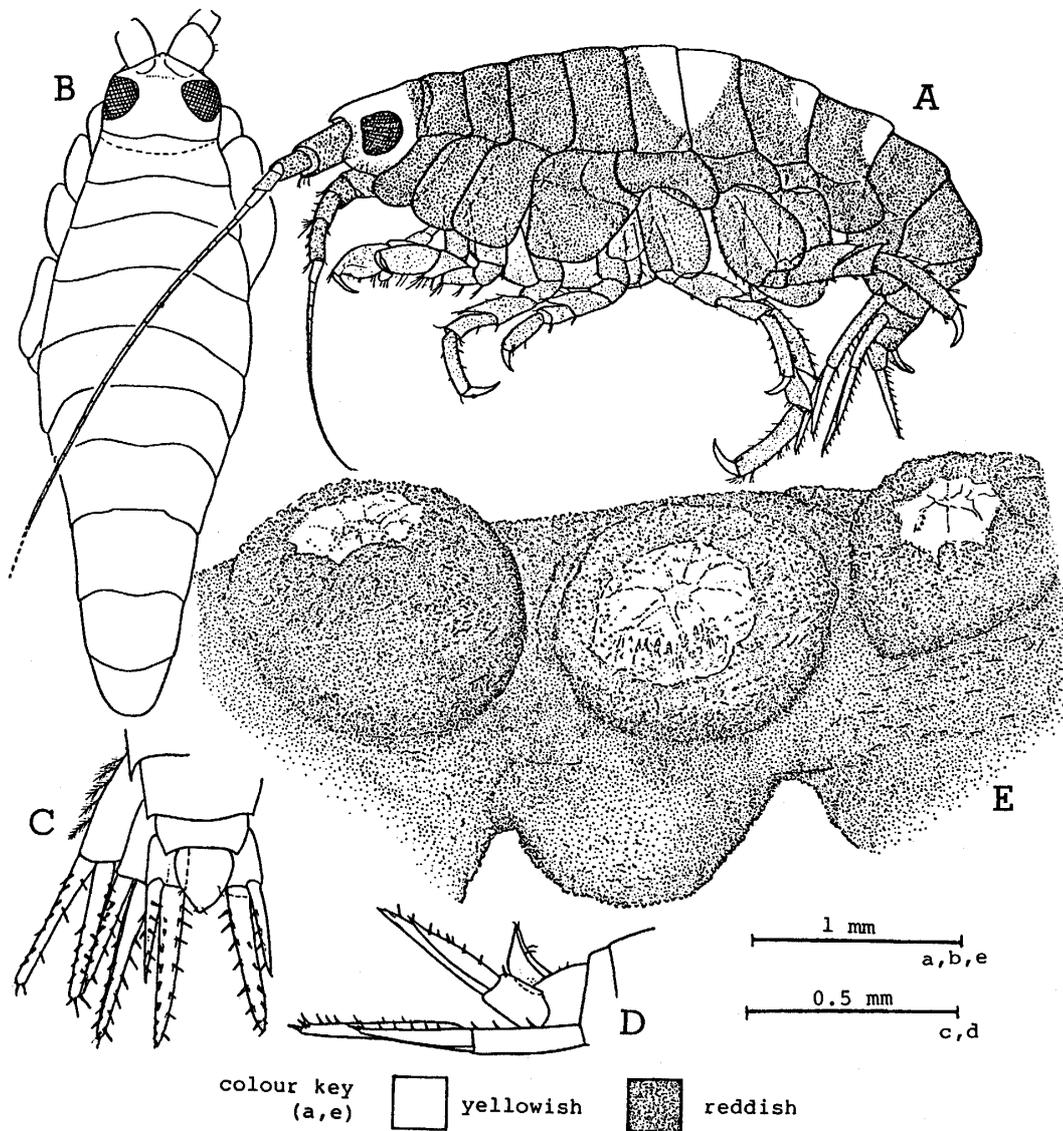


Fig. 3. *Pleusymtes symbiotica* sp. nov., paratype female with marsupium, 4.3 mm, carrying 9 embryos, from Manazuru. A: lateral view. B: dorsal view. C: urosome with telson and three pairs of uropods. D: last three urosomites with telson and last two uropods, lateral view. E: part of branch, with retracted polyps, of *M. flabellifera*.

has seven distal spines and an oblique row of lateral five spines.

The inner plate of maxilla (Fig. 4, C) is oval in shape, setose, and furnished with a plumose and eight bare setae on the distal or inner margin; the outer plate is rectangular in shape and bears about ten distal setae.

The inner plate of maxilliped (Fig. 4, F) is very short and small, armed with several setae, and its distal end is not reached the base of palp. The outer plate is setose, and its distal end barely reaches the distal inner angle of first segment of

palp. The palp is composed of four segments, each of them is setose on the inner margin; basal three segments are subequal in length, and successively narrowed distally; the fourth segment is falcate in shape and about as long as the third one; the surface of distal two segments are beset with several rows of fine setae.

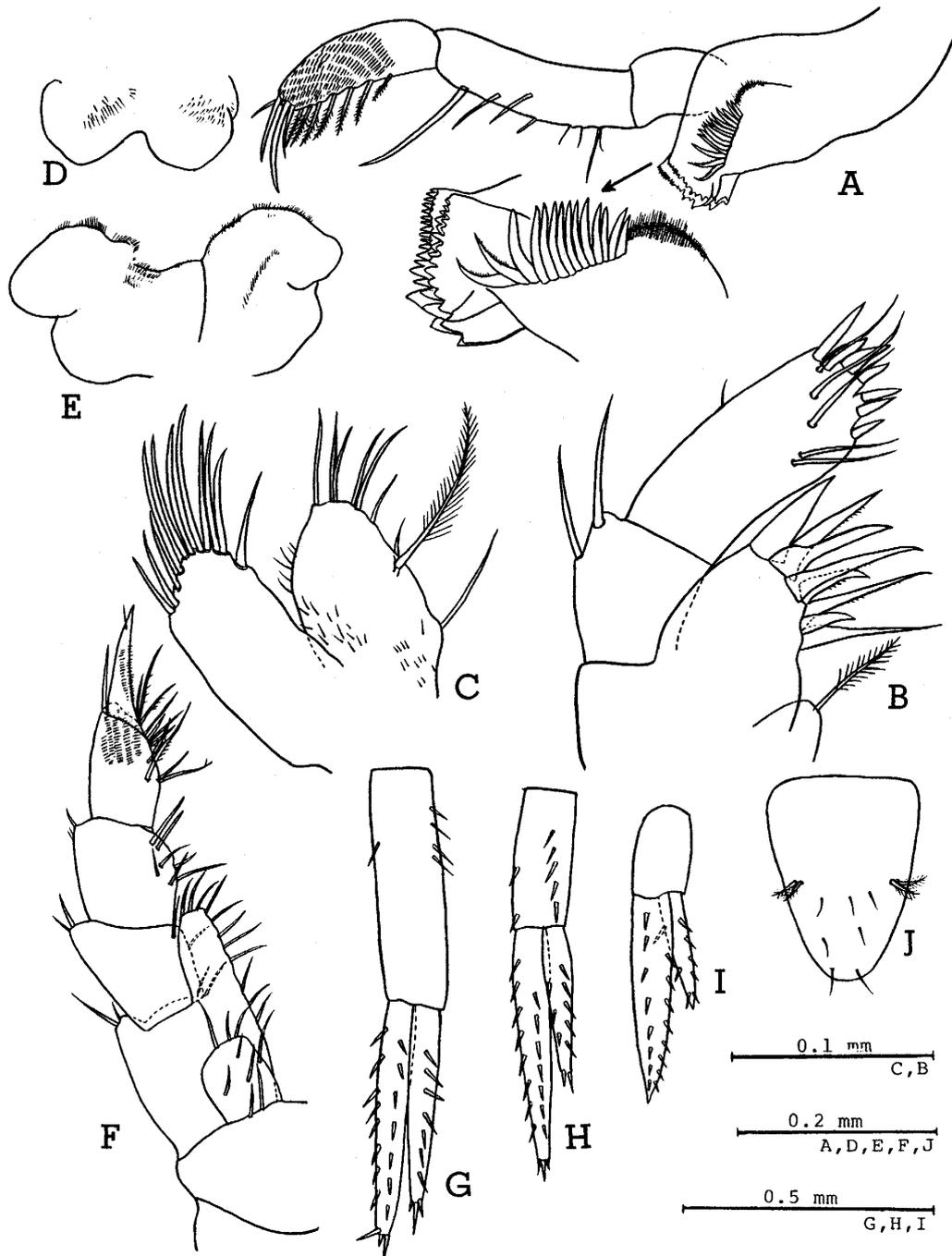


Fig. 4. *Pleusymtes symbiotica* sp. nov., paratype adult female, length 5.3 mm, from Nabeta-wan Inlet, Shimoda. A: mandible. B: maxillule. C: maxilla. D: labrum. E: labium. F: maxilliped. G-I: first (G) to third (I) uropode. J: telson.

The gnathopods are moderately large. The coxa of first gnathopod (Fig. 5, A) is rectangular in shape, a little smaller than the second coxa, and its lower margin is rounded and furnished with marginal fine setae. The basis is about as long as the carpus and propodus combined, and provided with a row of setae in the anterior margin. The ischium is short, about $1/4$ length of the basis, and much shorter than the merus. The merus is rounded distally and beset with a tuft of setae on the round distal margin. The carpus is somewhat triangular in shape, about $3/4$ of the combined length of ischium and merus, and provided with a tuft of setae on the rounded posterior distal angle. The propodus is oval in shape, as long as the ischium and merus combined, and furnished with unequal setae and several spinules on the palm, which is moderately convex. The dactylus is falcate, about $2/3$ as long as the palm.

The second gnathopod (Fig. 5, B) is a slightly longer than the first gnathopod. The basis is very long, cylindrical in shape, and nearly as long as the following four segments together, and beset with a row of fine setae on the anterior and posterior margins. The ischium is very short, $1/5$ as long as the basis. The merus is about $1\ 1/3$ times as long as the ischium, and beset with a tuft of setae on the posterior distal angle. The carpus is triangular in shape, about $3/4$ as long as the ischium and merus together, and its posterior distal portion is rounded and beset with a tuft of setae. The propodus is somewhat spindle-shaped; the palm is moderately convex, and beset with setae and spinules near the distal end. The dactylus is falcate, and nearly $3/4$ as long as the palm.

The peraeopods are somewhat robust. In general the third peraeopod is very similar to the fourth one (Fig. 4, C). The basis of fourth peraeopod is slender, nearly as long as the following three segments together, and about $1/3$ as wide as its length, and provided with setae on the anterior margin. The ischium is about $1/4$ as long as the basis. The merus is much more than twice as long as the ischium, and its posterior distal angle is acutely produced and nearly reaches about $1/3$ length of the carpus and provided with a spine at its apex. The carpus is about $3/4$ as long as the merus, and bears a spine on the posterior margin and setose or spinose on both distal angles. The propodus is $1\ 1/2$ times as long as the carpus, and setose or spinose on the lateral margins. The dactylus is falcate and a little more than $1/3$ as long as the propodus. The seventh peraeopod (Fig. 5, F) is very similar to the preceding two peraeopods in general appearance, but it is slightly shorter than the sixth (Fig. 5, E) and much longer than the fifth (Fig. 5, D). The basis of seventh peraeopod is a little less than the combined length of the ischium and merus, and broadly expanded, nearly as broad as its length; its posterior margin is distinctly serrated and setose. The ischium is very short and small, about

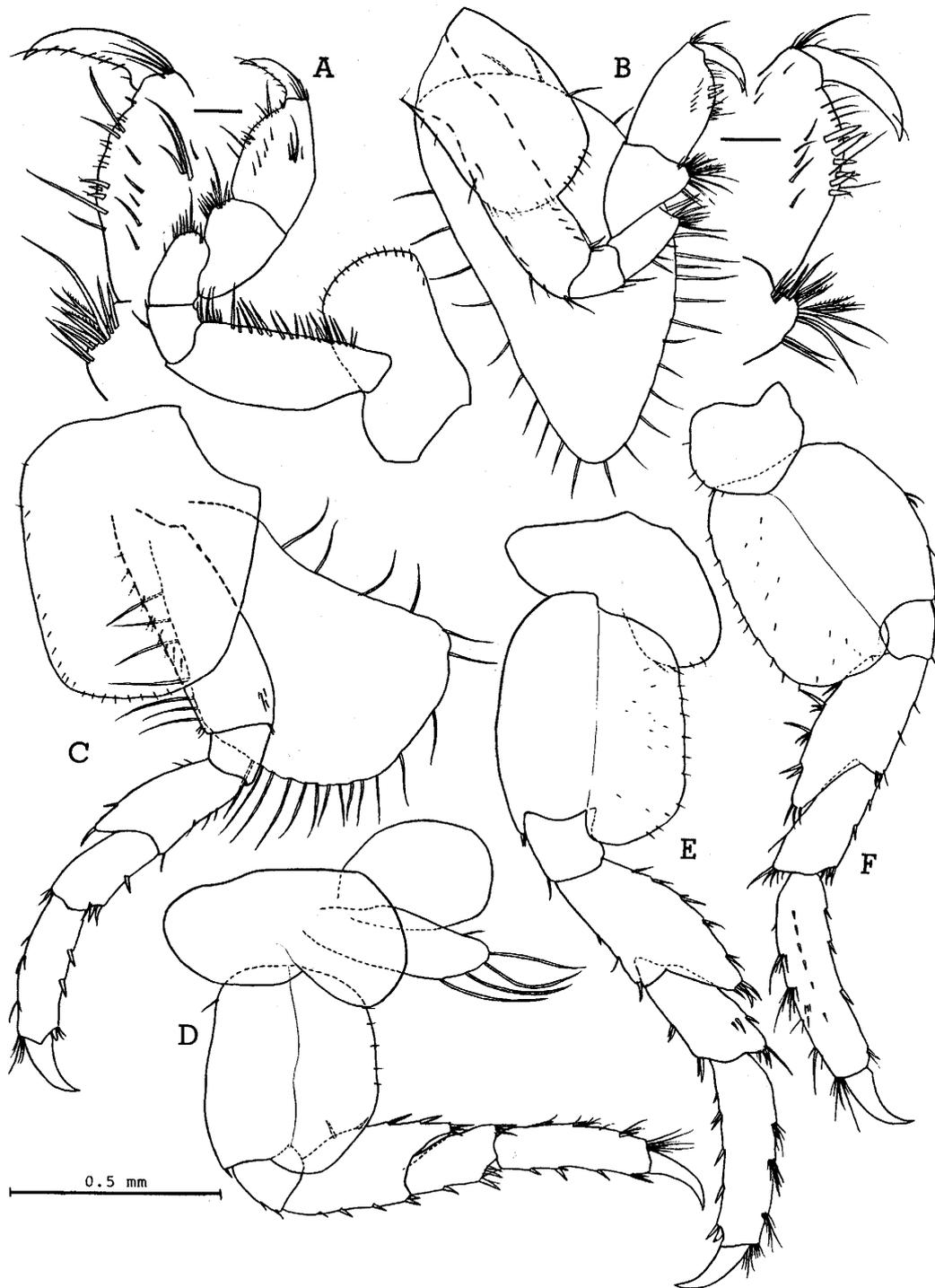


Fig. 5. *Pleusymtes symbiotica* sp. nov., paratype adult female, 5.3 mm, from Nabeta-wan Inlet, Shimoda. A: first gnathopod. B: second gnathopod. C-F: fourth (C) to seventh (F) pereopods.

1/3 as long as the merus. The merus is 1 1/2 times as long as the carpus and 1/2 as broad as its length; its posterior distal portion is acutely much produced distally, and reaches about half way of the posterior margin of carpus, and beset with three tufts of spinules on the posterior margin and tuft of spinules at its apex. The carpus is somewhat rectangular in shape, spinose on the margins and a tuft of spinules on its distal corners. The propodus is cylindrical in shape, moderately curved, and much shorter than the merus and carpus together, and bears four clumps of spines on the posterior margin, and four spinules on the anterior margin. The dactylus is robust, falcate and about 1/3 as long as the propodus.

The urosomites (Fig. 2, C, D) are free. The first urosomite is very large, about twice as long as the suequal last two urosomites combined.

The uropods (Fig. 2, C, D; Fig. 4, G-I) are biramous. The first uropod is the longest and nearly reaches the end of the last uropod; the peduncle is as long as the inner ramus, which is a little longer than the outer one; the rami are armed with two rows of spinules. The second uropod is nearly reaches the tip of the last uropod; the peduncle is a little shorter than the inner ramus, which is about 1 1/2 times as long as the outer ramus. The peduncle of the third uropod is 1/2 as long as the inner ramus, which is twice as long as the outer ramus. The rami are armed with spinules as in the first uropod.

The telson (Fig. 2, C, D; Fig. 3, C; Fig. 4, J) is triangular in shape with round apex, about as long as the peduncle of third uropod, and as measured at its base it is about 3/4 as broad as its length. There are a pair of setules near the apex and two pair of plumose setae in the middle portion of lateral margins.

The males are very similar to the females in general appearance, except that the body of males are smaller than that of the females.

Remarks. *P. symbiotica* sp. nov. is most allied to *P. japonica* (GURJANOVA, 1938) described from 6–62 m deep, north-western region of the Sea of Japan, but the former is distinguished from the latter by that the inner plate of maxilliped of the former is very short and small and not reached the base of palp and the telson bears a pair of distal setae and a pair of two plumose lateral setae. The new species is well characterized that this species is associated with a Japanese gorgonacean, *Melithaea flabellifera* (KÜKENTHAL). In the genus *Pleusymtes* there have been described eighteen species from littoral to abyssal depths in the arctic boreal waters. All the previously described species may be free living and none of the ectosymbiotic species, especially associated with gorgonacean, *Melithaea flabellifera*, has been known.

摘 要

相模湾産のイソバナ *Melithaea flabellifera* (KÜKENTHAL) (花虫綱, ヤギ目, イソバナ科) に共生するヨコエビの新種 *Pleusymtes symbiotica* sp. nov. (甲殻綱, 端脚目, テングヨコエビ科) について

LOWRY (1984) は Papua New guinea の Bootless 湾, 珊瑚海から, 当地産のイソバナの一種 *Melithaea* sp. に共生するヨコエビの一種 *Maxillipius commensalis* (Maxillipiidea 科) を記載した。 *Maxillipius* 属は, LEDOYER (1973) によって Madagascar 島北部の浅海の藻場から得られた標本に基づき新種 *M. rectitelson* として記載され, この種を模式種として創設された属と科である。上記の2種類が属するが, *M. rectitelson* は自由生活を営んでいる。

筆者等は相模湾産のイソバナ *Melithaea flabellifera* (KÜKENTHAL) の枝上に共生しているヨコエビの一種がいることを知り, このヨコエビについて調べた結果, テングヨコエビ科 Plustidae の *Pleusymtes* 属のものであることがわかった。本種の体色はイソバナに極めてよく似ている (*M. commensalis* も同様であるという)。本種は *Pleusymtes* の未記録種であり, ここに新種 *Pleusymtes symbiotica* として記載する。本属には18種が北半球のおもに北極を取り囲む冷水域の0-200 m 深から知られている (BARNARD and KARAMAN, 1991)。日本からは ISHIMARU (1985) によって北海道沿岸から3種と1亜種が記載されている。 *Pleusymtes* 属には本新種以外にイソバナなどと共生する種類は知られていない。

References

- BARNARD, J. R., and R. R. GIVEN, 1960. Common pleustid amphipods of southern California with a projected revision of the family. *Pacific Naturalist*, **1**: 37-48.
- BARNARD, J. L., and G. S. KARAMAN, 1991. The families and genera of marine gammaridean Amphipoda (except marine gammaroids). Part 2., *Rec. Austr. Mus.*, Suppl. **13**, (Part 2): 419-866.
- GAMÔ, S., and Y. SHINPO, 1992. Some observations on mimicry of a gammaridean amphipod, *Pleusymtes* sp. (Amphipoda, Gammaridea, Pleustidae) associated with a gorgonacean octocoral, *Melithaea flabellifera* (KÜKENTHAL) (Gorgonacea, Scleraxonia, Melithoidae) from Sagami Bay. *Manazuru mar. Lab. sci. Educ.*, Fac. Educ. Yokohama Natl. Univ. (8): 29-38. (In Japanese with English summary)
- GURJANVA, E., 1951. *Bokoblvny morei SSSR i sopredel'nykh vod* (Amphipoda, Gammaridea) *Opred po Faune SSSR. Nauk SSSR.*, **41**: 1-1029.
- ISHIMARU, S., 1985. Taxonomic studies on the family Pleustidae (Crustacea, Amphipoda, Gammaridea) from costal waters of northern Japan. *J. Fac. Sci. Hokkaido Univ. (Zool.)*, **24**: 43-69.
- LEDOYER, M., 1973. Amphipodes gammariens de la frondation des herbiers d' *Enhalus* de la région de Nosy-Bé (Madagascar). *Tethys*, (Suppl.), **5**: 25-36.
- LINCOLN, R. J., 1979. British marine Amphipoda: Gammaridea. *British Mus. (Nat. Hist.)*, **1**: vi + 657 pp.

- LOWRY, T. K., 1984. *Maxillipius commensalis*, a second species of the family Maxillipiidae from Papua New Guinea (Amphipoda, Gammaridea). *Crustaceana*, **46**: 195-201.
- SARS, G. O., 1895. Amphipoda. An account of the Crustacea of Norway with short descriptions and figures of all the species. **1**: vii + 711pp., 240+8pls.
- STEBBING, T. R. R., 1909. Amphipoda I. Gammaridea. Tierreich, Berlin, (21): xxix + 806pp.
- UTINIMI, H, 1967. Coloured illustrations of sheashore animals of Japan. Hoikusha, Osaka. xviii + xii + 168pp., 64pls. (In Japanese).