

NOTES ON SOME INDO-PACIFIC PONTONIINAE. XXII.
PLIOPONTONIA FURTIVA GEN. NOV., SP. NOV., A NEW SHRIMP
ASSOCIATED WITH A CORALLIMORPH ZOANTHARIAN

BY

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Although several shrimps of the subfamily Pontoniinae Kingsley, 1878, have already been reported in association with various sea anemones, all so far described have been found to belong to the genus *Periclimenes* Costa, 1844. During the course of collection of shallow water shrimps from the coastal waters of Kenya, a single specimen of shrimp was obtained from a mat-like bed of small brown anemone-like coelenterates. Study of this shrimp indicated that it could not be referred to any known genus. Identification of the host showed that it belonged to the zoantharian order Corallimorpha. A new genus is now described to include this species, which is the first pontoniinid genus found to be associated with the order Corallimorpha.

Pliopontonia gen. nov.

Definition. — A small sized commensal pontoniinid shrimp associated with corallimorph zoantharians. Body rather squat, flattened ventrally. Rostrum short, feebly developed with dorsal teeth; ventral teeth absent. Carapace smooth, orbit feebly developed, inferior orbital angle produced; antennal spine well developed; hepatic and supra-orbital spines absent: antero-lateral angle produced. Abdomen smooth; third segment not dorsally produced; pleura with rounded margins. Telson narrow, with two pairs of small dorsal spines and three pairs of posterior spines. Eyes normal, small, with globular cornea. Antennule normal; basal segment broad with acute stylocerite; intermediate and distal segments short; lower flagellum short, filiform; upper flagellum short, biramous with rami fused proximally. Antenna with basicerite unarmed, carpocerite long, flagellum well developed. Scaphocerite broad with small disto-lateral spine. Epistome unarmed. Mandible slender, without palp; molar process slender with small teeth and tessellate grinding surface; incisor process broad. Maxillula with bilobed palp; upper lacinia slender. Maxilla with slender palp, endites absent, elongated scaphognathite. All maxillipeds with fully developed exopods. First maxilliped with slender non-setose palp, large caridean lobe and triangular epipod. Second

maxilliped normal, epipod subrectangular without podobranch. Third maxilliped stout, with rounded epipod and rudimentary arthrobranch. First pereiopods slender, fingers of chela simple, cutting edges entire; coxae with small median process. Second pereiopods feeble, subequal, similar. Ambulatory pereiopods stout, with strong hamate dactylus. Fourth thoracic sternite unarmed. Pleopods normal. Uropods normal, with small disto-lateral spine.

Type species. — *Pliopontonia furtiva* sp. nov.

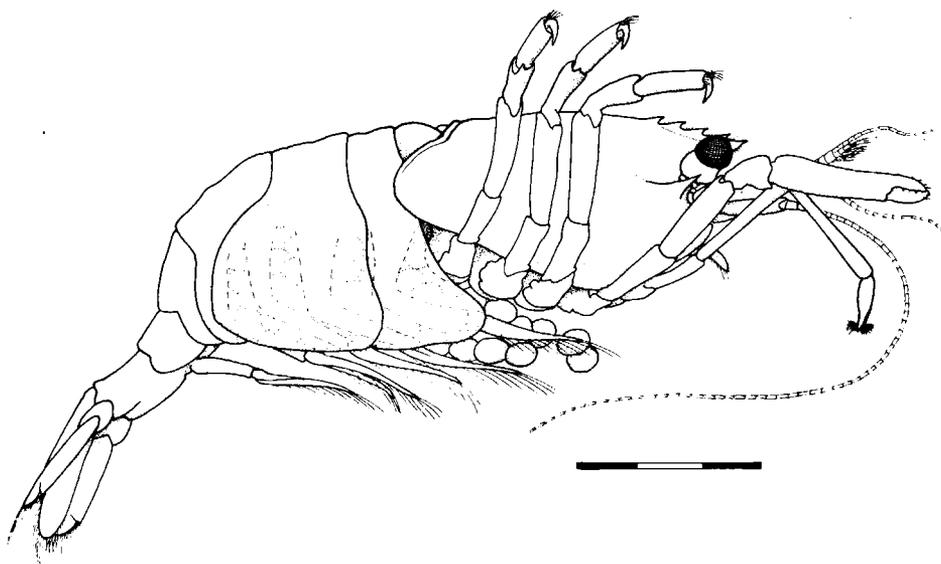


Fig. 1. *Pliopontonia furtiva* gen. nov., sp. nov., female, holotype. Scale in mm.

Systematic position of the genus. — The features of particular importance in assessing the systematic position of the genus *Pliopontonia* are: (i) rostrum feebly developed, dorsally dentate but without ventral teeth; (ii) hepatic spine absent; (iii) antennal spine well developed; inferior orbital angle distinct; (iv) molar process feeble, but not acute; (v) maxilla without endites; (vi) second maxilliped with normal exopod and epipod; (vii) third maxilliped with normal exopod and epipod, and with rudimentary arthrobranch; (viii) fourth thoracic sternite without median process; (ix) second pereiopods feeble, similar, subequal; (x) ambulatory pereiopods robust with stout simple hamate dactylus.

Consideration of the above features indicates that the new genus *Pliopontonia* is most closely related to the genus *Metapontonia* Bruce, an associate of fungiid corals (Bruce, 1967). The new genus also shows features in common with some other coral associated genera, for example, *Anapontonia*, Bruce, 1967, and *Philarius* Holthuis, 1952.

Pliopontonia may be readily separated from *Metapontonia* by the more strongly

developed dorsally multi-dentate rostrum. The mouthparts of *Pliopontonia* are less highly modified than in *Metapontonia*, as is shown by the more robust molar process of the mandible and the normal development of exopods and epipods on the second and third maxillipeds. In *Metapontonia* the second maxilliped lacks an epipod and the third maxilliped has only a rudimentary exopod as well as lacking an epipod. *Pliopontonia* also possesses a rudimentary arthrobranch on the maxilliped, which is entirely lacking in *Metapontonia*. The first maxilliped and maxilla are very similar in the two genera. Another difference between the two genera is that the orbit is better developed in *Metapontonia* although the inferior orbital angle is much reduced. In *Pliopontonia* the orbit is poorly developed but the inferior orbital angle is distinct and the antennal spine extremely strong. In *Pliopontonia* also, the second pereopods are subequal and similar. In *Mesopontonia* they are similar but distinctly unequal.

Pliopontonia also shows a number of points of resemblance to *Anapontonia* Bruce, an associate of oculinid corals (Bruce, 1967). It may be readily distinguished from this genus by its less strongly dentate rostrum and lack of a strongly compressed body form with a strongly armed caudal holdfast mechanism. In the mouthparts *Anapontonia* differs from *Pliopontonia* in the presence of a stout molar process and a reduced incisor process on the mandible and the absence of an epipod on the second maxilliped and a much reduced exopod on the third maxilliped.

The hepatic spine is also absent in the genus *Philarius* which also has simple hook-like dactyls on the ambulatory pereopods. In this genus, however, the rostrum is more strongly developed with several ventral teeth usually present. The maxilla bears a small endite and the second pereopods are particularly well developed and robust. The most important difference is found on the fourth thoracic sternite, which is armed with a conspicuous median finger-like process.

Remarks. — The new genus *Pliopontonia* may be easily separated from the pontoniinid associates of sea anemones by the complete absence of the hepatic spine. In all species of the genus *Periclimenes* the hepatic spine is well developed. The *Periclimenes* species found in association with Indo-West-Pacific anemones, *P. brevicarpalis* Schenkel, *P. inornatus* Kemp, *P. holthuisi* Bruce, and *P. ornatus* Bruce, all have relatively well developed rostra, generally with a distinct ventral tooth, although this may be absent in juveniles. Also the molar process of the mandible is strongly toothed and a bifid distal endite is present on the maxilla. The dactyl of the ambulatory pereopods is considerably more robust and hook-like than is found in any of the species of *Periclimenes*.

***Pliopontonia furtiva* sp. nov.**

Material examined. — 1 ovigerous ♀. Ras Iwatine, Mombasa, Kenya, 4° 00.55'S 39° 44.17'E; 25 February 1971; Coll. A. J. Bruce, Stn. 105, (# 1419).

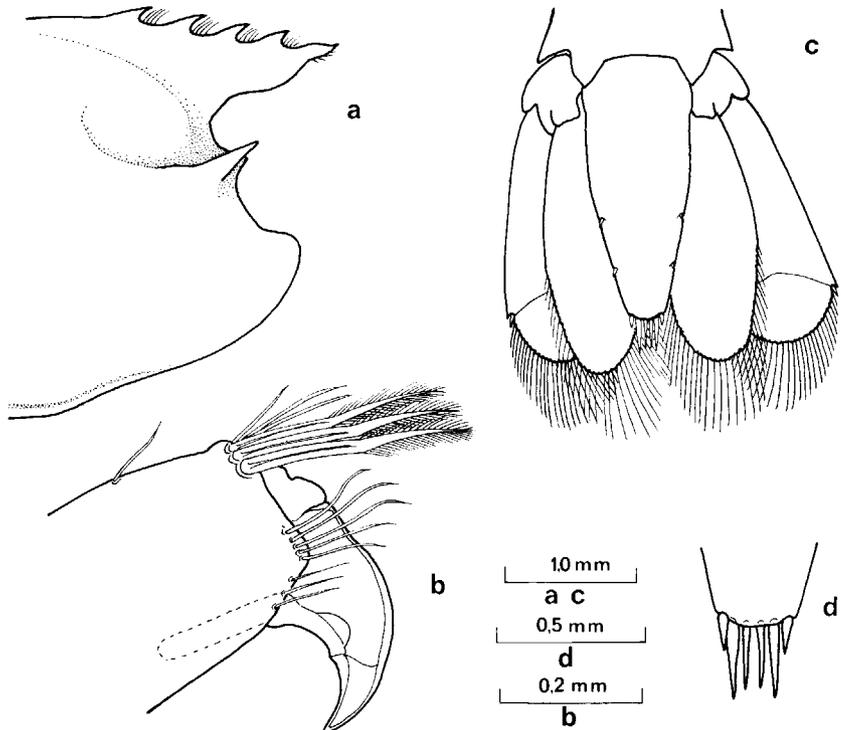


Fig. 2. *Pliopontonia furtiva* gen. nov., sp. nov., female, holotype. a, anterior carapace, lateral view; b, dactylus of third pereiopod; c, caudal fan; d, terminal spines of telson.

Description. — A small-sized pontoniinid of squat body form, ventrally flattened in the thoracic region.

The carapace is smooth, with a short rostrum extending anteriorly to three quarters of the length of the basal segment of the antennular peduncle. The lamina is compressed with no noticeable lateral carina. The tip is slender and acute. The dorsal margin is straight and bears four equally spaced acute teeth, the two most posterior teeth being situated behind the level of the orbital notch. The ventral margin, posteriorly to the slender tip, is strongly convex and without teeth. The interspaces between the dorsal teeth are feebly setose and the extremity of the ventral border is also sparsely setose. The orbit is feebly developed. The inferior orbital angle is broad and acutely produced in lateral view. The antennal spine is large and acute, situated submarginally at the level of the inferior orbital angle, which it distinctly exceeds. Supra-orbital and hepatic spines are absent. The antero-lateral angle of the carapace is produced and broadly rounded. The branchiostegite is deep anteriorly and shallow posteriorly, with a broadly rounded posterior margin.

The abdomen is smooth. The third segment is not posteriorly produced in the dorsal midline. The fifth segment is about two-thirds of the length of the sixth,

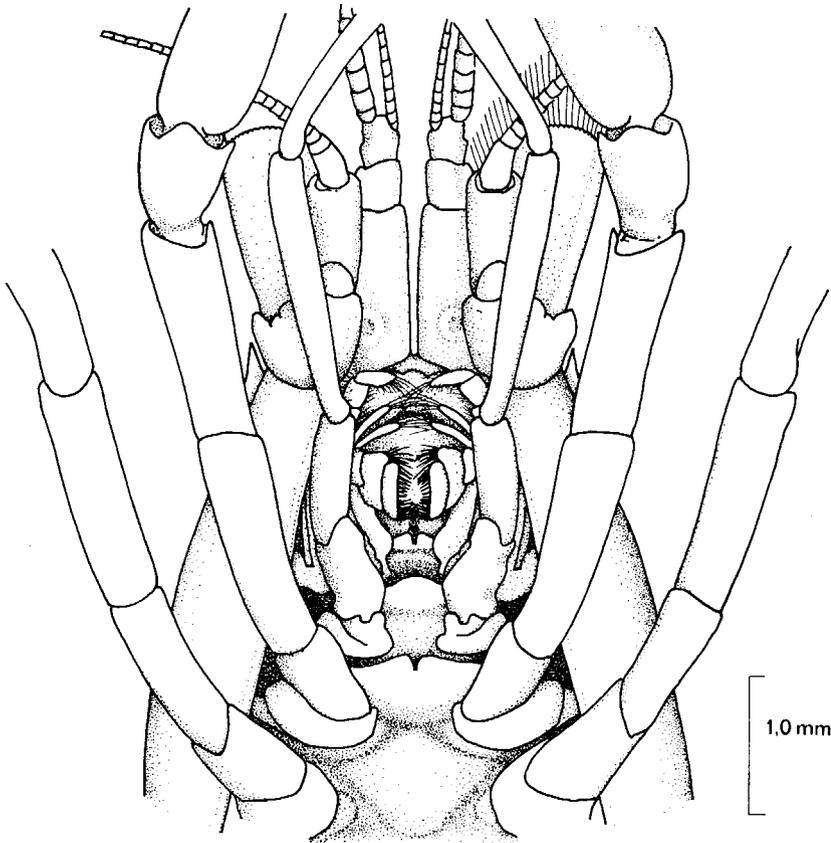


Fig. 3. *Pliopontonia furtiva* gen. nov., female, holotype. Anterior thoracic and buccal region, ventral view.

which is approximately as deep as long. The posterior angle is acutely produced and the posterior ventral angle is blunt. The pleura of all segments are broadly rounded. The pleura of the first three segments are enlarged to enclose a large marsupium and the first is produced anteriorly beneath the posterior thorax. The telson is narrow, 2.4 times longer than broad, with the anterior lateral margins parallel and the posterior lateral margins converge to a rounded posterior margin. Two pairs of small marginal dorsal spines are present at 0.6 and 0.8 of the telson length. The lateral pair of terminal telson spines are about twice the length of the dorsal spines. The intermediate spines are stouter and twice as long as the lateral spines. The submedian spines are more slender than the intermediate spines and 0.8 of their length.

The eyes are normally developed, with a short broad peduncle, about as wide as long, and a transverse globular cornea. There is no accessory pigment spot.

The antennular peduncle far outreaches the tip of the rostrum, which reaches only to three quarters of the length of the basal segment. The basal segment is

moderately broad, about 1.5 times longer than broad. The stylocerite is acute and reaches beyond the middle of the basal segment. The antero-lateral angle is produced and bears a slender acute tooth laterally. The medial border is convex. The ventral medial border bears a small acute tooth at half its length. The statocyst is normally developed and contains an oval statolith. The intermediate segment is short, about 0.8 times the length of the distal segment, and the two segments together are about equal to 0.6 of the length of the basal segment. The intermediate segment is obliquely jointed to the distal segment and bears a feebly developed setose lateral lobe. The medial border is also sparsely setose. The lower flagellum is well developed and filiform, about 2.5 times the length of the basal segment. The upper flagellum is biramous. The proximal four segments of the rami are fused. The shorter free ramus consists of three segments. The longer free ramus is filiform and of similar length to the lower ramus. About eleven groups of aesthetascs are present on the distal two thirds of the short flagellum.

The antenna has a robust basicerite with a rounded, unarmed anterior border. The carpocerite is stout, subcylindrical, three times longer than broad and extending anteriorly to the base of the terminal segment of the antennal peduncle. The flagellum is well developed and reaches posteriorly to the fifth abdominal segment. The scaphocerite is well developed and the lamella distinctly exceeds the antennular peduncle. The lateral border is feebly convex, almost straight distally and terminates in a small acute tooth. The lamella is 1.7 times longer than broad and the anterior part exceeds the tip of the disto-lateral spines. The median and anterior margins are convex and are bluntly angulated.

The epistome is normal and unarmed. The mandible is moderately robust and without palp. The molar process is comparatively feeble with an obliquely truncated masticatory surface. The upper surface of the masticatory surface bears a row of small acute teeth, the largest proximally, with short peripheral setae enclosing a grinding surface of tessellate setae. The incisor process is broad with four acute teeth along the oblique distal margin. The three medial teeth are subequal and the lateral tooth is enlarged and curved laterally. The maxillula bears a distinctly bilobed palp. The subacute lower lobe bears a short simple seta. The upper lacinia is narrow, with six stout simple spines distally. The lower lacinia is also narrow with few simple setae distally. The maxilla bears a slender simple non-setose palp. Coxal and basal endites are completely absent and the medial border presents two feeble rounded lobes. The scaphognathite is normally developed, broad anteriorly. The first maxilliped has an elongated slender non-setose palp. The basal endite is large and broadly rounded distally and completely fused with the coxal endite, which is separated only by a feeble indentation of the medial border. The anterior margin bears a few long simple setae which are also found more densely along the medial border. Less numerous setose setae are present submarginally. The exopod is well developed with four plumose setae distally, and a large elongated caridean lobe is present. A large

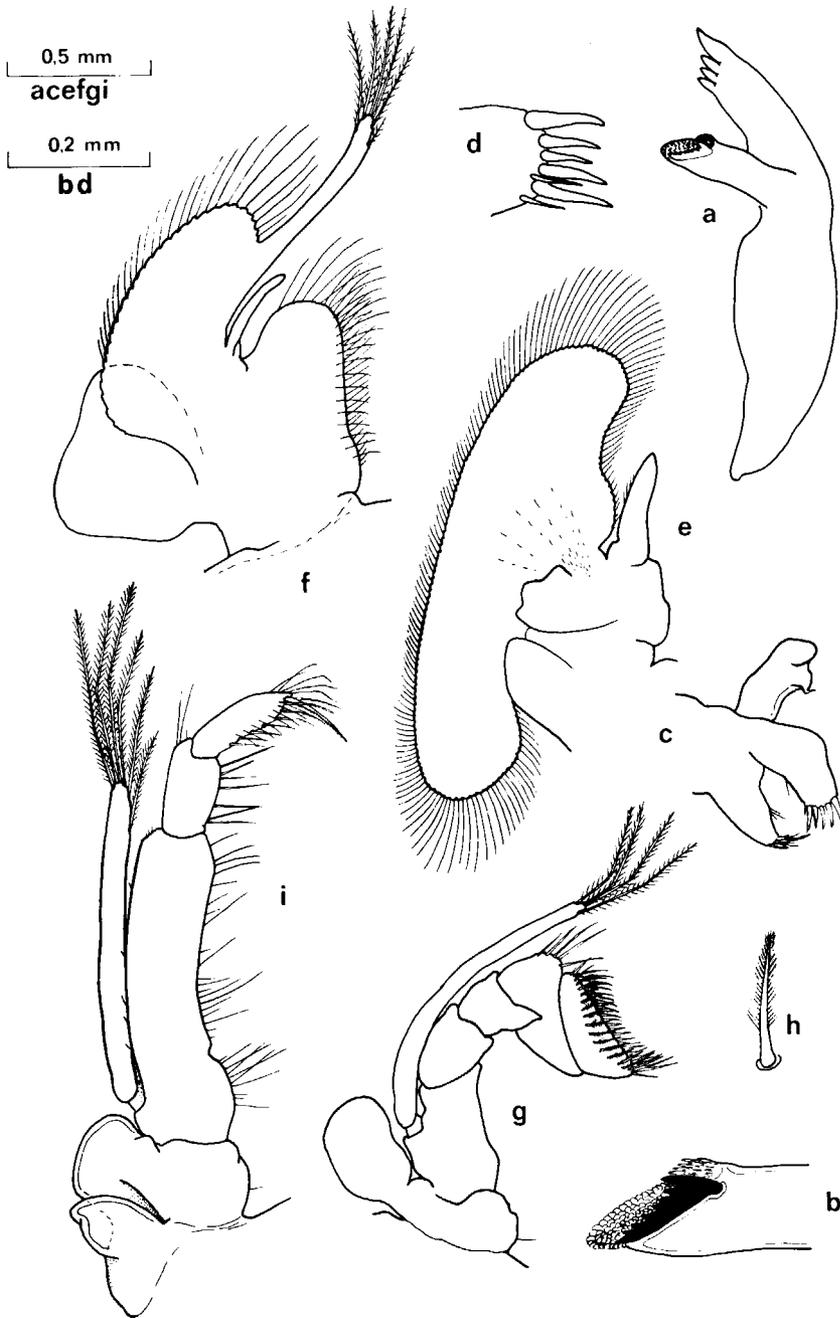


Fig. 4. *Pliopontonia furtiva* gen. nov., sp. nov., female, holotype. a, mandible; b, molar process of mandible; c, maxillula; d, extremity of upper lacinia of maxillula; e, maxilla; f, first maxilliped; g, second maxilliped; h, seta of second maxilliped; i, third maxilliped.

semi-triangular epipod is also present. The second maxilliped is of normal type. The terminal segment of the endopod is broad with numerous hooked simple setae along the medial border, and a row of stout densely setose submarginal setae ventrally. The anterior margin of the propod is feebly angulated and bears four long slender simple setae. The antero-medial angle of the carpus is acutely produced. The merus and ischio-basis are normal. The exopod is well developed, with five plumose terminal setae. The medial border of the coxa is rounded and the lateral border bears a subrectangular epipod without a podobranch. The third maxilliped is short and stout, with ischium, merus and basis fused, although the separation between ischium and basis is indicated medially by a small notch. The antepenultimate segment is 4.4 times longer than wide with a concave medial border bearing sparse simple setae. The basal portion is convex and also sparsely setose. The penultimate segment is twice as long as wide with stouter simple setae medially. The terminal segment is about 3.5 times longer than broad and slightly longer than the intermediate segment. The distal and medial borders are armed with minutely dentate setae. The exopod is well developed, extending a little beyond the penultimate segment and bears six plumose setae distally. The coxa bears a feeble rounded lobe medially and a rounded epipod laterally. A rudimentary arthrobranch, consisting of a single rounded lamella is also present laterally.

The first pereiopods are slender and extend beyond the carapocerite by the length of the carpus and chela. The chela has a subcylindrical palm, about twice as long as broad. The fingers are acute, slightly compressed, with entire cutting edges and equal to about half the length of the palm, and with dense groups of finely serrate setae. The carpus is seven times longer than broad and tapered proximally, and twice the length of the chela. The merus is subcylindrical and slightly shorter than the carpus. The ischium is two thirds of the length of the merus and 1.5 times the length of the basis. The coxa is provided with a small rounded setose medial lobe.

The second pereiopods are small and feebly developed. The chelae are only equal to approximately two thirds of the carapace length. The basicerite is exceeded by the carpus and chela. The chelae are similar and subequal in size. The palm of the major chela is subcylindrical, tapering slightly distally, smooth, and 3.5 times longer than wide. The fingers are 0.4 times the length of the palm, slightly compressed and curved, with stout hooked tips. The dactylus bears a single small acute tooth at 0.4 of the length of the otherwise entire cutting edge, which opposes two similar small teeth on the cutting edge of the fixed finger. The minor chela is similar in shape to the major chela and equal to 0.85 of its length. The carpus is short, 0.4 times the length of the palm, moderately expanded distally and unarmed. The merus is 0.84 times the length of the palm and slightly compressed proximally. The disto-ventral angle is unarmed. The ischium is slightly shorter than the merus, equal to 0.8 times the length of the palm, strongly compressed and unarmed. The basis is half the length of the ischium. The coxa is stout, 0.6 times the length of the basis and without a medial process.

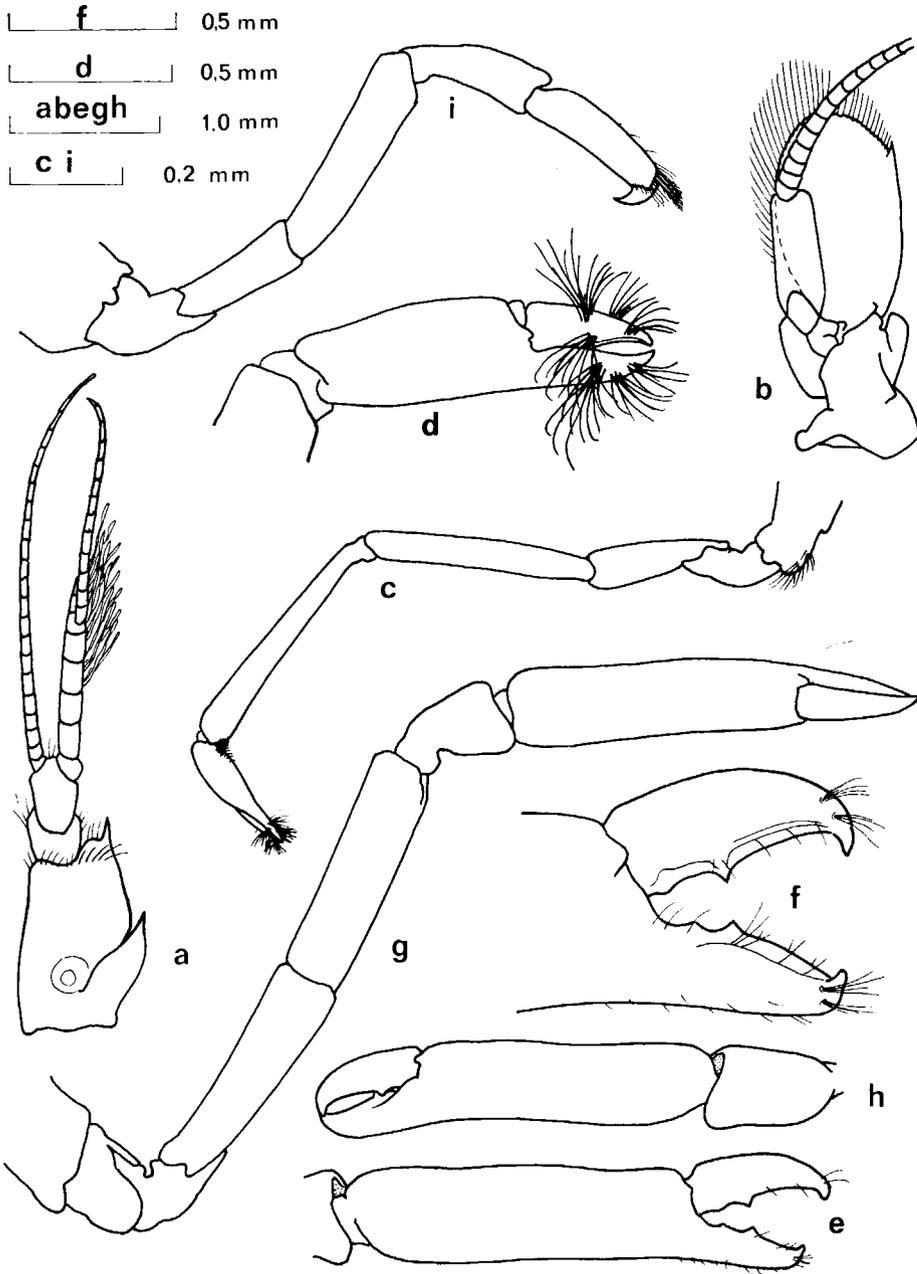


Fig. 5. *Pliopontonia furtiva* gen. nov., sp. nov., female, holotype. a, antennule; b, antenna; c, first pereiopod; d, chela of first pereiopod; e, major second pereiopod; f, fingers of major second pereiopod; g, minor second pereiopod; h, chela of minor second pereiopod; i, third pereiopod.

The ambulatory pereiopods are robust. The third pereiopod exceeds the basicerite by the carpus, propod and dactylus, or the carpocerite by the propod and dactylus. The dactylus is very short and stout, compressed, simple and strongly hooked. The length is about 1.7 times the width at the base. The unguis is distinct and the strongly concave ventral border is thickened. There are no lateral setae. The propod is stout, 3.5 times longer than wide, and tapering slightly distally. There are no ventral spines but the disto-ventral angle is provided with a few simple setae and the disto-dorsal margin bears three long stout setae which are densely provided with "woolly" setules distally. The carpus is stout, subequal to the length of the propod, tapering proximally and unarmed. The merus is 1.7 times the length of the propod, feebly concave dorsally, and unarmed. The ischium is more slender than the merus and equal to 0.6 of its length. The basis is subequal in length to the ischium. The coxa is stout and unarmed. The fourth and fifth pereiopods are similar to the third, but the meri are slightly shorter.

The first and second thoracic sternites are relatively broad so that the first and second maxillipeds are well separated. The third sternite is slightly raised as a low lobe on the midline. The fourth thoracic sternite is without a median process, but a broadly triangular plate, distinctly notched in the midline, is present immediately behind the coxae of the first pereiopods. The more posterior sternites are also broad and unarmed.

The branchial formula is as follows:

	Maxilliped			Pereiopod				
	I	II	III	I	II	III	IV	V
Pleurobranch	-	-	-	1	1	1	1	1
Arthrobranch	-	-	1	-	-	-	-	-
Podobranch	-	-	-	-	-	-	-	-
Mastigobranch	1	1	1	-	-	-	-	-
Exopod	1	1	1	-	-	-	-	-

The pleopods show no special features. The peduncle and rami are slender and the endopod bears a distinct appendix interna.

The uropods are normal. The postero-lateral angle of the basipodite is rounded. The lateral border of the exopod is almost straight and bears a small mobile spine distally. The endopod is longer and narrower than the exopod, and both exceed the tips of the posterior telson spines.

The ova are moderately numerous, about 100 in number with a greater diameter of 0.5 mm.

Type. — The only specimen, an ovigerous female, is designated as the holotype and is deposited in the collections of the British Museum (Natural History), registration number 1971 : 197.

Measurements (in mm). — Total body length, approx., 13.5; carapace length, 4.8; postorbital carapace length, 3.8; major chela of second pereiopod, 3.0; minor chela of second pereiopod, 2.6.

Colour. — Predominantly of glassy transparency with white bands. The

carapace is mainly transparent with a white bar across the proximal half of the rostrum, and a white band along the posterior border of the branchiostegite. Dorsally the abdomen is also transparent except for a white bar across the posterior border of the sixth segment. The anterior margin of the telson, the basipodite of the uropod and the anterior ends of the exopod and endopod are also white. The rest of the caudal fan is transparent. The ventral aspect of the abdomen is transversed from side to side by seven broad bands of white each with a narrow clear central zone. Each broad band is separated by a shorter, less distinct narrow band of white. The broad transverse white bands are continuous with vertical white bands on the pleura. A single band is present anteriorly on the first pleura, two are present submarginally on the second pleura and one on each of the third to fifth segments posteriorly as well as at the posterior ventral angle of the sixth segment.

The cornea and eyestalk are white, with a posterior distal window in the latter and the ophthalmic somite is also white. The proximal part of the lower flagellum of the antennule and articular region at the distal end of the terminal segment of the peduncle are white. The distal end of the carapocerite is also white.

First pereopods transparent. Second pereopods with the proximal end of the palm and the hinge region of the fingers conspicuously white; proximal and distal ends of carpus white, and distal end of merus white, with narrow transparent zones at articulations. Ambulatory pereopods similar with merus and carpus similar and with white at proximal and distal ends of propod.

Dorsal surface of gastric mill white. Lateral lobes of hepatopancreas white. Ovary pale olive green but with dorsal lobes anterior to heart and the abdominal parts of the ovary also white. Ova pale grey-green.

Host. — *Rhodactis rhodostoma* (Ehrenberg, 1834), a species of Actinodiscidae (Corallimorpha, Zoantharia).

Habitat. — The specimen was obtained from the outer region of a coastal lagoon inside a fringing coral reef, at a depth of 1 m below L.W.S. level. Water temperature 29.0°C.

Behaviour. — The behaviour of the shrimp was observed for some while on the host in the laboratory. During the day the shrimp was inactive, occasionally moving sluggishly around its container although at times swimming vigorously. On the host it adopted a position on top of the disc with the caudal fan near the mouth and its head directed outwards. In this position, the ventral abdominal markings of the shrimp blended closely with the radially striate markings of the host. By means of the dactyls of the third to fifth pereopods, the shrimp hung on to the tufted tentacles of the host.

When disturbed the shrimp drew its ambulatory pereopods together over the dorsum of the carapace and anterior abdomen. It was thus able to drag the host's tentacles together over its body at the same time depressing its body against the disc, thereby completely concealing itself from view. This hiding reaction was elicited with great ease and frequency. A slight shadow passing over the shrimp

produced immediate sudden concealment but gradual relaxation commenced almost at once subsequently. Contact from small *Artemia* also induced immediate concealment and no attempt was made to feed upon them.

Remarks. — The behaviour noted above contrasts with the species of *Periclimes* found in association with anemones. If disturbed when on the disc, these usually just walk rapidly to the margin of the disc and then move onto the lower surface. These shrimps are generally found in large anemones such as *Stoichactis* or *Radianthus*, where they are relatively inconspicuous among the large numbers of tentacles. The host of *Pliopontonia furtiva* is quite a small anemone-like coelenterate, brown in colour and only about 5 cm in diameter when fully expanded. It does however occur in dense aggregations with the effect of forming a mat of tentacles over a large area.

The feeding habits of the shrimp on the host could not be observed but the shrimp made no attempt to catch or eat small *Artemia* or *Artemia* nauplii, nor would it accept small fragments of prawn muscle. However, it did maintain a full gastric mill for the period of observation. The food appeared to consist of mucus from the surface of the disc, together with adherent particles, continuously being gathered by the elongated first pereopods. The relationship with the host thus appears to be that of a cleaner, as has been described in the case of species of *Periclimes* and other shrimps (Limbaugh et al., 1961). It is interesting to note that some of the other "cleaning-shrimps" such as *Periclimes yucatanicus* (Ives) and *P. pedersoni* Chace, are also frequently associated with anemones.

It is also interesting to note that this is the first recorded occurrence of a shrimp in association with a zoantharian of the order Corallimorpha, the previously recorded associations of pontoniid shrimps having been with the orders Actiniaria and Scleractinia.

ACKNOWLEDGEMENTS

I am grateful to Dr. C. E. Cuttress for the identification of the host.

RÉSUMÉ

Un nouveau genre, *Pliopontonia*, est décrit pour inclure une nouvelle espèce de crevette pontoniide, *P. furtiva*, trouvée en association avec un zoanthaire corallimorphe, provenant des eaux peu profondes de la côte du Kenya. Le genre le plus proche de ce nouveau genre est *Metapontonia* Bruce, trouvé en association avec des coraux oculinides. La nouvelle crevette est le premier genre de Pontoniinae qui a été trouvé associé avec les Corallimorpha, bien que d'autres genres, associés aux zoanthaires, aient été trouvés sur les Actiniaria ou les Scleractinia. *Pliopontonia* se distingue aisément de *Metapontonia* par la morphologie de ses pièces buccales. Le processus molaire est robuste; la lacinia inférieure de la maxillule n'est pas tronquée, le troisième maxillipède a un exopodite normal et un épipodite avec une arthrobranchie rudimentaire. De plus, le rostre de *Pliopontonia* a plusieurs dents dorsales et les seconds périopodes sont égaux et similaires.



Fig. 1. *Pliopontonia furtiva* gen. nov., sp. nov. Female, holotype, partly concealed among the tentacles of its host *Rhodactis rhodostoma* (Ehrenberg).

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