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OF THE GENUS *PONTOPHILUS* FROM JAPANESE
WATERS

(CRUSTACEA, DECAPODA, CRANGONIDAE)¹⁾

By

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(Zoological Laboratory, Faculty of Agriculture, Kyushu University, Fukuoka)

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The genus *Pontophilus* LEACH, 1817 is represented by the largest number of the species among Crangonidae, and nowadays at least twenty species occur in the Indo-West Pacific region. However, it is only four species that have been made known from Japanese waters: *P. bidentatus* (DE HAAN, 1844), *P. incisus* KEMP, 1916, *P. japonicus* DOFLEIN, 1902 and *P. sp.* The last species was recently recorded from the East China Sea by FUJINO and MIYAKE in 1970. It is therefore of interest to add hereupon two new species, *P. dimorphus* and *P. vestigialis*, to the meagre knowledge of this genus from Japan. The former species is established on the material of the collection of the decapod crustaceans, made in Sagami Bay by His Majesty the Emperor of Japan. This species is characterized by having four median dorsal spines on the carapace and by the sexual dimorphism in the form of the antennular flagella. In the latter species the type locality is Kagoshima Bay, Kagoshima Prefecture, and this form, as the specific trivial shows, bears the diagnostic vestigial carinae running laterally on the carapace.

The type specimens of *P. dimorphus* will be deposited in the Biological Laboratory of the Imperial Household, while those of *P. vestigialis* are preserved in the collection of the Zoological Laboratory of Kyushu University.

It is most pleased to express the authors' cordial thanks to the staffs of the Biological Laboratory, Imperial Household and Mr. Y. USHIO of Kagoshima University, who kindly placed the interesting materials to the authors' disposal for examination. The authors' grateful thanks are also due to Dr. J. C. YALDWYN of Dominion Museum, New Zealand for his helpful information on the New Zealand species.

1) Contributions from the Zoological Laboratory, Faculty of Agriculture, Kyushu University, No. 433.

Genus **Pontophilus** LEACH, 1817**Pontophilus dimorphus** sp. nov.

(Figs. 1, 2)

Description of holotype (ovigerous female). A relatively stumpy form with four striking median dorsal spines on the carapace and the partly sculptured abdomen.

The rostrum is short, truncate and constricted in the middle, reaching the anterior margin of the eyepeduncle. The rostrum is distinctly channeled dorsally.

The carapace is almost smooth save for sporadically set plumose hairs. The anterior margin of the carapace bears a triangular suborbital and a strong branchiostegal spine. There are four strong median dorsal spines; the foremost spine is at the anterior third of the carapace and directed slightly upwards; the second spine is feebly weaker than the third and situated halfway between the first and the third spines; the fourth spine is the smallest and a little more separated from the third than the second is from the third. Laterally, at the level of the suborbital spine, a strong spine stands slightly before the second median dorsal spine. Feebly ventral to this spine there is a row of three spines: the anterior two are very small and close to each other, and the other is large and much separated from the anterior two, with a defined carina. The hepatic spine is very strong, being followed by a much smaller spine in about the middle of the carapace. Posterior to the branchiostegal spine a small spine lies at a similar level. A fine stria originating from the anterior margin of the carapace, below the suborbital spine, runs as far backward as the middle of the carapace in a nearly straight line.

The thoracic sterna are entirely smooth with a short median frontal process.

The abdomen is glabrous except for the rather obscure irregular sculptures on the pleura of the first five abdominal somites. The ventral margin of each pleuron is broadly rounded or truncated and no spine or projection is present. On the first somite is visible a rather conspicuous longitudinal carina which fails to extend to the posterior margin. The sixth abdominal somite is long and cylindrical, measuring about twice as long as the fifth.

The telson is elongate, slender and dorsally sulcate, weakly attenuating posteriorly to a pointed projection which is provided with three slender spines on either side; the outer spine is very short, the others long and subequal. Dorsolaterally are present two pairs of small spines dividing the length of the telson equally.

The cornea is globular. The eyepeduncle is short and stout with a distinct tubercular process at the anterior inner corner.

The basal segment of the antennular peduncle is broad with anterolaterally a prominent process which extends to the level of the middle of the second segment. The stylocerite is of a broad lobe ending externally in a larger and internally a smaller tooth; the anterior margin between these teeth is nearly straight. The distal two

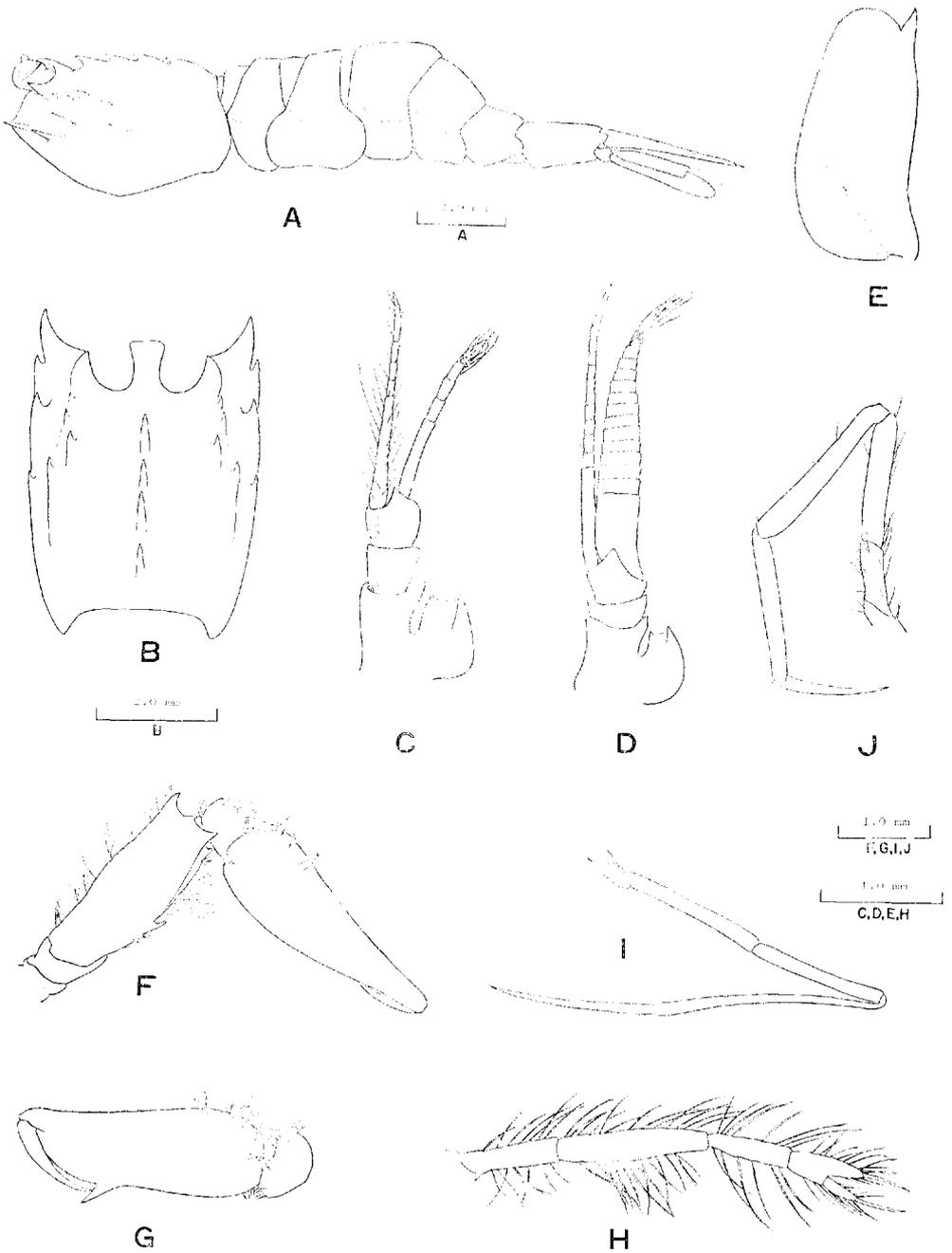


Fig. 1. *Pontophilus dimorphus* sp. nov., A-C, E-J: holotype, ovigerous female; D: paratype, male. A. entire animal in lateral view; B. carapace in dorsal view; C, D. antennula; E. antennal scale; F. first pereopod in lateral view; G. first pereopod in dorsal view; H. second pereopod; I. third pereopod; J. fourth pereopod.

segments are subequal in both length and breadth. The upper antennular flagellum is slender, cylindrical and jointed for five segments; the basal segment is long and as long as the rest segments combined. The lower flagellum is longer than the outer, consisting of a basal long and six short and subequal segments. Long and short fine setae are dispersed on all the segments.

The basicerite of the antennal peduncle terminates in a small tooth laterally. The antennal scale is broad, slightly more than twice as long as its maximum breadth. The lateral margin is sinuous with terminally a well-defined tooth which feebly exceeds the anterior margin of the lamella of a round form.

The branchial formula is tabulated below.

	I	II	III	IV	V	VI	VII	VIII
Pleurobranchs	-	-	1	1	1	1	1	1
Arthrobranchs	-	-	1	-	-	-	-	-
Podobranchs	-	-	-	-	-	-	-	-
Epipods	1	1	r	-	-	-	-	-
Exopods	1	1	1	-	-	-	-	-

(r : rudimental)

The mouthparts are typical of the genus. The mandible is of only a molar process narrow and separated into two strong prominent processes distally. The upper lacinia of the maxillula is broad and crooked with several long spines and setae; the lower lacinia is small and setose distally; the palp is narrow and slightly curved with an apical spine. The vestigial endite of the maxilla is present; the palp is distinct. The first maxilliped is made up of the well-developed triangular epipod, the exopod with the narrow caridean lobe, and the slender palp. The ultimate segment of the second maxilliped is very short and obliquely coalesced with the penultimate segment, with a sheet of coarse plumose setae distally; the well-developed epipod is devoid of the podobranch. The third maxilliped overreaches the end of the antennal scale by the length of the ultimate segment; the ultimate segment is slightly longer than the penultimate, both the segments being furnished with long spinules and coarse setae; the antepenultimate segment is about twice as long as penultimate; a small truncate epipod is present.

The first pereopods overreach the end of the antennal scale by the length of half the chela. The chela is broad, somewhat less than three times as long as the maximum breadth, becoming feebly narrower distally. The dactylus is strong and gently curved. The subchelar spine is stout, pointed and not articulated. The carpus is short with two spines anteriorly, a smaller outer and a larger ventral. The merus is shorter than the chela, being armed anteriorly with two strong spines, the one dorsally and the other ventrally, and a minute spine is visible between them; ventrally is present a well-defined spine in about the middle. The ischium and the basis are very short and

unarmed. Soft plumose hairs lie on the upper surface of the carpus and the upper and the lower borders of the merus. No exopod is present.

The second pereiopods are slender and short, surpassing the end of the merus of the first pereiopod by the length of the chela. Both the movable and the immovable fingers are subequal in length and breadth, each having a long, sharply pointed

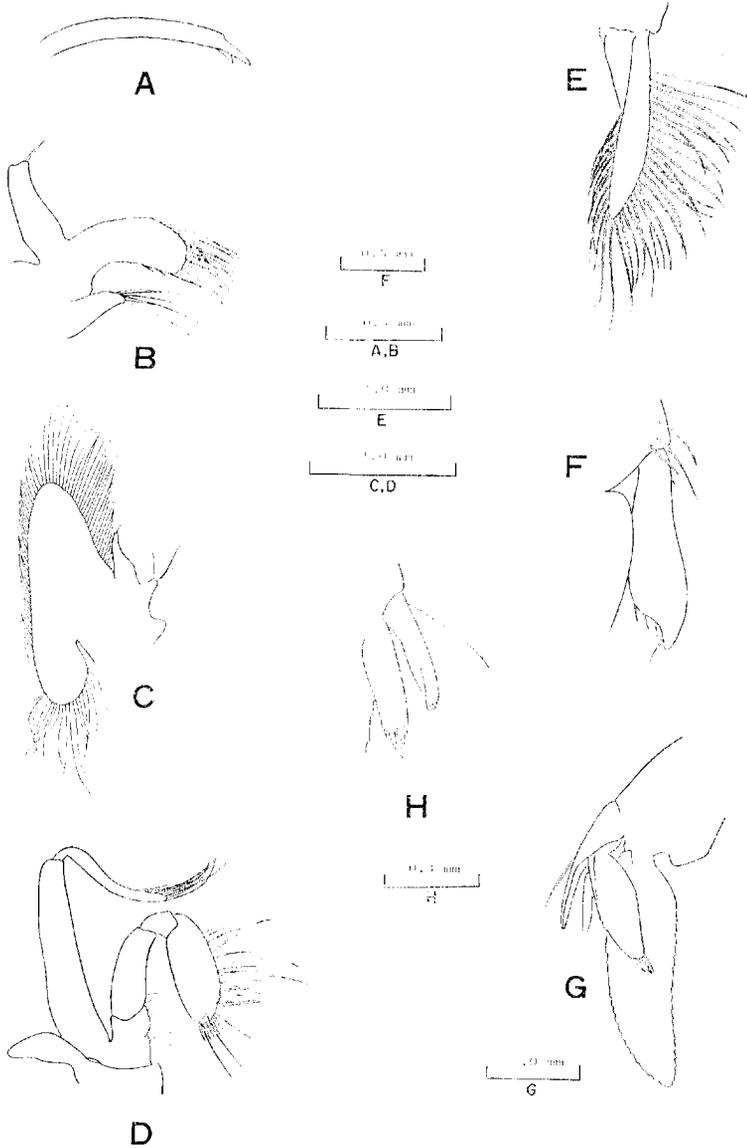


Fig. 2. *Pontophilus dimorphus* sp. nov., A-E: holotype, ovigerous female; F-H: paratype, male. A: mandible; B: maxillula; C: maxilla; D: second maxilliped; E, F: endopod of first pleopod; G: second pleopod; H: appendix masculina and appendix interna.

terminal spine. The palmar portion is as long as the fingers excepting the spines; coarse setae or bristles are present there. The carpus is longer than the chela. The merus is distinctly more than one and a half the length of the carpus. The ischium is longer than the carpus. These segments are all provided with long, plumose hairs dorsally and ventrally.

The third pereopods are extremely slender and long, reaching with the dactylus and the propodus together beyond the branchiostegal spine. The propodus is distinctly longer than the dactylus. The carpus is slightly longer than half the propodus. The ischium is longer than the carpus.

The last two pereopods are stout. The fourth pereopods are shorter than the fifth. The dactylus is slender and acutely pointed, two-thirds the length of the propodus. The propodus is subequal to the carpus in length.

The endopods of the pleopods are well developed without the appendix interna.

The ova, after preservation, are rather large and measure 0.5×0.6 mm in the longest diameter.

Description of paratype (male). The male is of a smaller size than the ovigerous female (holotype), and more slender and calcified. The rostrum is more erected and reaches as far forward as the anterior margin of the cornea. The ventral margin of the fourth and the fifth abdominal pleura is rounded, while that in the ovigerous female is straight or slightly concave. The papilla on the cornea is less distinct than in the ovigerous female. The male is apparently different from the ovigerous female in the form and size of the upper and the lower antennular flagella; the upper flagellum is stout, compressed and very broad, far overreaching the anterior margin of the antennal scale; it consists of thirteen broad and short segments and a basal long one. The lower flagellum is slender and somewhat longer than the upper flagellum; it is made up of a long basal and fourteen similar short segments, each of which is with a few short hairs at the base. The thoracic sterna are armed with a vestigial frontal projection and three median, crest-like processes which are anteriorly pointed and rather similar to each other in shape, the foremost one arising at the base of the third pereopod. The abdominal sterna bear in the median line with a small spinous projection at the base of each pleopod. The endopods of all the pleopods are well developed. In the first pleopod the endopod is hairless and flipper-shaped with the tip obtusely pointed, extending to the proximal third point of the exopod. The appendix masculina of the second pleopod is stout and flattish with the apex fringed with short setae, surpassing the middle of the endopod; the appendix interna is rather broad and naked without any hairs and setae, a little shorter than the appendix masculina. The other pleopods bear the developed appendix interna.

Measurements (mm).

	♂	ovig. ♀ (holotype)
Body length	15.3	18.3
Carapace length	3.2	4.0
Telson length	2.8	3.5
Length of antennal scale	2.0	2.1
Length of chela of first pereiopod	2.3	3.0

Material examined. Sagami Bay: Amadai-ba, Maruyama-dashi, 80 m, Jul. 21, 1952-1 ovig. ♀ (holotype), BLIH No. 698; 1 mile southwest off Joga-shima I., 75 m. Jun. 13, 1959 -1 ♂ (paratype), BLIH No. 1563.

Remarks. The present species may be easily distinguished from any other known species of this genus by having four distinct median dorsal spines on the carapace. DE MAN (1920) gave the extensive key for *Pontophilus* known up to that time, in which the species belonging to the group with the outer margin of the antennal scale not toothed, and the first four abdominal somites being dorsally smooth were conveniently separated into four groups according to the number of the median dorsal spines which vary from none to three. In 1958 RICHARDSON and YALDWIN recorded a new but unnamed species of this genus from North Auckland. Very recently YALDWIN (1971) made a preliminary description of this species with the name, *P. quadrispinosus*. This form like the present species bears four spines dorsally, but the separation between these species is rather easy in the form of the rostrum and the antennal scale, in the spinulation of the carapace, in the shape of the posterior margin of the fifth abdominal somite, and in the presence or absence of the sculpture on the first three abdominal somites and of the ventral spine of the merus of the first pereiopod.

Remarkable for the present species is the antennular flagella which are conspicuously dimorphic in sexes. As noted in the description, male has the upper flagellum consisting of many very broad and short segments. While, in female the upper flagellum is slender, cylindrical and made up of only four joints. Such a difference between both sexes has hardly been known in crangonids.

***Pontophilus vestigialis* sp. nov.**

(Figs. 3, 4)

Description of holotype (ovigerous female). The rostrum is short and broad, the obtusely pointed apex reaching the anterior border of the eyepeduncle. It dorsally is hollowed longitudinally.

The carapace is broad and depressed. Mid-dorsally is present a single spine located at the anterior quarter, which is followed by a carina. This carina is ill-defined in the middle of the carapace, and becomes abruptly higher at about the proximal third, disappearing posteriorly. There is a pair of lateral short and divergent carinae which are anteriorly notched at about the similar level with the median dorsal spine.

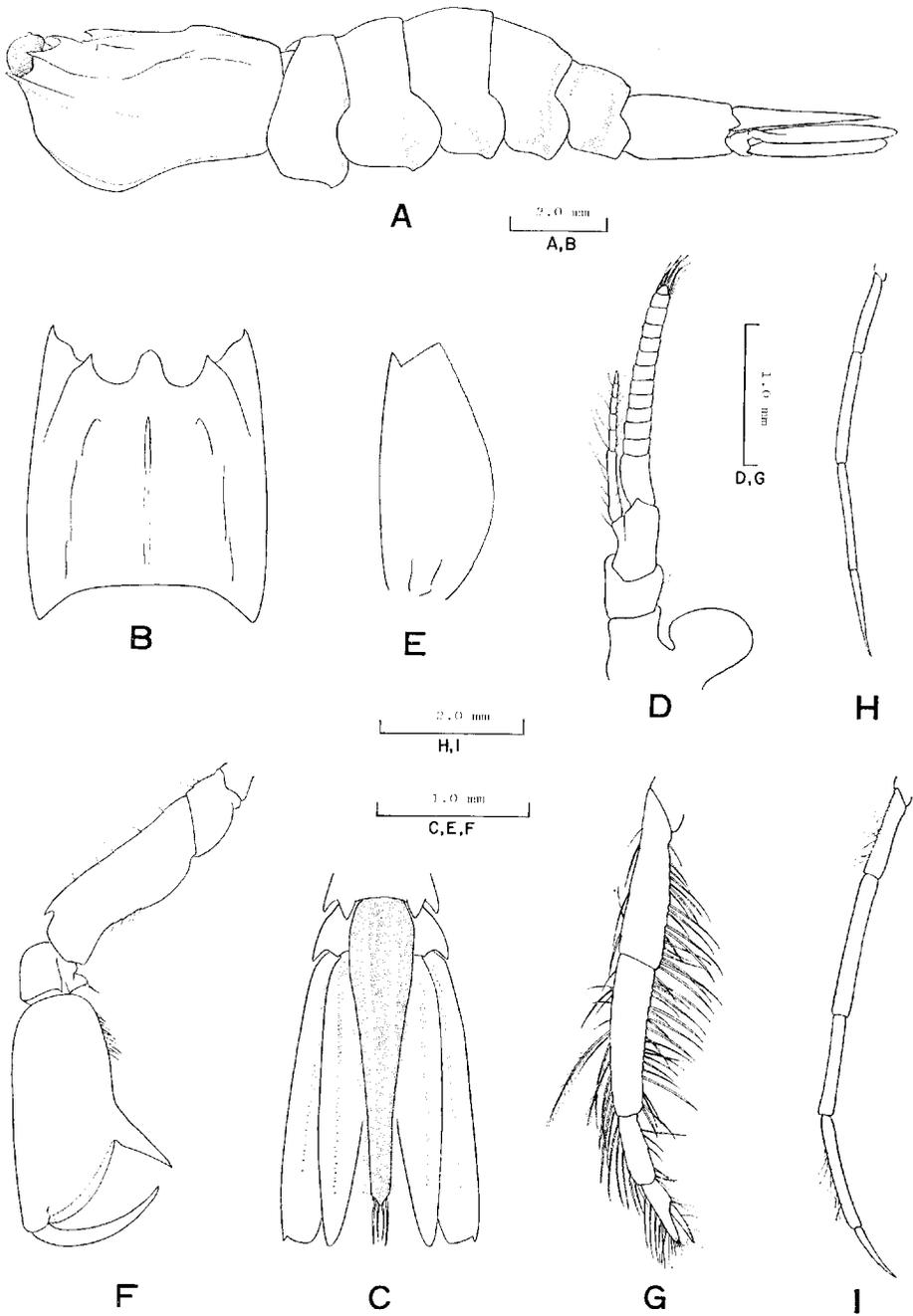


Fig. 3. *Pontophilus vestigialis* sp. nov., paratype, ovigerous female. A. entire animal in lateral view; B. carapace in dorsal view; C. telson and uropods; D. antennula; E. antennal scale; F. first pereopod; G. second pereopod; H. third pereopod; I. fourth pereopod.

Posterior to and at the slightly lower level than the above-mentioned carina is visible an obscure trace of interrupting carina running from the middle. The suborbital and branchiostegal spines are distinct and from each spine a defined carina runs backwards.

The thoracic sternia are entire with a very strong projection frontally.

The abdominal somites are finely rugged with obscure depressions and grooves ventrally. The pleuron of each somite is bluntly pointed posteroventrally. The third to the fifth somites are carinated dorsally; the carina on the third somite is ill-defined and restricted posteriorly. The sixth somite is less than one and a half the length of the fifth.

The telson is slender and elongate, longer than the sixth abdominal somite. It dorsally is somewhat sulcated and no spine is present. The pointed terminal projection bears three pairs of spines, the outer minute and the inner two subequal and long.

The cornea is globular. The cyepeduncle is short and stout with a small papilla anteriorly.

The basal segment of the antennular peduncle is with the broadly expanded and round stylocerite, the anterior margin of which is smooth and semicircular. The second segment is shorter and broader than the third. The upper antennular flagellum is flattened and jointed for thirteen segments, the basal one of which is the longest. The lower flagellum is much shorter and slender than the upper, made up of a basal long and five distal subequal jointis, with fine setae on their surface.

The basicerite of the antennal peduncle is short and bears no spine laterally. The antennal scale almost reaches the level of the tip of the upper antennular flagellum. It is broad and more than twice as long as the maximum breadth. The lateral margin is gently convex with terminally a prominent tooth. The end of the lamella is acutely angled and slightly overreaches the end of the lateral tooth.

The branchial formula is shown below.

	I	II	III	IV	V	VI	VII	VIII
Pleurobranchs	-	-	1	1	1	1	1	1
Arthrobranchs	-	-	-	-	-	-	-	-
Podobranchs	-	-	-	-	-	-	-	-
Epipods	1	1	r	-	-	-	-	-
Exopods	1	1	1	-	-	-	-	-

(r : rudimental)

The mouthparts are typical of the genus. The mandible is of a strong molar process with three blunt projections distally. The upper lacinia of the maxillula is broad and marginally setose and spinous; the lower lacinia is also rather broad and foliaceous with long marginal setae; the palp is truncated with a long terminal spine. The endite of the maxilla is vestigial and remains only as a small process; the

scaphognathite is normal with very long hairs proximally. The first maxilliped has an extremely broadened triangular epipod, the long and slender palp and the developed exopod with the narrow caridean lobe. The podobranch is absent from the second maxilliped. The third maxilliped outreaches the antennal scale; the ultimate segment is flat and twice as long as the penultimate; the epipod is small, rigid and rectangular; a small arthrobranch is present, but no pleurobranch.

The first pereopods exceed the end of the antennal scale by the length of half the chela. The chela is broad and somewhat more than twice as long as the maximum breadth, becoming feebly broader distally. The dactylus is strong and gently curved. The subchelar spine is large, strong and not articulated with the sharply pointed top. The carpus is short with a small spine at the outer antero-ventral corner. The anterior margin of the merus is armed with a prominent subterminal spine; ventrally is smooth without any spines or tubercles. The ischium is stout and very short. No exopod is present.

The second pereopods are short, extending nearly to the tip of the branchiostegal spine. The chela is small. The movable finger is narrower and longer than the immovable one, both lacking the terminal spine. The palmar portion is slender and shorter than the fingers. The carpus is cylindrical and as long as the chela. The merus and the ischium are much stronger than the distal segments, the former more or less shorter than the latter. Each segment of this pereopod is provided with long, coarse setae simple or plumose.

The third pereopods are slender and long, attaining the end of the antennal scale. The propodus is longer than the dactylus. The carpus is slightly longer and stouter than the propodus. The ischium is subequal to the dactylus in length. The fourth pereopods reach with the dactylus beyond the end of the antennal scale. The dactylus is rather short with the acutely pointed tip. The propodus is more than one and a half the length of the dactylus, a trifle shorter than the merus. The fifth pereopods resemble the fourth, but the proportional length of the carpus is larger than in the fourth.

The endopods of the pleopods are relatively well developed. The endopod of the first pleopod is slender with long and plumose setae marginally. No appendix interna is present on the pleopods.

The ova measure 0.4×0.5 mm in the longest diameter.

Description of paratypes. The paratypes (one male and three ovigerous females) are closely similar to the holotype. The male is somewhat smaller than the ovigerous female. The endopods of the pleopods of the male are comparatively well developed. The endopod of the first pleopod is slender, long and naked without hairs, the bluntly pointed top reaching as far as the middle of the exopod. The endopods of the following pleopods are also narrow and hairy marginally, without the appendix interna

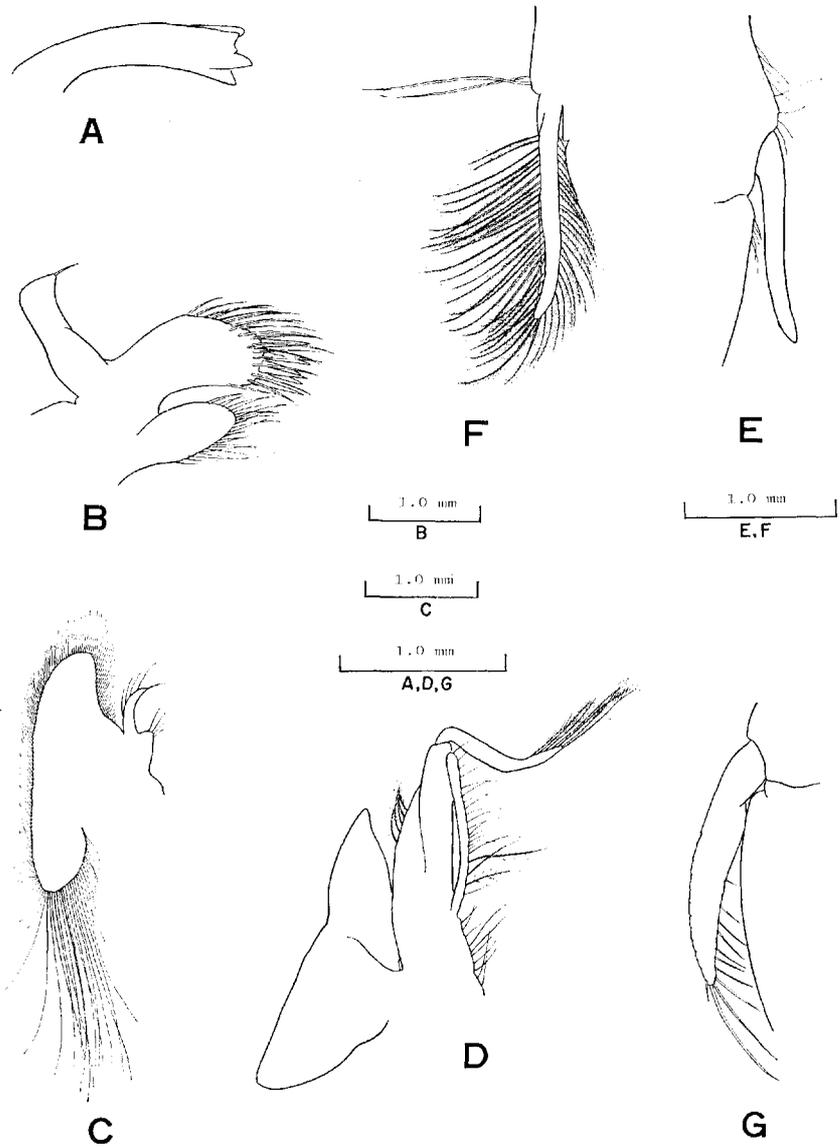


Fig. 4. *Pontophilus vestigialis* sp. nov., A-D, F : paratype, male; E, G : paratype, ovigerous female. A. mandible; B. maxillula; C. maxilla; D. first maxilliped; E, F. first pleopod; G. second pleopod.

and masculina. The second to the fifth thoracic sternites of the male bear four compressed, oblong and anteriorly pointed processes in the median line; the frontal process is large and strong, reaching beyond the base of the third maxilliped. On each abdominal sternite of the male there is a strong spinous projection, and in the first three of them the tips are crooked anteriorly. It is observed that the carina

posterior to the median dorsal spine on the carapace is more or less variable in development among individuals.

Measurements (mm).

	ovig. ♀ (holotype)
Body length	29.5
Carapace length	5.0
Telson length	3.5
Length of antennal scale	2.6
Length of chela of first pereiopod	2.5

Material examined. Kagoshima Bay, Kagoshima Pref., May 28, 1969, Y. USHIO leg. —1 ovig. ♀ (holotype), ZLKU No. 17239; 1 ♂, 3 ovig. ♀♀ (paratypes), ZLKU No. 17240.

Remarks. The general affinity of the present species is found in the Indian species, *Pontophilus bidentatus* (DE HAAN) and *P. sabsechota* KEMP. These three species have the common characters in the last three abdominal somites which are carinated dorsally, in a frontal spine on the median dorsal carina of the carapace, and in a pair of notches on the first lateral carinae. In addition to the above-mentioned characters, *P. bidentatus* shows curious resemblance to the present species in that the telson lacks spines dorsally, and that the merus of the first pereiopod bears a well-defined subterminal tooth dorsally. However, the distinction between them is found in the features enumerated below.

1. The rostrum is bluntly pointed in *P. vestigialis*, whereas it usually is nearly truncated distally in *P. bidentatus*.

2. The carination on the carapace is much more distinct in *P. bidentatus* than in the present species. The median dorsal carina in *P. bidentatus* is high and suddenly arises behind the middle as a crest-like lamella, and the frontal spine is stronger than that of the present species. In *P. bidentatus* the first lateral carina is halved by a narrow furrow into the anterior shorter and lower and the posterior longer and higher portion; the former carina terminates frontally in a distinct spine and the latter notched anteriorly. On the contrary, in *P. vestigialis* the first carina is ill-defined and rather vestigial, which is notched frontally and followed by the trace of discontinuous carina posteriorly. The second and the third carinae in *P. vestigialis* disappear before the middle of the carapace, but they continue as far backwards as the posterior margin of the carapace in *P. bidentatus*.

3. The dorsal carinae on all the abdominal somites but the sixth one is high and lamellar in *P. bidentatus*, but the carination is restricted to the third to the fifth abdominal somites and rather reduced in *P. vestigialis*.

4. The lamella of the antennal scale is much more acutely pointed and the lateral margin is concave in *P. bidentatus*, while it is convex in *P. vestigialis*.

5. The dactyli of the last two pereiopods are distinctly broader and shorter in

P. vestigialis than in *P. bidentatus*.

In the second species, *P. sabsechota*, the second lateral carina on the carapace bears two spines whereas in the present species no spine is detected there. The form of the rostrum, the spinulation of the telson, and the shape of the antennal scale are apparently different from each other.

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