



HOKKAIDO UNIVERSITY

Title	Harpacticoid Copepods from the Pacific Abyssal off Mindanao. : I. Cerviniidae (With 37 Text-figures and 1 Table)
Author(s)	ITÔ, Tatsunori
Citation	北海道大學理學部紀要, 23(1), 63-127
Issue Date	1982-03
Doc URL	https://hdl.handle.net/2115/27674
Type	departmental bulletin paper
File Information	23(1)_P63-127.pdf



Harpacticoid Copepods from the Pacific Abyssal off Mindanao. I. Cerviniidae¹⁾

By

Tatsunori Itô²⁾

Zoological Institute, Hokkaido University

(With 37 Text-figures and 1 Table)

As a member of the scientists on Cruise KH-79-1 of R/V Hakuho Maru of the Ocean Research Institute, University of Tokyo, I participated a faunistic study of deep-sea meiobenthos, especially harpacticoid copepods. During this cruise from Tokyo to Cebu (January to February 1979), we obtained some samples of meiobenthos, which were collected mainly at Station 5 (a southeast area off Mindanao) of abyssal depths with different sampling gears such as epibenthic sledge and spade corer. Specimens which are reported in this paper were collected with two separate sampling gears. 1) Murano's net: a plankton net of a rectangular mouth, attached to a beam trawl. 2) Itô's net: a plankton net (mesh number NXX13: 94 μ m opening) attached to a side of an epibenthic sledge. In fact, the hauls collected with these gears contained not only bottom sediments but also planktonic organisms; therefore, it is probable that harpacticoids collected with these gears are not always benthic. This probability will be checked in a separate paper by comparative examinations among samples collected with these gears and the spade corer.

Through the course of the examination of these samples I found some interesting harpacticoids which were apparently new to science or new for the Pacific fauna. As the first report on the harpacticoid fauna of this abyssal bottom, the present paper deals with seven species of two known genera, *Pontostratiotes* Brady and *Stratiopontotes* Soyer, and a new genus of Cerviniidae. A taxonomic note on the genus *Ameriotes* Por is also given in connection with the redescription of *Stratiopontotes mediterraneus* Soyer. Faunal list for each sampling locality will be given in a separate paper together with the full data on the number of individuals collected.

1) This study is supported in part by a Grant-in-Aid for Scientific Research from the Ministry of Education of Japan.

2) Present address: Seto Marine Biological Laboratory, Kyoto University, Shirahama, Wakayama 649-22.

Although several samplings were tried during this cruise, only two hauls obtained in separate days are relevant to this paper. 1) 5-II-1979 (Itô's net): 05°23.4'N, 130°07.8'E; ocean bottom 5587 m deep; sediment red clay with pumice. 2) 6-II-1979 (Murano's net): 05°30.8'N, 130°20.2'E—05°28.0'N, 130°19.9'E; ocean bottom 5567 m deep; sediment red clay with pumice.

Type-series and specimens described in this paper are deposited in the Zoological Museum, Faculty of Science, Hokkaido University. Some of other specimens, which are not yet dissected, will be deposited in the Ocean Research Institute, University of Tokyo, after the completion of the present study.

Before going further, I would like to express my sincere thanks to Professor M. Horikoshi, the chief scientist of the cruise, University of Tokyo, and other scientists of the cruise who helped me in the sampling together with the crew of Hakuho Maru. I am very much indebted to Dr. M. Murano, Tokyo University of Fisheries, who gave me some samples collected for his study of deep-sea mysids. Sincere gratitude is also due to Professor M. Yamada, Hokkaido University, who read through the manuscript.

General description for the genus *Pontostratiotes* Brady

In the following text, five species of the genus *Pontostratiotes* are reported. These characters which are mentioned below are common among them, and will be omitted in each description of these species if they are not particularly worth mentioning. Spines and setae may occasionally be numbered from the proximal-most toward distal.

First thoracic somite short but not fusing with cephalon, bearing pleurotergite without spinous formation. Genital double-somite subdivided into two parts with a transverse suture dorsally and laterally; a rudimentary leg 6 represented by a cylindrical process attached onto each lateral extremity of genital area. Anal somite pyriform in dorsal aspect; anal operculum well developed, represented by a semicircular flap which is clearly demarcated at base and inserted into somite above anus. Furcal rami confluent, very much elongated.

Antennule of female consisting of eight segments, the third armed with an aesthetasc. *Antenna*. Allobasis with a trace of demarcation between basis and fused first endopodite segment indicated by a concavity together with a suture. Apical endopodite segment armed with three close setae on anterior face, four geniculate setae, one simple seta, and one basally bifurcate seta on distal end. Exopodite consisting of four segments, the first longest; each of second and third segments armed with one seta, fourth segment with two apical setae. *Mandible*. Coxa-basis armed with four appendixes (setae and/or spines). Exopodite consisting of four segments, the first with two inner setae, each of the second and the third with one inner seta, and the fourth with two apical setae. Endopodite consisting of one segment. *Maxillula*. Two parallel setae arising from anterior face of arthrite of prae-coxa. Coxa and basis forming an inner process. Epipodite represented by a seta. Endopodite represented by a rudimentary segment armed with three setae. *Maxilla*. Syncoxa furnished with four endites. Basis forming a cylindrical inner process with a strong apical claw which is not clearly articulated at base,

together with one spine accompanied by two slender setae, one located posteriorly and the other ventrally; one strong claw arising from posterior face near base of endopodite. Endopodite consisting of three small segments, each of the first two with two appendixes (spines and/or setae) and the third with four appendixes in all. *Maxillipede* consisting of praecoxa, coxa, basis, and two endopodite segments; praecoxa confluent with coxa but demarcated by a clear constriction with a suture. Coxa armed with seven appendixes (spines and/or setae) along inner edge.

Leg 1. Basis armed with one outer seta and one inner seta which is rather spiniform; a spinous projection occurring at distal edge between exopodite and endopodite. Exopodite three-segmented; each of first two segments armed with one outer spine and one inner seta; third segment armed with three outer appendixes (spines and/or setae), two apical setae, and one inner seta. Endopodite three-segmented; each of first two segments armed with one inner seta; third segment armed with one outer, two apical, and two inner setae. *Leg 2, leg 3, and leg 4.* Basis armed with one outer seta, forming a spinous projection on distal edge between rami. Both rami three-segmented. Exopodite: each of first two segments armed with one outer spine and one inner seta; third segment armed with three outer spines, two apical appendixes (the outer is a spine, the inner a seta), and two (leg 2), two (leg 3), and three (leg 4) inner setae. Endopodite: first segment armed with one inner seta; each second segment of leg 2 and leg 3 armed with two inner setae, of leg 4 with one inner seta in female and two inner setae in male; third segment armed with one outer spine, two apical setae, and two (leg 2), three (leg 3), and two (leg 4) inner setae. *Leg 5* of female consisting of two segments. Basal segment armed with one seta. Exopodite elongate.

***Pontostratiotes pacificus* n. sp.**

(Figs. 1~8)

Material. Two adult females and one adult male were dissected and designated as the type-series. Holotype: Female. Paratypes: A female and a male (allotype). Type-locality: Southeast off Mindanao, the Pacific Ocean. These specimens were collected with Murano's net (6-II-1979).

Female (Holotype). Body (Figs. 1-1, 1-2) about 3.4 mm long, colorless and semitransparent. Rostral projection not prominent, not extending beyond labrum, with a bifid apex. Labrum swelling out, with numerous short spinules. Cephalon 0.42 mm wide, almost quadrate in dorsal view; posterior edge armed with ten, rather narrow, spinous projections in all (two sets of five projections), of which the dorsal two are about twice longer than others, and do not extend beyond second thoracic somite; small granular protuberances and some hairs scattered dorsally and laterally; a rectangular lump with at least six pores (?) located on posterodorsal surface (Fig. 1-3). First thoracic somite with small granular protuberances dorsally and laterally. Second thoracic somite; pleurotergite anterolaterally forming a hooked extension which is furnished with long spinules and, toward posterior, contiguous to a lateral horn; lateral horn not extending beyond third thoracic somite;

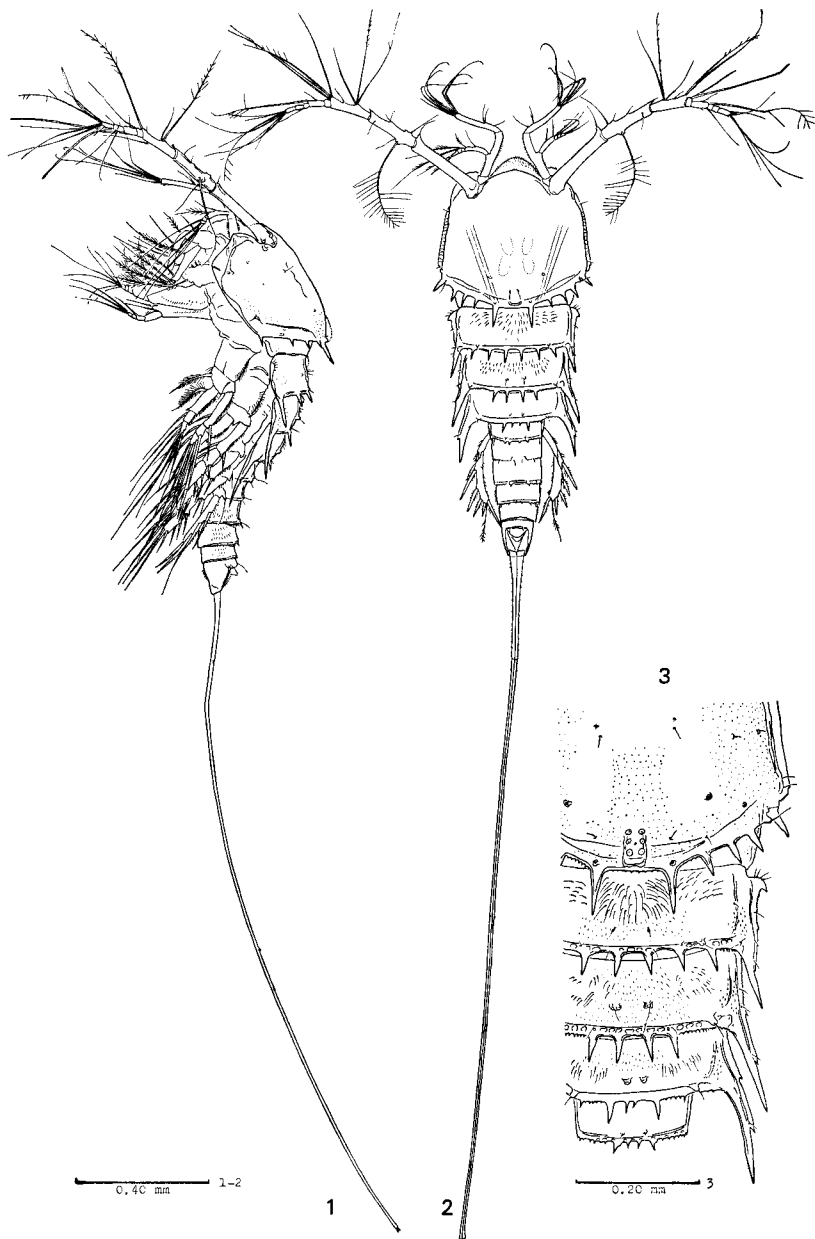


Fig. 1. *Pontostratiotes pacificus* n. sp. Female (holotype). 1. habitus, lateral; 2. habitus, dorsal; 3. cephalon and thorax, dorsal.

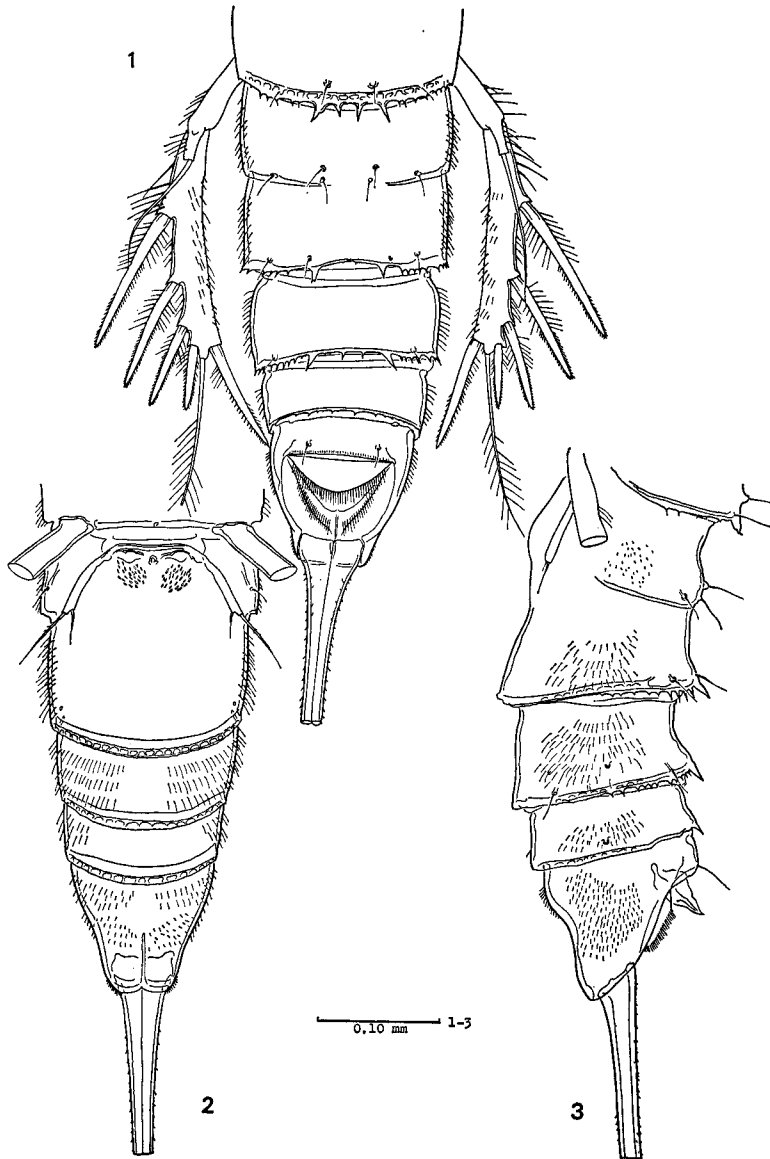


Fig. 2. *Pontostratiotes pacificus* n. sp. Female (holotype). 1. leg 5 and abdomen, dorsal; 2. abdomen, ventral; 3. abdomen, lateral.

six short spinous projections, which are subequal in length, arising from posterior edge between lateral horns; posterior edge serrated between lateral horn and neighboring spiniform projection; numerous long hairs arising from dorsal surface, some granular protuberances scattered on dorsolateral surface. Third and fourth thoracic somites similar to second thoracic somite in general shape of pleurotergite; each anterolateral extension not hooked but represented by a blunt protuberance; lateral horns longer than those of preceding somite; four spinous projections, which are subequal in length, arising from posterior edge of third thoracic somite; four spinous projections, which are different in size from each other (especially internal two are smaller), arising from posterior edge of fourth thoracic somite, of which posterior edge between lateral horn and neighboring spiniform projection is irregularly serrated. Posterior edge of fifth thoracic somite with four short spinous projections dorsally, and irregularly serrated laterally. Genital double-somite (Fig. 2-1) serrated along dorsal half of posterior edge; genital area as shown in figure (Fig. 2-2); each of leg 6 armed with two slender setae apically; many spinules attached to lateral surface (Fig. 2-3). Antepenultimate somite similar to posterior subdivision of genital double-somite in structure of posterior edge. Penultimate somite shorter than preceding somite. Anal somite almost as long as preceding two somites combined, furnished with a pair of long sensory hairs dorsally, and many spinules laterally and ventrally. Furcal rami about 62% of body length. Terminal setae of furcal rami are broken.

Antennule (Fig. 3-1). First segment longest, about six times as long as median diameter, with a short truncate protuberance, which is apically armed with a bare seta, at anterodistal portion and furnished with numerous short spinules; second segment shorter than first, forming a short spiniform projection at anterior distal end, furnished with a long, sparsely hairy, seta which arises from a crateriform protuberance of posterior face at a point a third of the length from the base; third segment a little shorter than second, somewhat thickening distally, furnished with a slender aesthetasc; second and third segments with short spinules on each anterior face; apical five segments small; fifth segment as long as succeeding two segments combined, thickening distally; eighth segment as long as preceding two segments combined, armed with setae together with a slender aesthetasc. *Antenna* (Fig. 3-2) furnished with numerous short spinules everywhere. Coxa short. Allobasis with a slight concavity which is located at anterior face and indicating the base of fused endopodite, about 4.5 times as long as its diameter, with no seta. Apical endopodite segment 1.5 times as long as allobasis, armed with three close setae on anterior face near a point at a proximal third. Exopodite: four segments combined almost as long as allobasis; first segment twice longer than succeeding three segments combined, armed with two setae each located medially and subapically and about as long as this segment; second and third segments very short; fourth segment tapering apically; all setae spinulose or bilaterally hairy. *Mandible* (Fig. 4-2). Praecoxa stout, well sclerotized, armed with dents and a spinulose seta along cutting edge. Coxa-basis longer than wide, furnished with

many hairs; one long plumose seta and two spinulose setae arising from inner distal angle, one plumose seta on distal edge near endopodite. Exopodite much longer than coxa-basis; first segment long, cylindrical, with many hairs, and armed with two inner setae each located medially and distally; apical three

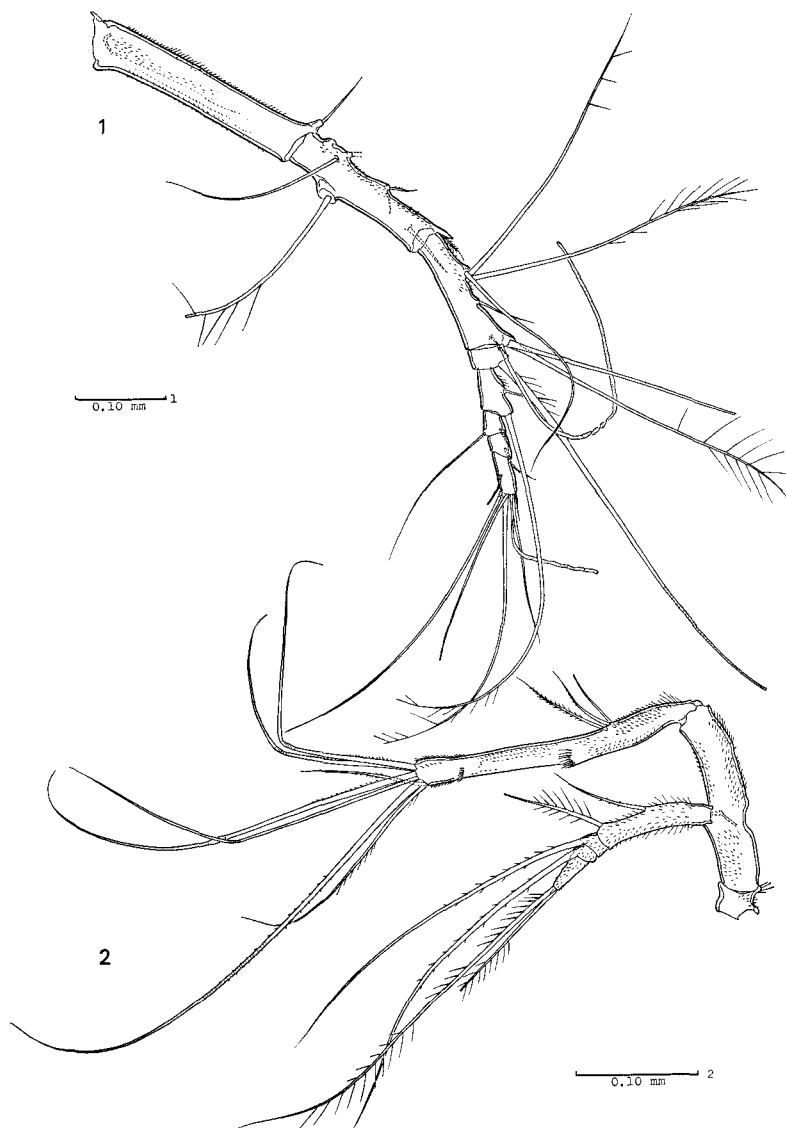


Fig. 3. *Pontostratiotes pacificus* n. sp. Female (holotype). 1. antennule; 2. antenna.



Fig. 4. *Pontostratiotes pacificus* n. sp. Female (holotype). 1. mandible; 2. endopodite of right mandible; 3. maxillula; 4. maxilla; 5. maxillipede.

segments very short; all setae of each segment elongate, longer than four these segments combined, and bilaterally plumose. Endopodite shorter than exopodite, somewhat sinuate, armed with four inner setae, of which three are located medially and the rest subapically; six close setae, three of which are probably naked (cf. Fig. 4-2), located on apical inner edge. *Maxillula* (Fig. 4-3). Arthrite of praecoxa much broadening inwards, armed with two thick setae on posterior face, and ten (?) spines or setae along cutting edge; a row of fine spinules on posterior surface; two anterior parallel setae sparsely with spinules. Coxa furnished with spinules near its outer distal edge; inner process not extending beyond arthrite of praecoxa, armed with six apical setae, two of which are furnished with a comb-like row of fine spinules. Epipodal seta well developed, plumose. Inner process of basis about twice longer than coxal inner process, apically thickening, armed with ten spines or setae on apical end, two closely set slender setae on subapical ventral edge, and two long setae on anterior face near dorsoapical angle. Endopodal setae bilaterally hairy. *Maxilla* (Fig. 4-4). Syncoxa about twice as long as its basal width, tapering apically; endites widely separated from each other; first endite armed with five more or less spinulose setae, of which the ventralmost is longest and not clearly articulated at base; second endite rudimentary, with three finely spinulose setae; third endite short and cylindrical, armed with one seta and two long spiniform setae which are ornamented with a comb-like row of fine spinules; fourth endite cylindrical, much longer than previous endite, armed with one spinulose seta, one spinulose spiniform seta, and one long spine which bears a comb-like row of fine spinules ventrally. Basis: inner process long, as long as fourth endite of syncoxa; three basally fused fine setae on distal edge close to inner base of endopodite. Endopodite: first segment armed with one sparsely spinulose inner seta and one medially geniculate spiniform seta on anterior distal edge; second segment with two geniculate spiniform setae each on anterior distal edge and inner distal edge; third segment with four slender long apical setae, one of which is spiniform. *Maxillipede* (Fig. 4-5). Praecoxa short, as long as wide, furnished with long hairs along inner edge. Coxa elongate, about 2.5 times as long as its greatest width that is located at a level of basal quarter; inner edge armed with a set of one plumose seta and one spinulose seta almost medially, a set of two long plumose setae and one arched spine subapically, and a set of one strong claw, which bears a comb-like row of fine spinules ventrally, and a short plumose seta apically; many long hairs along proximal half of inner edge and almost whole length of outer edge. Basis about half as long as coxa, armed with one long plumose seta on about the middle of inner edge and one long comb-like spine on inner distal angle; outer edge fringed with many long hairs. Endopodite: two segments combined a little shorter than basis; first segment armed with two long inner setae closely set medially and one long plumose inner seta subapically; second segment with three apical setae, two of which are spiniform and subapically geniculate, and one plumose outer seta; all setae slender.

Leg 1 (Fig. 5-1). Intercoxal plate not swelling out at free edge, furnished

with long hairs along free edge except for a median portion; a few short hairs (? spinules) attached onto anterior face near each outer distal corner. Coxa with long and thick hairs along outer edge; a fine setula (? sensory hair) arising from a short protuberance of outer edge; a few oblique rows of spinules on posterior surface near outer edge. Basis markedly protruded outwards over coxa; spiniform projection between both rami small; outer seta short, not extending beyond first exopodite segment, attached near dorsal corner; inner seta thick and stout, about as long as first endopodite segment, with both short and long spinules bilaterally. Both rami subequal in length. Exopodite: first segment 1.5 times as long as apical two segments combined, forming a spinous projection at base of

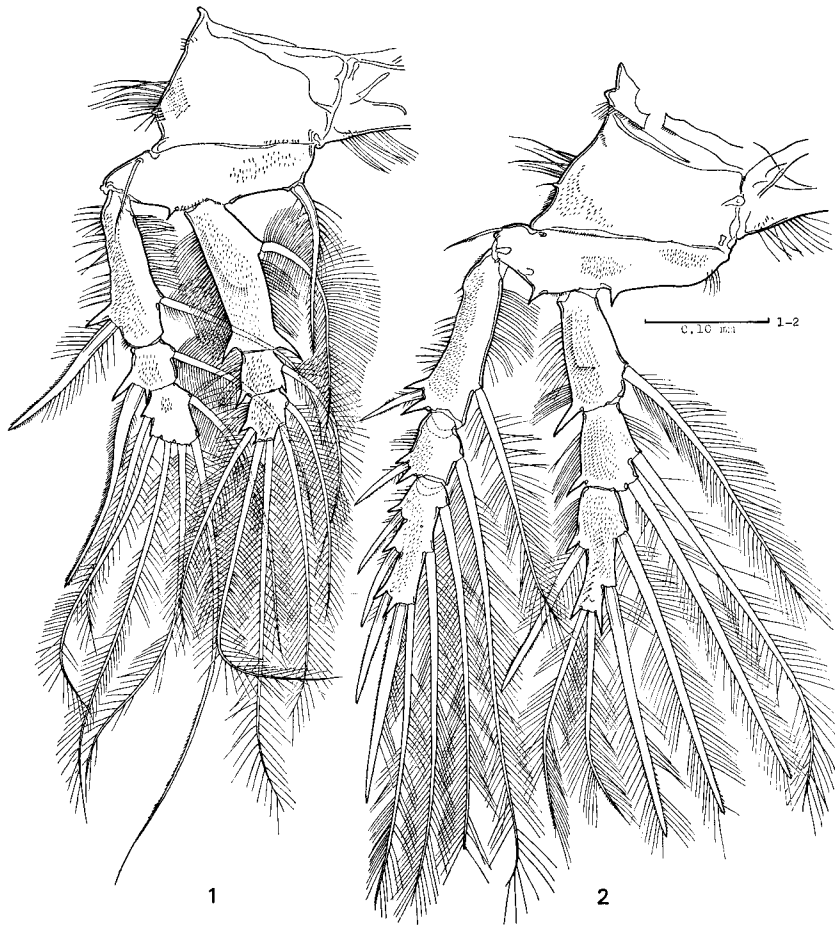


Fig. 5. *Pontostratiotes pacificus* n. sp. Female (holotype). 1. leg 1; 2. leg 2.

outer seta which is thick and as long as this segment, fringed with long spinules along outer edge and long hairs along inner edge; second segment forming two spinous projections, and its big finely spinulose outer seta arising between these projections; third segment a little longer than second, and its setae all long and plumose; inner seta of each segment long and plumose; both faces of first segment and each anterior face of second and third segments ornamented with short spinules. Endopodite: first segment about 1.8 times as long as apical two segments combined, forming a spur-shaped process at each of inner and outer distal angles, and its inner seta located at a point a third of the length from the base; second and third segments subequal in length; second segment forming a small spinous projection at each of outer and inner distal angles, and its inner seta located medially; outer seta of third segment arising from a clear step at subapical edge; all setae of each segment plumose; inner edge and distal half of outer edge of first segment and each outer edge of apical two segments fringed with long hairs. *Leg 2* (Fig. 5-2). Intercoxal plate and coxa almost as in leg 1. Basis protruded outwards over coxa; outer seta short; spinous projection between rami prominent; a spinous projection occurring on inner distal edge close to inner base of endopodite; some long hairs arising from inner edge. Both rami subequal in length. Exopodite: first segment about as long as apical two segments combined, swelling out at a subproximal portion of outer edge, furnished with numerous fine spinules both anteriorly and posteriorly, and long hairs along inner edge; second segment shortest, about 1.5 times longer than wide; third segment about twice as long as second segment; all setae of each segment plumose; each anterior surface of apical two segments furnished with fine spinules. Endopodite; first segment furnished with a strong spur-shaped projection at outer distal angle, a vertical row of spinules on posterior face; second segment shorter than first segment, with a small spur-shaped projection at outer distal angle; third segment about as long as first segment, clearly narrowing from the middle toward distal, with a few vertical rows of spinules on posterior surface, and its outer spine, which is about 1.3 times as long as this segment, arising from clearly stepped edge located at the middle of its length; second inner seta of second segment and two inner setae of third segment strong rod-shaped, fringed with long hairs bilaterally, together with short spinules; anterior face of each segment furnished with short spinules. *Leg 3* (Fig. 6-1). Intercoxal plate, coxa, and basis almost as in leg 2, but demarcation between coxa and basis more inclined. Basis protruded outwards over coxa; two spinous projections prominent. Exopodite armed as in leg 2. Endopodite: inner seta of first segment shorter than first two segments combined, finely plumose; second inner seta of second segment and three inner setae of third segment rod-shaped. *Leg 4* (Fig. 6-2). Intercoxal plate low. Posterior face of coxa bearing well-developed spinules together with a setula near outer distal corner. Demarcation between coxa and basis much inclined. Basis protruded outwards over coxa; two spinous projections rudimentary. Both rami smaller than those of leg 3. Subproximal swelling of first exopodite segment rudimentary. Endopodite; spur-shaped

projection of first segment small; all inner setae of second and third segments rod-shaped; posterior surface of first segment with many scattered spinules; third segment with vertical rows of spinules posteriorly. *Leg 5* (Fig. 2-1). Basal segment furnished with a bare seta which arises from an apically truncate cylindrical process. Exopodite about five times as long as the greatest width, armed with four spinulose outer spines, one hairy terminal seta, and one spinulose spine at subapical inner edge.

Male (Allotype: some apical segments of the left antennule broken off). Body (Fig. 7-1). about 2.6 mm long. Armature of cephalon and thorax (Fig. 7-2) principally as in the female, but third and fourth thoracic somites somewhat different

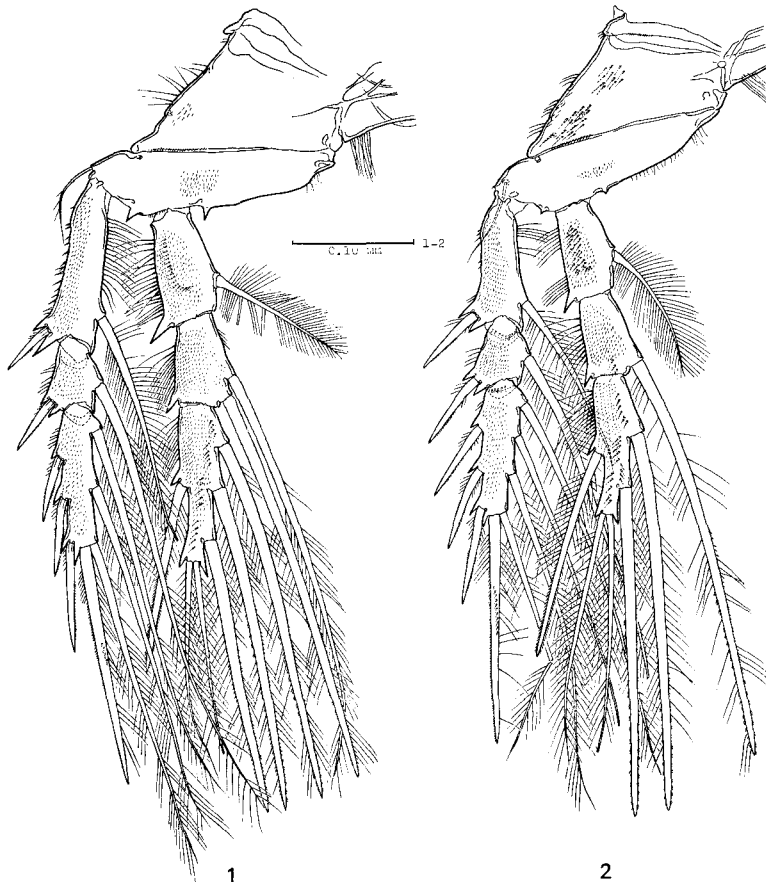


Fig. 6. *Pontostratiotes pacificus* n. sp. Female (holotype). 1. leg 3; 2. leg 4.

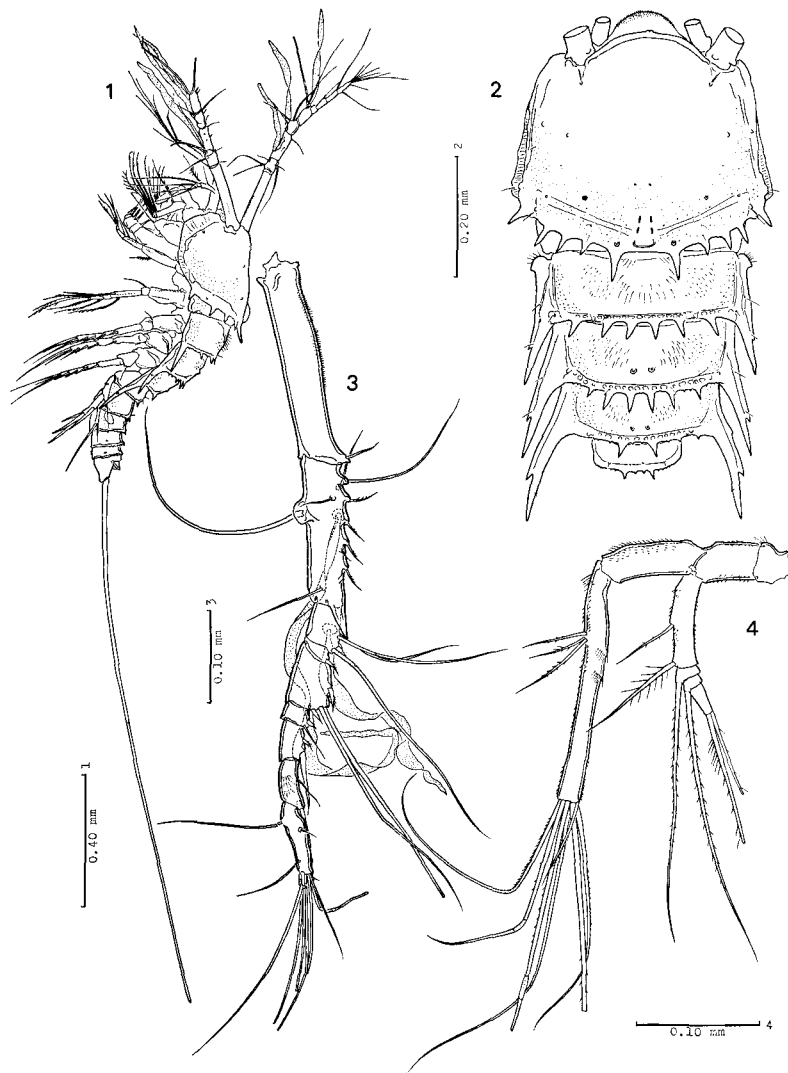


Fig. 7. *Pontostratiotes pacificus* n. sp. Male (allotype). 1. habitus, lateral; 2. cephalon and thorax, dorsal; 3. antennule; 4. antenna.

(cf. Figs. 1-3 and 7-2). First abdominal somite (with leg 6) roughly serrated along dorsal half of its posterior edge. Furcal rami about 63% of body length.

Antennule (Fig. 7-3) haplocer. First segment as in the female. Anterior face of second segment with some protuberances, each of which terminates in a seta. A very thick aesthetasc arising from each of second and third segments. *Antenna*

(Fig. 7-4) as in the female, but less spinulose. Allobasis with no seta. *Mandible*, *maxillula*, *maxilla*, and *maxillipede* principally the same as in the female.

Leg 1 (Fig. 8-1, showing the length of outer seta of basis), *leg 2*, and *leg 3* as in the female. *Leg 4*. Endopodite (Fig. 8-2): second segment armed with two inner setae, the second rod-shaped. *Leg 5* (Fig. 8-3). Basal segment as in the female. Exopodite consisting of two segments, the first armed with one outer spine on subapical edge, the second with three outer spines, one apical spine, and one inner spine medially and one inner seta subproximally. *Leg 6* (Fig. 8-4)

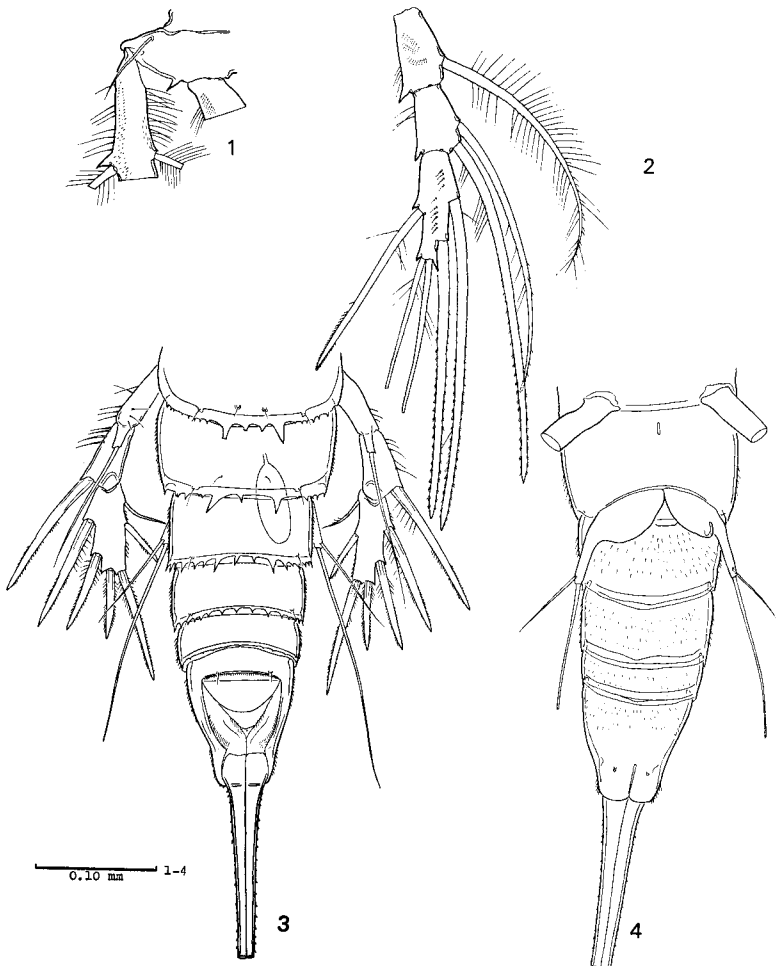


Fig. 8. *Pontostratiotes pacificus* n. sp. Male (allotype). 1. basis of leg 1; 2. endopodite of leg 4; 3. leg 5 and abdomen, dorsal; 4. abdomen, ventral.

represented by a broad plate, of which outer edge forms a cylindrical extension with two slender setae each apically and subapically.

Remarks. The present new species resembles *P. acanthoferens* Yamanaka, 1973 in the general armature of thorax, but differs from the latter in the armature of cephalon; moreover, the first antennular segment of the latter species has two "protuberant contiguous processes" and is "serrulate" along its posterior edge, though none of these structures are present in either sex of the present new species. The first antennular segment of the new species is similar to that of an unnamed species of *Pontostratiotes* reported by Por (1969, p. 6). Por's specimens (two males), however, differ clearly from the new species in having a rod-shaped rostrum and the armature of cephalon as well as thorax. The present new species has no seta on the antennal allobasis in either sex. Such a characteristic is also found in *P. glaber* Por, 1969, as far as seen in Por's figure (Por, 1979, fig. 22).

The specific identity of the male is justified by the following characters: armature of cephalon and thorax, and structure of first antennular segment and antennal allobasis without seta.

***Pontostratiotes unisetosus* n. sp.**

(Figs. 9~13)

Material. Two adult females and one adult male were dissected and designated as the type-series. Holotype: Female. Paratypes: A female and a male (allotype). Type-locality: Southeast off Mindanao, the Pacific Ocean. These specimens were collected with Murano's net (6-II-1979).

Female (Holotype: a pair of leg 6 broken off). Body (Fig. 9-1, 9-2) about 1.7 mm long, colorless and semitransparent. Rostral projection short and wide, triangular in dorsal view. Cephalon 0.35 mm wide, almost quadrate in dorsal view; posterodorsal edge of cephalic shield armed with two triangular projections (Fig. 9-3) which extend beyond succeeding somite a little; many granular protuberances scattered dorsally and laterally. First thoracic somite fringed with a narrow hyaline membrane along posterior edge of its pleurotergite, furnished with granular protuberances. Second thoracic somite; pleurotergite anterolaterally forming a blunt extension which is furnished with spinules and, toward posterior, contiguous to a lateral horn; lateral horn extending a little beyond succeeding somite; dorsoposterior edge armed with two spiniform projections which are short and not sharp; two apically rounded protuberances each located at dorsolateral surface near posterior edge. Third and fourth thoracic somites: anterolateral extension of each pleurotergite not prominent; each lateral horn a little shorter than that of preceding somite; dorsoposterior edge armed with four spiniform projections which are short and not sharp as in those of second thoracic somite. Two spiniform projections discernible from serration on dorsoposterior edge of fifth thoracic somite but not prominent. Genital double-somite (Fig. 9-4) finely serrated along dorsal half of posterior edge, furnished with spinules laterally (Fig.

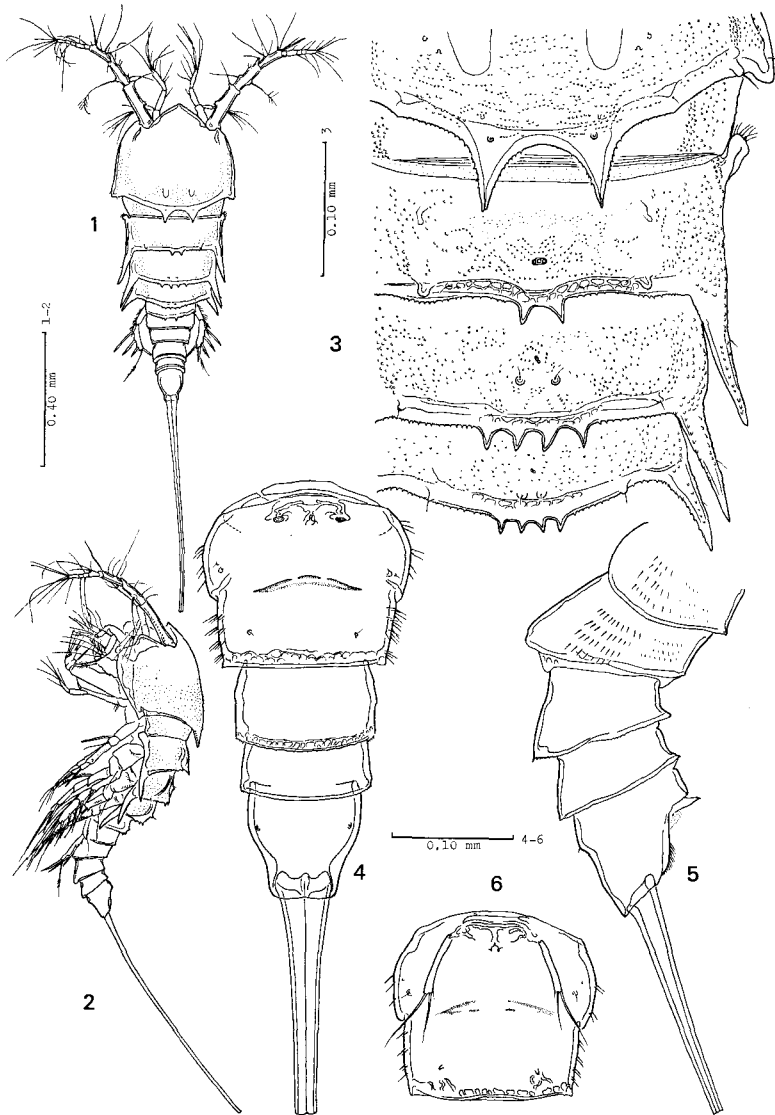


Fig. 9. *Pontostratiotes unisetosus* n. sp. Female (1-5, holotype; 6, paratype). 1. habitus, dorsal; 2. habitus, lateral; 3. cephalon and thorax, dorsal; 4. abdomen, ventral; 5. abdomen, lateral; 6. genital double-somite, ventral.

9-5); genital area as shown in figure. Although a pair of leg 6 were broken off, two scars are detected on genital area (Fig. 9-4; cf. Fig. 9-6, paratype). Antepenultimate, penultimate, and anal somites were dorsally covered with detritus or sludge, and their detailed structure was not examined. Furcal rami about 48% of body length. Terminal furcal setae were broken.

Antennule (Fig. 10-1). First segment 4.2 times longer than thick, forming a short seta-bearing projection which is located at anterior face near apical end, armed with a bifurcate spinous projection at about the middle of anterior face, a small projection on posterodistal edge, and with many granular protuberances both anteriorly and posteriorly; second segment shorter than first, forming a short but thick spinous projection at anterior distal end, with granular protuberances on its distal half, and armed with a long sparsely hairy seta which arises from a crateriform protuberance on a point at a proximal third of posterior face; third segment as long as second segment bearing a slender aesthetasc; fifth and eighth segments subequal in length. *Antenna* (Fig. 10-2). Coxa short, bare. Allobasis armed with two setae, one at an anterodistal portion of basal region, the other at about the middle of anterior face of endopodal region, both setae short and hairy. Exopodite: first segment a little longer than three apical segments combined, spinulose, subapically armed with only one seta which is sparsely hairy. Apical endopodite segment shorter than allobasis. Allobasis, first exopodite segment, and endopodite segment furnished with many short spinules. *Mandible* (Fig. 10-3; cf. Fig. 10-4, paratype female). Praecoxa well sclerotized, armed with a spinulose seta on inner dorsal edge. Coxa-basis narrow, furnished with numerous hairs on ventral edge and anterior surface, armed with four apical or subapical setae, one of which is widely separated from the rest, plumose and is located ventrally, the rest three set close to each other at dorsoapical edge; one of three close setae much elongated, plumose. Exopodite: first segment about three times as long as its greatest width, its first inner seta arising from subproximal edge; all setae of each segment well developed, plumose. Endopodite segment narrow, as long as exopodite segments combined, armed with three closely set setae at about the middle of inner edge, one seta on subapical inner edge, and six setae apically; all setae slender, sparsely spinulose or hairy. *Maxillula* (Fig. 11-1). Arthrite of praecoxa widening inwards, armed with nine spines and setae along inner edge, one thick seta arising from posterior surface; two parallel anterior setae slender, sparsely spinulose; an arched row of fine spinules occurring on posterior surface. Coxal inner process apically or subapically armed with two spines and four setae, anterior two of which are furnished with many short spinules bilaterally. Epipodal seta well developed, plumose. Inner process of basis about twice as long as coxal inner process, armed with two long setae on anterodorsal surface near inner end, of which the dorsal is furnished with many fine spinules; one thick spine together with two slender setae arising from dorsal half of inner end; one slender spine (? spiniform seta) and seven setae arising from ventral half of inner end. Three endopodal setae well developed, hairy. *Maxilla* (Fig. 11-2). Syncoxa about three times longer than

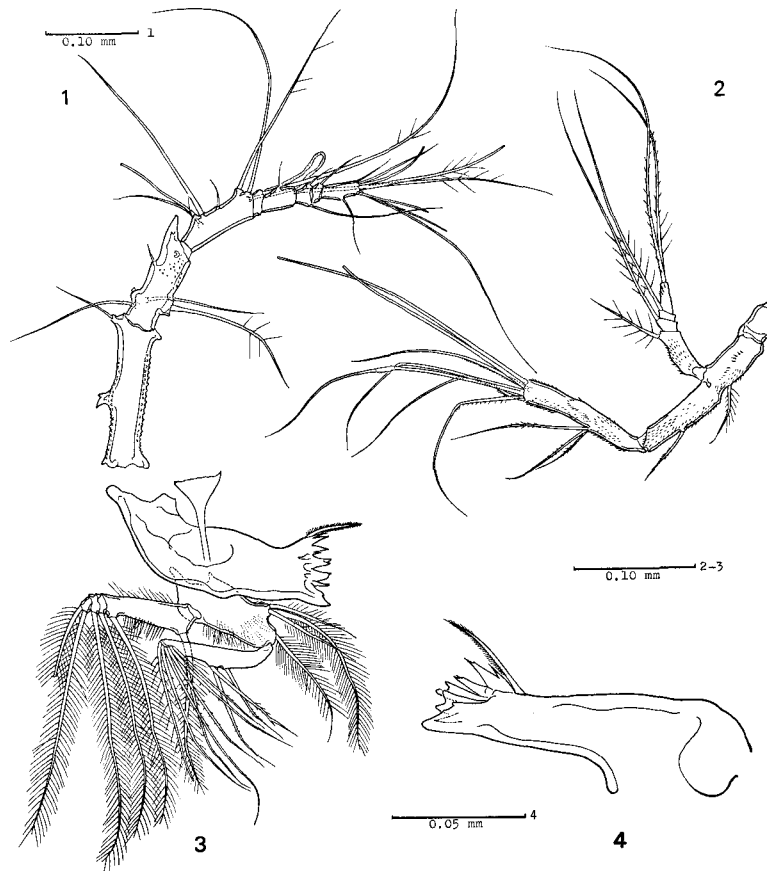


Fig. 10. *Pontostratiotes unisetosus* n. sp. Female (1-3, holotype; 4, paratype).
1. antennule; 2. antenna; 3. mandible; 4. praecoxa of mandible.

wide, furnished with fine spinules closely set on subproximal outer edge; first endite widening apically, armed with five setae, the first (dorsalmost) thick, the fifth (ventralmost) thick and not articulated at base, other three very small; second endite represented by a protrusion with three setae, which are subequal in length and sparsely spinulose; third endite cylindrical, apically armed with one long spine, which is furnished with a few spinules, and two setae, both sparsely spinulose; first three endites widely spaced; fourth endite cylindrical, armed with a strong spine, which is furnished with a few prominent spinules, and two setae, of which the dorsal is thicker than the rest. Basis (Fig. 11-3): inner process a little longer than fourth endite of syncoxa; three juxtaposed setae on distal edge close to

inner base of endopodite. Endopodite; first segment armed with one spine on inner edge and one slender seta on posterior distal edge; second segment armed with one inner seta and one distal seta, the former rather spiniform and with very fine spinules medially; third segment armed with four slender setae apically. *Maxillipede* (Fig. 11-4). Praecoxa short, furnished with long hairs along inner edge. Coxa elongated, about 2.5 times as long as the greatest width; first inner

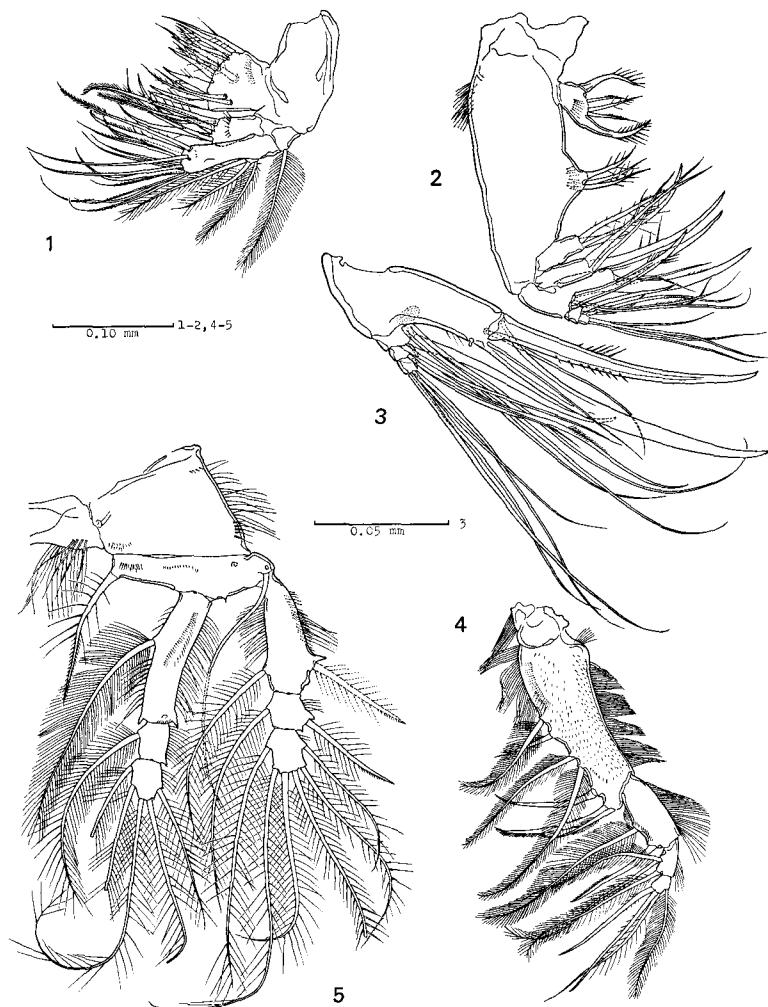


Fig. 11. *Pontostratiotes unisetosus* n. sp. Female (holotype). 1. maxillula; 2. maxilla; 3. basis and endopodite of left maxilla; 4. maxillipede; 5. leg 1.

appendix represented by a well-developed plumose seta which is located on a point at proximal two-fifths of the length; second inner seta close to previous seta, short; third and fourth inner setae closely set, long and plumose; fifth inner appendix

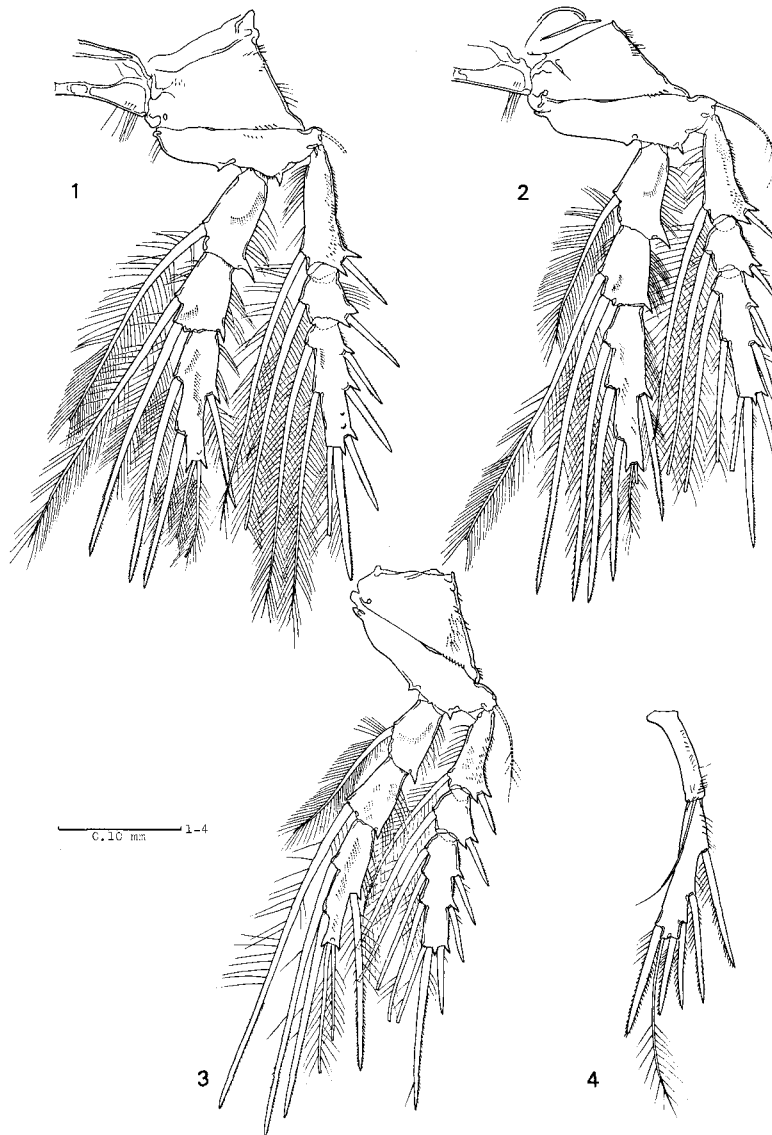


Fig. 12. *Pontostratiotes unisetosus* n. sp. Female (holotype). 1. leg 2; 2. leg 3; 3. leg 4; 4. leg 5.

represented by an arched slender spine; sixth and seventh inner appendixes represented by a long spine which is spinulose ventrally and a short hairy seta; many long hairs attached onto proximal inner edge and whole of outer edge. Basis about a half as long as coxa, armed with one very long plumose seta on about the middle of inner edge and one spine on subapical inner edge; many long hairs attached onto outer edge. Endopodite; first segment longer than wide, armed with two closely set setae on the middle of inner edge and one seta on inner distal edge, all setae plumose; second segment shorter than preceding segment, armed with one apical spine together with two setae, one of which is spiniform; a slender, prominently plumose seta arising from outer edge.

Leg 1 (Fig. 11-5). Free edge of intercoxal plate a little swelling out bilaterally, furnished with very long hairs; four long cirri arising from anterior surface of each swelling. Coxa furnished with fine spinules along outer edge. Basis somewhat protruded outwards over coxa; outer seta very long (the seta of the leg illustrated was broken at a midway), longer than three exopodite segments combined; spinous projection between both rami rudimentary; inner seta arising from inner distal angle, very much widely separated from endopodite. Exopodite: first segment about 1.5 times as long as apical two segments combined, fringed with long spinules and hairs; each outer spine of first two segments with long hairs bilaterally and some spinules apically; first outer appendix of third segment represented by a bilaterally hairy seta as in other outer setae. Endopodite: first segment about 1.7 times as long as apical two segments combined, four times longer than wide, forming a small spinous projection at each distal angle, its inner seta well developed and located almost medially. *Leg 2* (Fig. 12-1). Free edge of intercoxal plate not swelling out, furnished with long hairs and short spinules, no cirri. Basis somewhat protruded outwards over coxa; outer seta slender; spinous projection between rami small; a small spinous projection occurring on inner distal edge close to inner base of endopodite; a few long hairs arising from inner edge. Both rami subequal in length. Exopodite: first segment twice as long as second segment and about as long as third segment, not swelling out at any subproximal portion of outer edge. Endopodite: first segment forming a spur-shaped projection at outer distal angle; third segment about 1.7 times as long as second segment; second inner seta of second segment and two inner setae of third segment rod-shaped; outer spine of third segment located almost medially; two terminal setae of third segment slender. *Leg 3* (Fig. 12-2). Interoxal plate and basal segments almost as in leg 2. Three exopodite segments combined shorter than three endopodite segments combined. Endopodite: inner seta of first segment not reaching distal end of third segment; second inner seta of second segment and three inner setae of third segment rod-shaped; third segment as long as first two segments combined, its two terminal setae small, outer spine shorter than this segment. *Leg 4* (Fig. 12-3). Both rami smaller than those of preceding leg. Endopodite: inner setae of second and third segments rod-shaped; outer spine of third segment longer than this segment; first two segments furnished with numerous

spinules on each posterior surface (only prominent spinules were illustrated). *Leg 5* (Fig. 12-4). Basal segment cylindrical; apical seta slender, as long as exopodite segment. Exopodite about 1.5 times as long as basal segment, armed with four

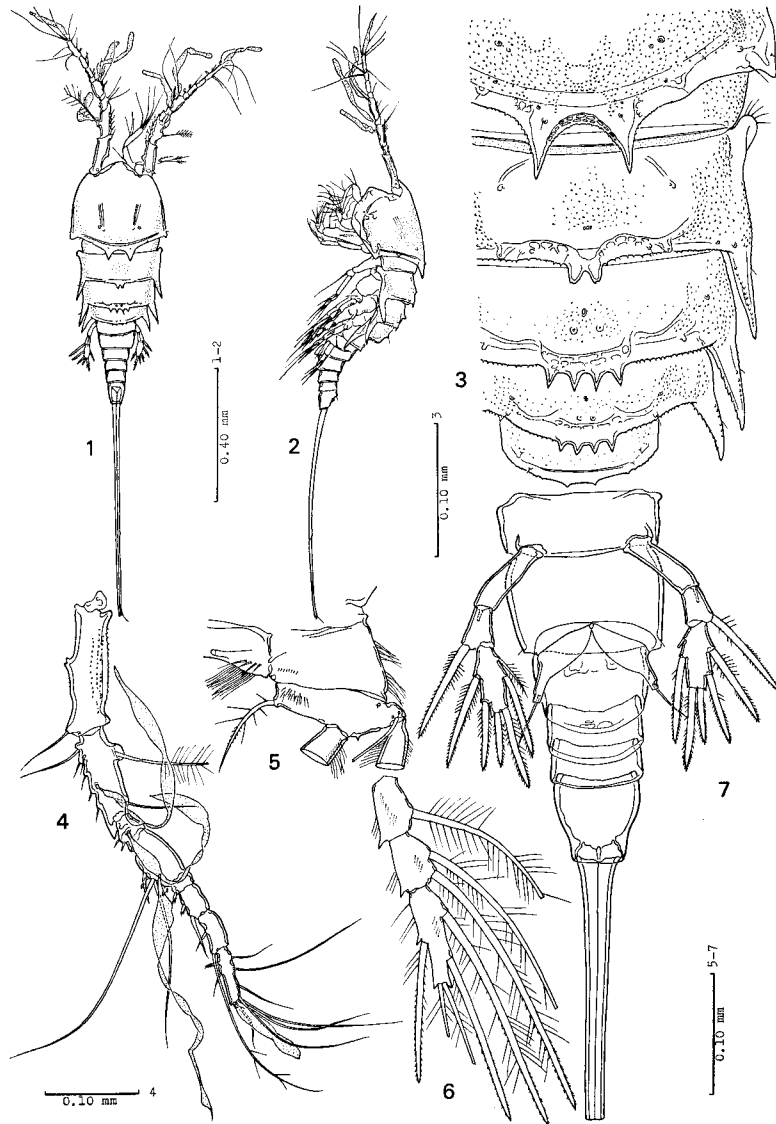


Fig. 13. *Pontostratiotes unisetosus* n. sp. Male (allotype). 1. habitus, dorsal; 2. habitus, lateral; 3. cephalon and thorax, dorsal; 4. antennule; 5. coxa and basis of leg 1; 6. endopodite of leg 4; 7. leg 5 and abdomen, ventral.

outer spines, one terminal seta which is slender and bilaterally hairy, and one inner spine subapically.

Male (Allotype: left antenna broken off). Body (Figs. 13-1, 13-2) about 1.4 mm long. Armature of cephalon and thorax almost as in the female. Spiniform processes of dorsal hind edge of second thoracic somite not pointed (Fig. 13-3). Abdomen as shown in figure (Fig. 13-7). Furcal rami about 41% of body length.

Antennule (Fig. 13-4) haplocer. First segment as in the female; second, third, fourth, and apical segments each with a broad aesthetasc. *Antenna* and *oral appendages* principally as in the female.

Leg 1 (Fig. 13-5) Intercoxal plate with cirri. Outer seta of basis elongate as in the female. *Leg 2* and *leg 3* as in the female. *Leg 4*. Endopodite (Fig. 13-6) armed with two inner setae on its middle segment, the second rod-shaded. *Leg 5* (Fig. 13-7). Seta of basal segment arising from a rudimentary process. Exopodite two-segmented; first segment armed with one outer spine; second segment longer than first segment, armed with two spines on outer edge, two closely set spines on distal end, and one small seta and one spine on inner edge. *Leg 6* (Fig. 13-7) represented by a plate forming a cylindrical process. A terminal seta of each leg was probably broken off.

Remarks. The present new species resembles the specimens reported by Por (1969) under the name *P. scotti* Brodskaya, 1959, especially in the general characteristics of the armature of cephalon and thorax and the structure of the first antennular segment. Por's material, however, clearly differs from the new species in having two setae on the first exopodite segment of the antenna. In the present new species this segment bears only one seta: this characteristic (the specific name alludes this) was confirmed not only in the holotype but also in two paratypes including the allotype.

Incidentally, I don't think Por's specimens are of *P. scotti* because the first antennular segment of *P. scotti* bears two spinous projections located almost medially (Scott, 1910, pl. II, fig. 1), but the segment of Por's material bears only one projection as in the new species described. Antennal setation also seems to be different between them, though it is uncertain whether their materials were damaged or not.

Pontostratiotes abyssicola Brady, 1883

(Figs. 14~18)

Pontostratiotes abyssicola: Brady, 1883, p. 105, pl. 44; Lang, 1948, p. 182, fig. 109; Brodskaya, 1959, p. 1786; Dinet, 1977, p. 1167, figs. 1-2.

Material. An adult female (Southeast off Mindanao, the Pacific Ocean; 5-II-1979, Itô's net). The single specimen collected was fairly damaged. The specimen, however, reveals me some interesting characteristics which have previously been unknown. In the following the specimen is described and illustrated in detail as far as possible.

Female. Body (Figs. 14-1, 14-2) about 3 mm long, colorless and semitransparent. Rostral projection extending toward anteroventral (see lateral view: Fig. 14-2), with a bifid apex. Labrum not much swelling. Cephalon 0.55 mm wide,

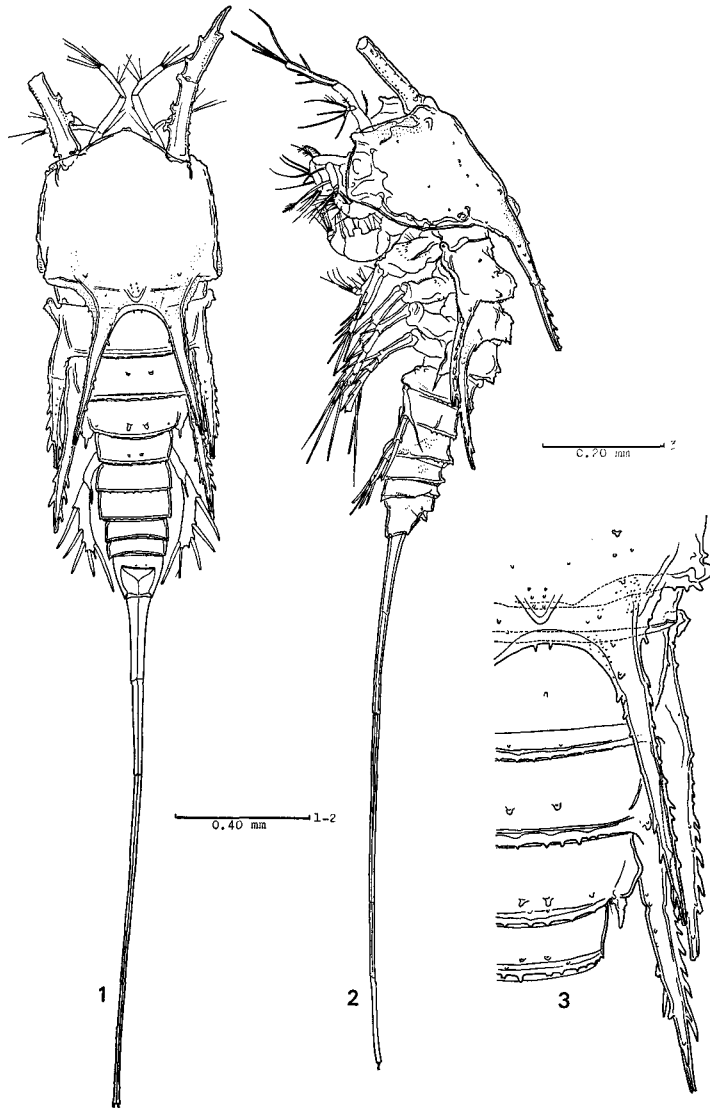


Fig. 14. *Pontostratiotes abyssicola* Brady. Female. 1. habitus, dorsal; 2. habitus, lateral; 3. cephalon and thorax.

almost quadrate in dorsal view, furnished with a lump with at least six pores (?) on dorsal surface near posterior edge; cephalic shield protruded ventrally at mandibular region, armed with two long dorsal horns; these dorsal horns somewhat divergent, almost reaching posterior end of fourth thoracic somite, furnished with denticles dorsally and laterally (Fig. 14-3). Pleurotergite of first thoracic somite without particular ornamentation. Second thoracic somite: pleurotergite anterolaterally forming a blunt extension which is naked and externally serrated and, toward posterior, contiguous to lateral horn; lateral horn reaching posterior edge of fourth thoracic somite, denticulate; hind edge with denticles between lateral horns. Third thoracic somite: anterolateral extensions of pleurotergite not prominent; a pair of tubercles arising from dorsal face near posterior edge; lateral horns well developed as in preceding somite. Fourth thoracic somite: anterolateral extension not prominent, each lateral horn represented by a small spinous projection; a pair of tubercles occurring on dorsal face near posterior edge. Fifth thoracic somite (Fig. 15-1) furnished with denticles along posterior edge. Genital double-somite (Fig. 15-1): anterior and posterior subdivision furnished with denticles on posterior edge of each dorsal half; genital area as shown in figure (Fig. 15-2: a pair of leg 6 broken off). Abdomen furnished with many short spinules laterally (Fig. 15-3). Antepenultimate somite with denticles posteriorly. Anal operculum rounded. Furcal rami about 53% of body length, with very short spinules on dorsal face near base. Furcal setae were broken.

Antennule. First segment of the left antennule and first two segments of the right persisted on the cephalon, though no seta remained on them. First segment (Fig. 15-4) about 4.5 times as long as thick, furnished with a seta-bearing protuberance (apical seta missing) at distal extremity of anterior face, six (? seven) tubercles arranged in a longitudinal row on posterior face, and many granular protuberances dorsally and ventrally; two spinous projections occurring on anterior face, the first (proximal) one apically bifid and the second apically serrated. Second segment forming a strong horny extension anterodistally. *Antenna* (Fig. 15-5). Coxa short, bare. Allobasis almost bare, about six times as long as basal diameter, armed with two setae anteriorly (both are broken). Exopodite: first segment about 1.4 times as long as apical three segments combined, with very short spinules, armed with two setae; fourth segment slender, longer than second and third segments combined. Apical endopodite segment shorter than allobasis. *Mandible* (Fig. 16-1). Praecoxa armed with two spinulose setae on dorsal edge near cutting edge. Coxa-basis elongate, with spinules along dorsal rim (dots represent scars of missing spinules); of four apical setae, the ventralmost widely separated from other three. Exopodite and endopodite (Fig. 16-2) less spinulose. First exopodite segment about three times as long as apical three segments combined, its first inner seta located subproximally. Endopodite segment somewhat sinuate, armed with three close setae on about the middle of inner edge, one finely spinulose seta on subapical inner edge, and four closely set apical setae, at least one of which is finely spinulose. *Maxillula* (Fig. 16-3). Arthrite of

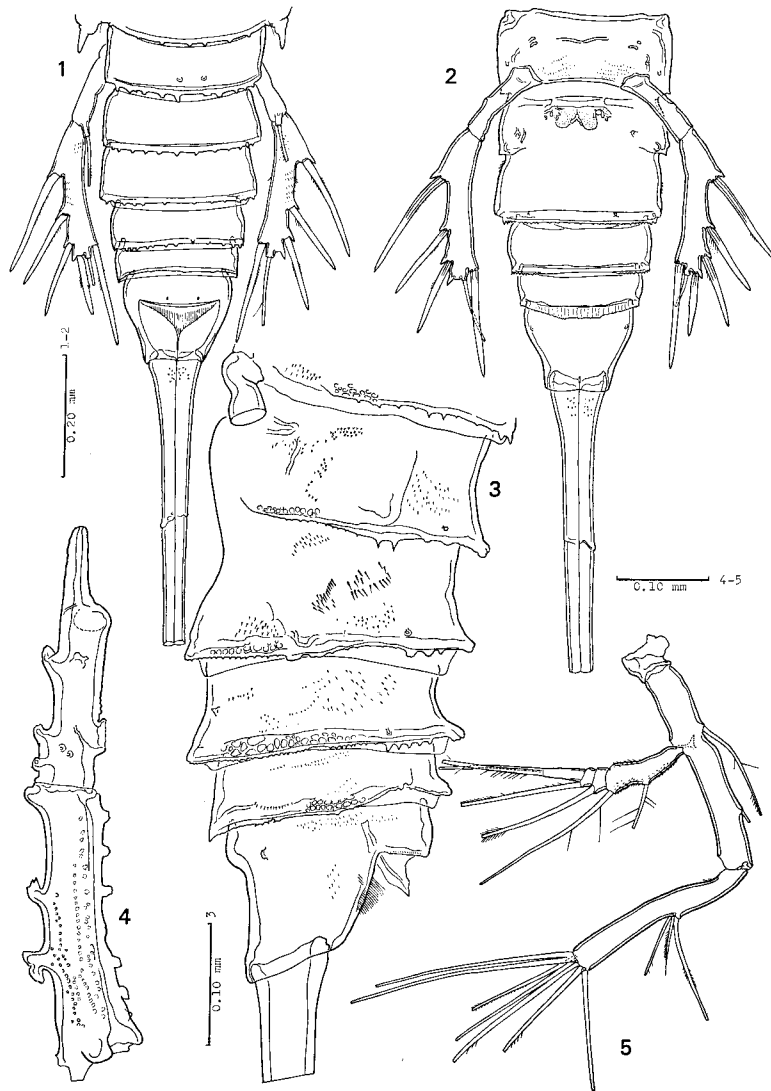


Fig. 15. *Pontostratiotes abyssicola* Brady. Female. 1. leg 5 and abdomen, dorsal; 2. leg 5 and abdomen, ventral; 3. abdomen, lateral; 4. first two segments of antennule; 5. antenna.

praecoxa a little widening inwards, armed with 11 spines and setae along inner edge, one thick seta arising from posterior surface; two parallel anterior seta slender, sparsely spinulose. Coxal inner process not reaching inner edge of



Fig. 16. *Pontostratiotes abyssicola* Brady. Female. 1. mandible; 2. endopodite of right mandible; 3. maxillula; 4. inner process of basis of right maxillula; 5. maxilla; 6. maxillipede; 7. leg 1.

arthrite of praecoxa, apically or subapically armed with two spiniform setae and four setae, anterior two of which are long and bilaterally spinulose. Epipodal seta hairy. Inner process of basis (Fig. 16-4) much longer than coxal inner

process, armed with 14 apical or subapical setae in all, two of which are spiniform and densely furnished with spinules dorsally. Three endopodal setae (broken) hairy. *Maxilla* (Fig. 16-5). *Syncoxa* about 2.5 times longer than wide; first endite widening apically, armed with five setae, the first (dorsalmost) thick and with some prominent spinules, the fifth (ventralmost) thick, spinulose, and not articulated at base, other three small and more or less spinulose; second endite scarcely protruded, with three short setae which are sparsely spinulose; third endite short cylindrical, terminating in one spine and two setae; spaces among first three endites wide; fourth endite cylindrical, armed with one long arched spine and two setae (broken). *Basis*: apical claw of inner process very strong; three basally fused setae (only each apical portion is illustrated) on distal edge close to inner base of endopodite. Endopodal setae were broken. *Maxillipede* (Fig. 16-6). *Praecoza* short, furnished with long hairs along inner edge. *Coxa* elongated, about twice as long as the greatest width, gradually tapering apically; first inner appendix represented by a well-developed plumose seta which is located on a point at a proximal third of the length; second inner seta thick, finely spinulose; third and fourth inner seta plumose; fifth inner seta thick and finely spinulose; first five inner setae moderately spaced; sixth and seventh inner setae closely set, the former (anterior) seta very strong and spinulose, the latter plumose; many long hairs attached to proximal inner edge, which somewhat swells out, and along whole of outer edge. *Basis* about a half as long as *coxa*, armed with one very long plumose seta on about the middle of inner edge and one spine on subapical inner edge; many long hairs attached onto outer edge. *Endopodite*: first segment longer than wide, armed with two closely set setae on the middle of inner edge, the anterior slender, and one seta on inner distal edge, all setae hairy; second segment shorter than first segment, armed with two apical setae and two outer setae.

Leg 1 (Fig. 16-7). Free edge of intercoxal plate apparently swelling out bilaterally; at least six spinules (some of them are represented by scars) occurring on each swelling edge or anterior surface near edge; very long hairs attached onto each swelling edge. *Coxa* furnished with many scattered short spinules on anterior surface and long spinules along outer edge. *Basis* markedly protruded outwards over *coxa*; spiniform projection between rami well developed, sharply pointed; inner seta very big, widely separated from endopodite, arising from inner distal angle. Outer seta of *basis* is broken, though it seems to be very long. *Exopodite*: first segment longer than apical two segments combined; first outer appendix of third segment represented by a seta (broken) as in other setae. *Endopodite*: first segment elongated, about twice as long as apical two segments combined, forming a spinous projection not only at outer distal edge but also at inner distal edge, its inner seta located almost medially. *Leg 2* (Fig. 17). Free edge of intercoxal plate a little swelling out, furnished with many prominent spinules (hairs were missing?). *Coxa* with two sensory hairs, one located at middle outer edge the other on anterior face midst. *Basis* markedly protruded outwards over *coxa*; spinous projection between rami well developed; a prominent spinous projection occurring on inner



Fig. 17. *Pontostratiotes abyssicola* Brady. Female. Leg 2.

distal edge close to inner base of endopodite; a few short spinules attached onto inner edge. Both rami subequal in length. Most of setae were broken. Exopodite: first segment twice as long as second segment, a little swelling out at a subproximal portion of outer edge; third segment longer than first segment. Endopodite: first segment twice longer than wide, forming a spur-shaped projection at outer distal angle; third segment about 1.8 times as long as second segment, its outer spine located medially; second inner seta of second segment and two inner setae of third segment rod-shaped. *Leg 3* (Fig. 18-1). Free edge of intercoxal plate scarcely swelling, furnished with spinules (scars) and long hairs. Basis markedly protruded outwards over coxa; two spinous projections prominent.

Three exopodite segments combined as long as three endopodite segments combined. First exopodite segment swelling out at a subproximal portion as in leg 2. Endopodite: second inner seta of second segment and three inner setae of third segment rod-shaped; third segment about as long as first two segments combined, its outer spine located medially. *Leg 4* (Fig. 18-2). Free edge of intercoxal plate not swelling out, furnished with spinules (scars) and hairs. Basis markedly protruded outwards over coxa; two spinous projections prominent. All inner setae of second and third endopodite segments rod-shaped. *Leg 5* (Figs. 15-1, 15-2). Basal segment furnished with a seta which arises from an apically truncate cylindrical process. Exopodite about four times as long as its greatest width, armed with four outer spines, one slender terminal seta, and one inner spine subapically.

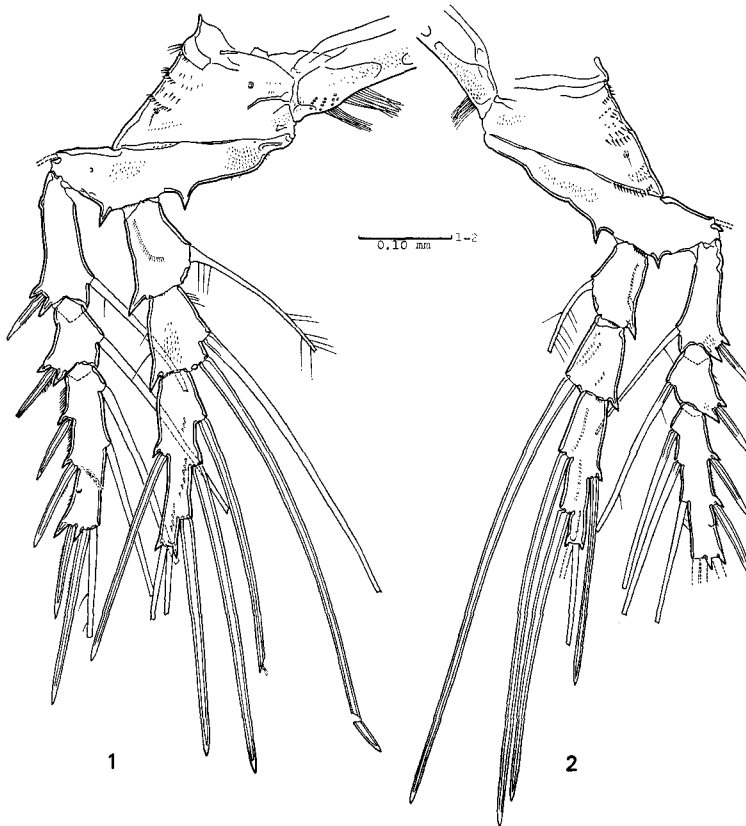


Fig. 18. *Pontostriatiotes abyssicola* Brady. Female. 1. leg 3; 2. leg 4.

Remarks. Brady (1883) clearly showed that his male specimen of *P. abyssicola* had a pair of horny processes on the cephalon anterolaterally, and this unique characteristic has recently been ascertained by Dinet (1977) who reported not only the male but also the female. If the unknown male of the present species from the western Pacific has no such cephalic horns, the female collected must be considered of a separate species. According to Dinet's description and figures (Dinet, op. cit.) of *P. abyssicola*, posterolateral processes of the fourth thoracic pleurotergite are small, and the first antennular segment is 4.3 times as long as its width (Dinet, op. cit., p. 1198). In these two characteristics, Dinet's material almost accords with mine.

Although Por (1969) reported a female specimen from the Indian Ocean under the name *P. abyssicola*, his specimen has already been designated as the holotype of a separate species, *P. pori* Dinet, 1969 (Dinet, op. cit., p. 1170). *P. pori* is easily discernible from *P. abyssicola* in having long posterolateral processes on the fourth thoracic pleurotergite.

***Pontostratiotes sixtorum* Por, 1969 *mindanaoensis* n. subsp.**

(Figs. 19~23)

Material. An adult male was dissected and designated as the holotype. Type-locality: Southeast off Mindanao, the Pacific Ocean. The specimen was collected with Murano's net (6-II-1979).

Male (Holotype). Body (Figs. 19-1, 19-2) about 1.9 mm long, colorless and semitransparent, with well-developed superficial reticulation as shown in figures. Exoskeleton thick sclerotized. Rostrum (Fig. 19-4) well developed, represented by a triangular extension of cephalic shield. Labrum not much swelling. Cephalic shield markedly protruded ventrally at mandibular region, and covering over mandible and maxillula (cf. Fig. 19-2, and Figs. 1-1 for *P. pacificus* and 9-2 for *P. unisetosus*): two triangular projections occurring on dorsal hind edge. First thoracic somite short, covered with posterior extension of cephalic shield. Each pleurotergite of second, third, and fourth thoracic somites laterally well-sclerotized; each lateral edge a little protruded anteriorly, two-stepped, posteriorly extending as a wide horny process; dorsal hind edge finely denticulated. A pair of spermatophores occurring through fifth thoracic and succeeding somites (Fig. 20). Each posterior rim of fifth thoracic somite as well as abdominal somites, except for anal somite, very weakly denticulated. Abdominal somites furnished with fine spinules scattered on each ventral face. Anal somite furnished with fine spinules on dorsal surface anterior to anal operculum. Furcal rami about 46% of body length, furnished with numerous short spinules. Furcal setae are broken.

Antennule (Fig. 21-1) haplocer. First segment subcylindrical except for an apical portion, about four times as long as diameter (measured medially), posterodistally forming a very strong horny process which is arched backward; seta-bearing process not prominent. Second segment shorter than first segment,

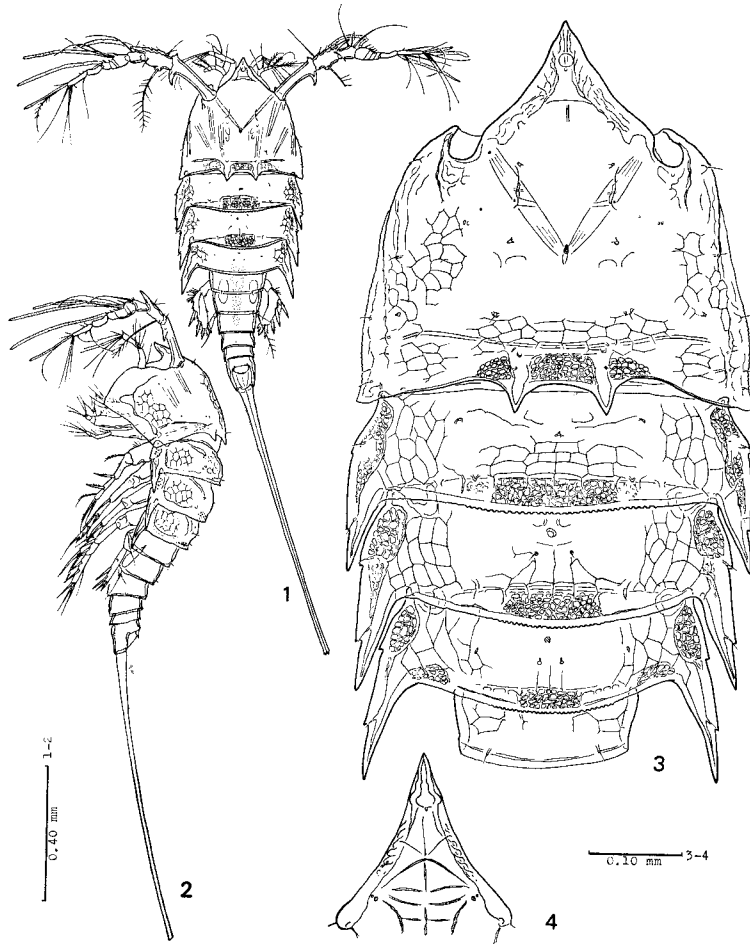


Fig. 19. *Pontostratiotes sixtorum* Por *mindanaoensis* n. subsp. Male (holotype).
1. habitus, dorsal; 2. habitus, lateral; 3. cephalon and thorax, dorsal; 4. rostrum.

anterodistally forming a strong horny process which extends straight toward apical, posteriorly furnished with a sparsely hairy seta which arises from a crateriform protuberance on about the middle of its length. A long aesthetasc (not very wide) arising from second, third, fourth (annulated), and apical segments. *Antenna* (Fig. 21-2). *Coxa* short, with fine spinules. *Allobasis* with a suture internally at almost the middle of its length, about four times as long as its diameter, armed with two long setae anteriorly (the first one is missing in the right antenna illustrated), furnished with many spinules externally and posteriorly. *Exopodite*: four

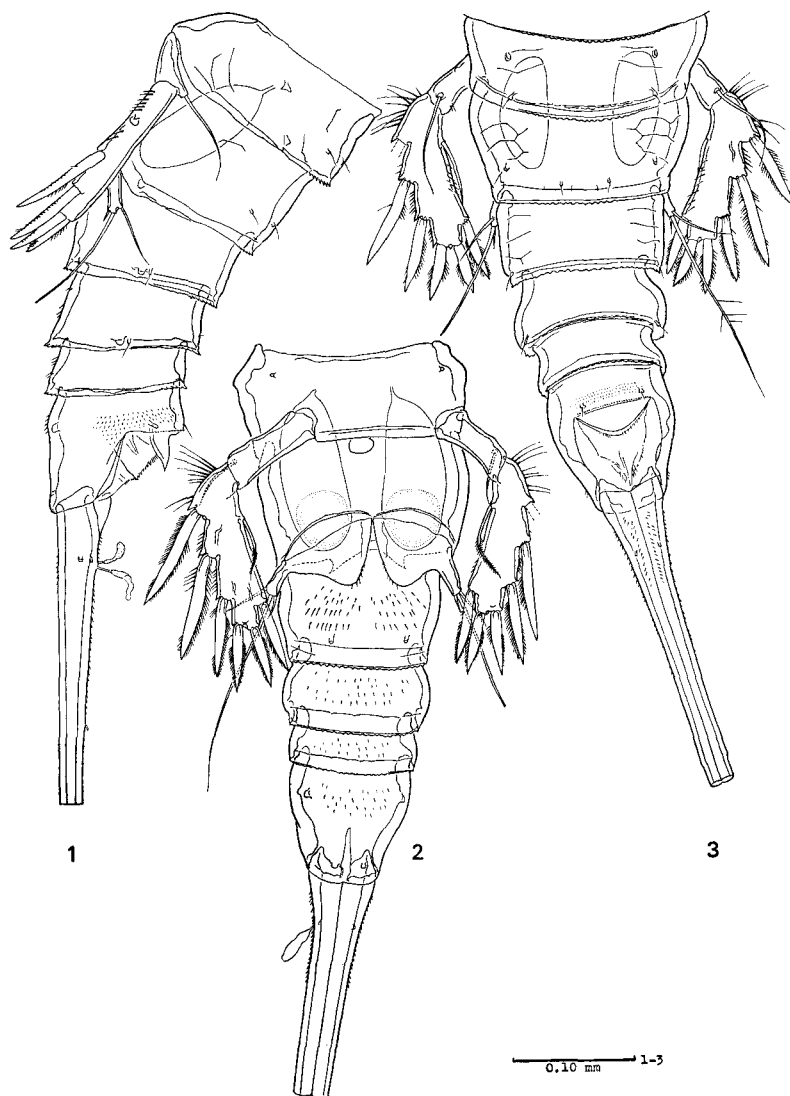


Fig. 20. *Pontostratiotes sixtorum* Por *mindanaoensis* n. subsp. Male (holotype). 1. leg 5 and abdomen, lateral; 2. leg 5 and abdomen, ventral; 3. leg 5 and abdomen, dorsal.

segments combined about two-thirds times as long as allobasis; first segment shorter than apical three segments combined, armed with two well-developed setae, both spinulose; second and third segments not very short; fourth segment about as long as second and third segments combined. Apical endopodite



Fig. 21. *Pontostratiotes sixtorum* Por *mindanaoensis* n. subsp. Male (holotype).
1. antennule; 2. antenna; 3. mandible; 4. maxillula.

segment as long as allobasis, with many rows of spinules of different lengths. *Mandible* (Fig. 21-3). *Praecoxta* well sclerotized, bearing dents and a slender spinulose seta along cutting edge. *Coxa-basis* about twice longer than wide, heavily pubescent, armed with four apical setae, one of which is long and plumose.

Exopodite: four segments combined shorter than coxa-basis; first segment about 2.5 times longer than wide, its first inner seta located at a point proximal one third of the length; apical three segments very short; all setae of each segment well developed, plumose. Endopodite segment about four times as long as its greatest width, armed with three close inner setae which are rather short and located almost medially, one long inner seta subapically, and six setae apically. *Maxillula* (Fig. 21-4). Arthrite of praecoxa not widening inwards, armed with one thick seta on posterior face, and 11 (?) spines or setae along cutting edge; a row of fine spinules on posterior surface near base; two anterior parallel setae rather short and slender, very sparsely spinulose. Coxa furnished with spinules on its anterior surface near outer edge; inner process not extending beyond arthrite of praecoxa, armed with seven apical setae, anterodorsal one of which is bilaterally furnished with prominent spinules. Epipodal seta short, hairy. Inner process of basis about twice as long as coxal inner process, armed with 13 (?) apical or subapical setae, at least dorsal two of which are furnished with prominent spinules. Inner endopodal seta short, plumose. *Maxilla* (Fig. 22-1). Syncoxa about twice longer than wide, tapering apically, furnished with long spinules along outer edge; first endite almost discoidal, armed with four setae, of which the dorsalmost and the ventralmost are big and with prominent spinules, other two slender and short; second endite rudimentary, armed with three sparsely spinulose setae which are subequal in length; third endite represented by a short cylindrical process armed with three apical setae, all sparsely spinulose; fourth endite cylindrical, much longer than previous endite, apically armed with one sharp long spine, which is with a few prominent spinules, and two setae, one of which is thick and with many short spinules. Basis: inner process thick; three juxtaposed slender setae arising from distal edge close to inner base of endopodite; posterior claw furnished with a few prominent spinules dorsally. Endopodite: first segment armed with one inner spine and one subapically geniculate spiniform seta on anterior apical edge; second segment with two subapically geniculate spiniform setae; third segment with one geniculate spiniform seta and three slender setae. *Maxillipede* (Fig. 22-2). Praecoxa furnished with numerous long hairs along inner edge. Coxa about twice longer than wide, bearing many scattered spinules on posterior surface, several vertical rows of spinules on anterior surface, many long hairs on proximal half of inner edge and outer edge; first two inner setae fairly close to each other; second inner seta short and spinulose; first, third, and fourth inner setae well developed, densely plumose; fourth and fifth setae close to each other; fifth, sixth, and seventh inner setae very big, rather spiniform, fringed with spinules bilaterally. Basis twice as long as its greatest width, fringed with many long hairs along outer edge; one long plumose inner seta located at a point two-thirds of the length from the base; one very strong claw, which is furnished with prominent spinules dorsally, arising from subapical inner edge. Endopodite: two segments combined shorter than basis; first segment armed with two closely set setae at the middle of inner edge and one plumose seta on apical inner edge; second segment shorter than first

segment, armed with one spine, which is as long as basis, and one geniculate spiniform seta on distal end, and two hairy setae on outer edge.

Leg 1 (Fig. 22-3). Intercoxal plate scarcely swelling out bilaterally at its

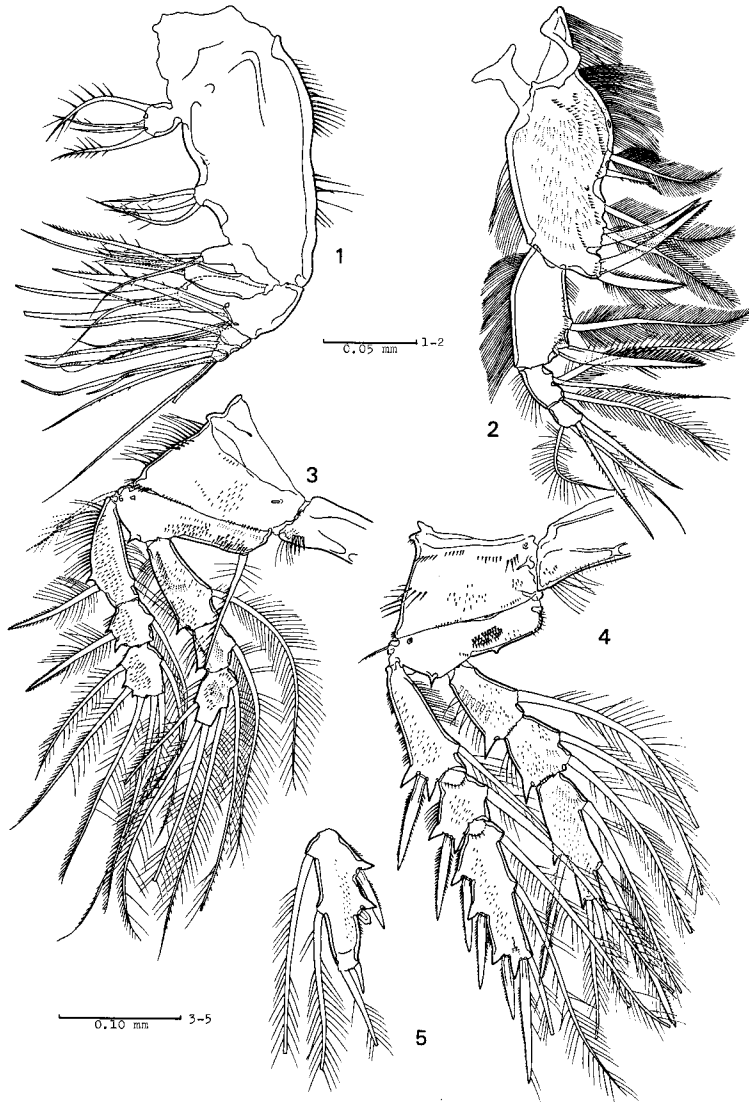


Fig. 22. *Pontostratiotes sistorum* Por *mindanaoensis* n. subsp. Male (holotype). 1. maxilla; 2. maxillipede; 3. leg 1; 4. leg 2; 5. abnormal third exopodite segment of leg 2.

free edge; four prominent spinules attached onto anterior surface near each outer distal corner; long hairs arising from free edge near lateral end. Coxa fringed with long spinules along outer edge. Basis a little protruded outwards over coxa; spinous projection between both rami small; outer seta (missing in the illustrated leg) about as long as first exopodite segment; inner seta widely separated from base of endopodite, shorter than two endopodite segments combined. Exopodite: first segment as long as apical two segments combined, furnished with long spinules along outer edge; each outer spine of first two segments subequal in length, furnished with hairs and spinules; second and third segments subequal in length; second segment with a small spinous projection at its outer distal angle, but without any projection at inner distal angle; outer edge of each segment fringed with long hairs; spinous projections of outer edge of each segment small; all of outer and terminal setae of third segment furnished with hairs and spinules. Endopodite: first segment as long as apical two segments combined, with no spinous projection at inner distal edge, its inner seta attached onto a point at two-thirds of the length from the base. Both rami furnished with many scattered spinules on each anterior surface. *Leg 2* (Fig. 22-4). Free edge of intercoxal plate not swelling out, furnished with a few very small spinules on anterior surface near outer distal corner, a row of fine spinules on posterior surface along free edge. Basis scarcely protruded outwards; spinous projection between rami small; a small spinous projection occurring on inner distal edge. Exopodite: first segment shorter than apical two segments combined, with no swelling at any subproximal portion of outer edge; second segment as long as wide; third segment longer than first segment; each outer spine of all segments arising from clearly stepped edge with spinous projection; each outer edge fringed with short spinules. Endopodite: three segments combined shorter than three exopodite segments combined; first two segments forming a spinous projection at each outer distal angle, furnished with long hairs along each outer edge sparsely; first segment furnished with a longitudinal row of prominent spinules on posterior surface; second segment shorter than first segment; third segment about as long as first two segments combined, its outer spine located on a point at three-fifths of the length from the base; second inner seta of third segment rod-shaped. Both rami furnished with numerous fine spinules scattered on anterior surface of each segment. *Leg 3* (Fig. 23-1). Intercoxal plate and coxa almost as in leg 2. Basis without spinous projection on inner distal edge. Outer spine of third endopodite segment located at a point two-thirds the length from the base. Second and third inner setae of third endopodite segment rod-shaped. Both rami furnished with many scattered spinules on each anterior surface. *Leg 4* (Fig. 23-2). Intercoxal plate low, not swelling. Demarcation between coxa and basis much inclined. Basis not much protruded outwards over coxa, without spinous projection on inner distal edge; spinous projection between both rami rudimentary. Endopodite: second segment armed with two inner setae, these not rod-shaped; third segment as long as first two segments combined, its outer spine longer than

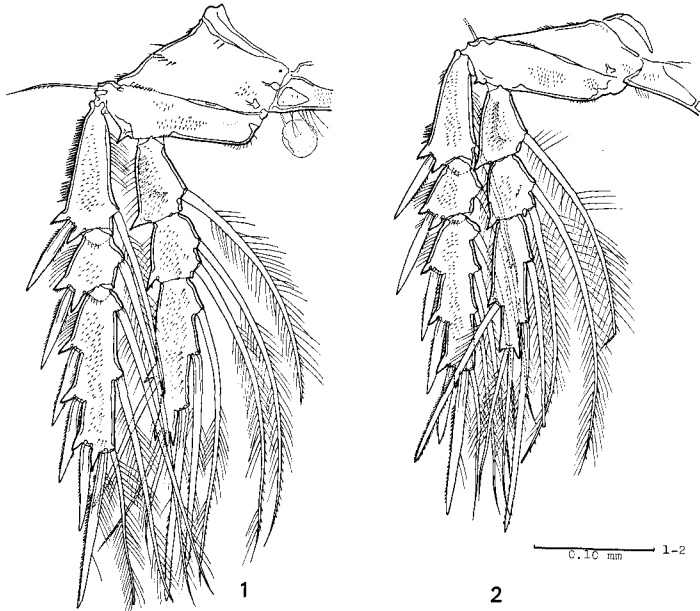


Fig. 23. *Pontostratiotes sixtorum* Por *mindanaoensis* n. subsp. Male (holotype).
1. leg 3; 2. leg 4.

this segment, located at a point two-thirds the length from the base; second inner seta of third segment rod-shaped. *Leg 5* (Figs. 20-2, 20-3). Basal segment sub-cylindrical, armed with a bare seta which arises from a rudimentary protuberance. Exopodite consisting of one segment, approximately 3.5 times longer than wide, armed with one small finely spinulose seta at a proximal quarter of inner edge, four spines on stepped outer edge, one spine apically, and one spine on stepped inner edge subapically; all of six spines thick and spinulose. *Leg 6* (Fig. 20-2) represented by a plate with a cylindrical outer process which bears one long seta, which extends beyond penultimate somite, and two short setae.

Remarks. The description of *P. sixtorum* s. str. was based upon a single female specimen collected from the Indian Ocean (Por, 1969). The specific identification of my male specimen may be supported by the resemblance in the following characters: prominent triangular rostrum, armature of cephalon and thorax, shape of first antennular segment, and proportion of exopodite and endopodite segments of leg 1; moreover, Por's figure of the body shows no reticulation, but a microscopic photograph clearly indicates its presence as in the present specimen (cf. Por, op. cit., figs. 76 and 175). The present male, however, differs from Por's specimen in the setal structure of the endopodite of leg 4: Distal seta of second segment and

first inner seta of third segment are rod-shaped in Por's specimen (Por, op. cit., fig. 175), though these are not rod-shaped in the present specimen (the difference in the number of setae of the second segment is regarded as a sexual dimorphism). Because of this difference in the setal structure I discriminate the present male as of a separate subspecies from *P. sixtorum sixtorum*.

***Pontostratiotes robustus* n. sp.**

(Figs. 24~27)

Material. An adult male was dissected and designated as the holotype. Type-locality: Southeast off Mindanao, the Pacific Ocean. The specimen was collected with Murano's net (6-II-1979).

Male (Holotype). Body (Figs. 24-1, 24-2) about 1.6 mm long, with brownish tinge, semitransparent, with well-developed superficial reticulation as shown in figures. Exoskeleton very much sclerotized. Rostrum (Fig. 24-4) prominent, triangular in shape, extending toward front. Cephalic shield fairly extending ventrally, well covering over oral appendages (Fig. 24-2); posterior extension well developed, with no spinous projection, entirely covering over first thoracic somite; superficial reticulation present on lateral and posterior surface (Fig. 24-3). First thoracic somite dorsally reduced in its length but each lateral portion of its pleurotergite definable under cephalic shield. Each pleurotergite of second, third, and fourth thoracic somites alike, with prominent superficial reticulation, with no spinous projection dorsally, not particularly protruded toward anterior at each lateral portion; each lateroposterior angle forming a pointed extension; each posterior edge very finely serrated. Fifth thoracic and abdominal somites, except for anal somite, with superficial reticulation dorsally and laterally, not ventrally (Figs. 25-1, 25-2, 27-3); each hind edge finely serrated. Anal somite tapering posteriorly, furnished with a row of denticles along base of anal operculum. Furcal rami 31% of body length. Furcal setae were broken.

Antennule (Fig. 24-4) haplocer; first segment about twice as long as its greatest diameter, subcylindrical, furnished with a short bare seta anterodistally, with neither spinous projection nor denticles, furnished with delicate spinules on anterior surface; second segment as long as first segment, forming a straight spinous projection at anterior distal edge; a thick aesthetasc arising from each of second, third, and fourth (annulated) segments; apical segment with a slender aesthetasc terminally. **Antenna** (Fig. 25-3). Coxa short, bare. Allobasis about five times as long as basal diameter, armed with two setae anteriorly, the first very long and sparsely spinulose, the second short and finely spinulose; short spinules occurring on anterior surface of basal part. Exopodite: three segments combined as long as apical endopodite segment; first segment a little longer than apical three segments combined, furnished with spinules on inner face, armed with two setae, the first located medially and slender, the second located distally; second and third segments very short; fourth segment longer than preceding two segments combined; all setae

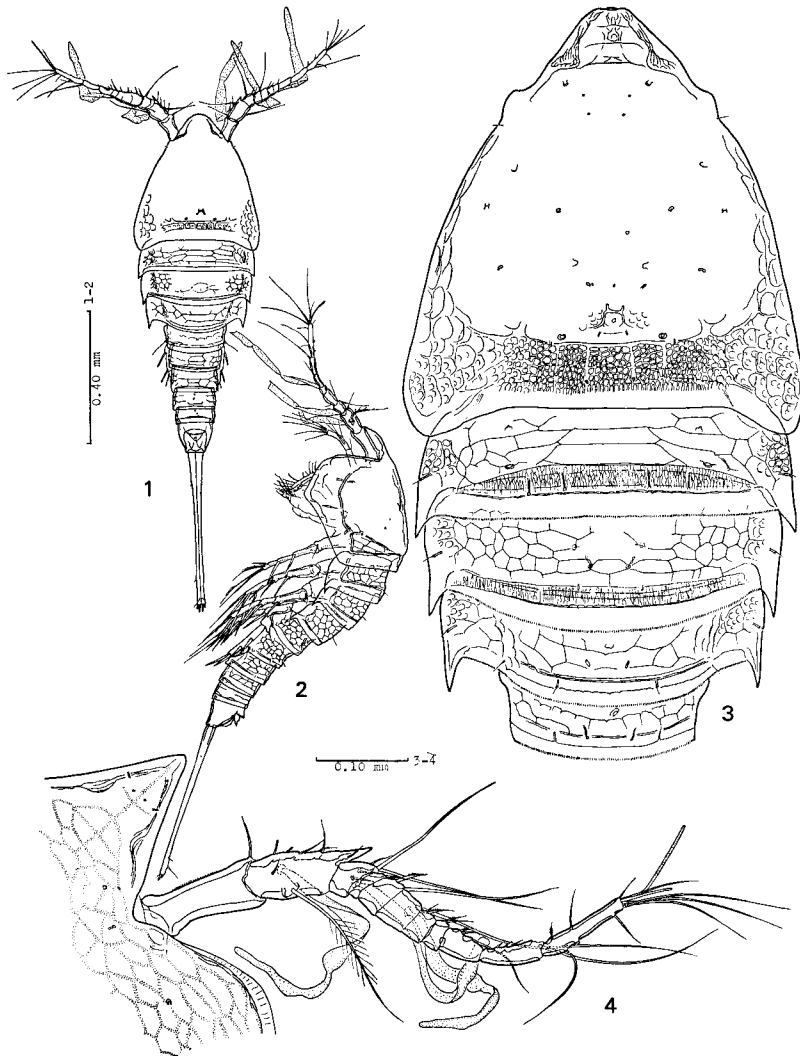


Fig. 24. *Pontostratiotes robustus* n. sp. Male (holotype). 1. habitus, dorsal; 2. habitus, lateral; 3. cephalon and thorax, dorsal; 4. rostrum and antennule.

of apical three segments very long and furnished with long spinules or hairs bilaterally. Apical endopodite segment as long as allobasis, furnished with some rows of spinules; setae with short spinules. *Mandible* (Fig. 25-4). *Praecoxa* well sclerotized, with spinules proximally, armed with dents and a well-developed bilaterally spinulose seta along cutting edge. *Coxa-basis* widening apically,

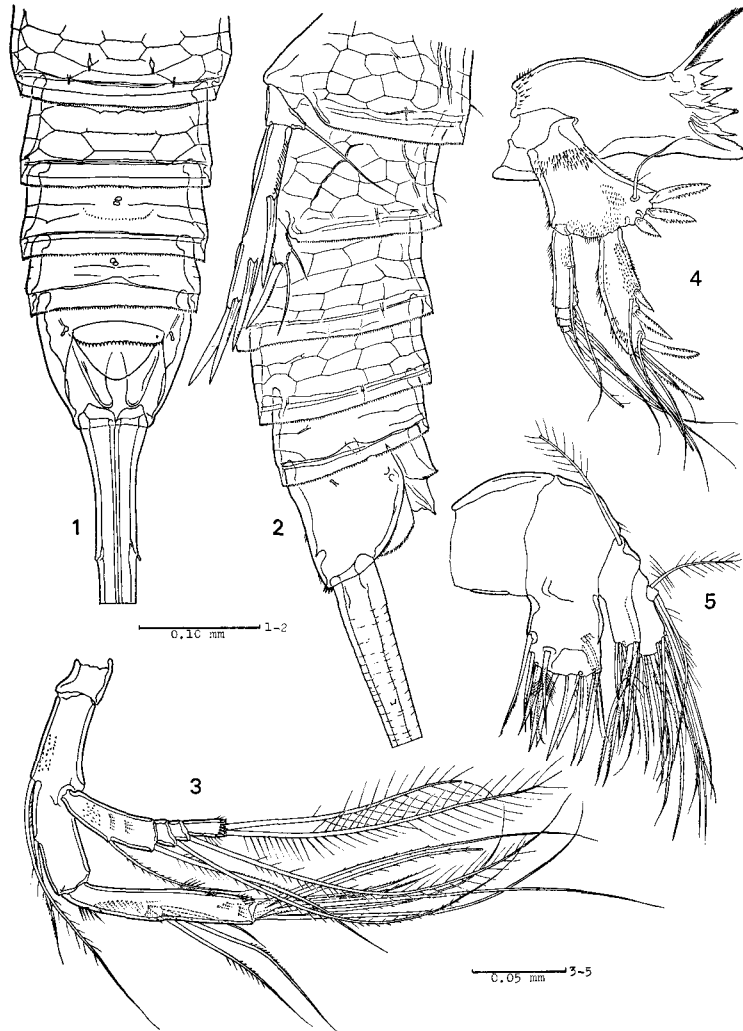


Fig. 25. *Pontostratiotes robustus* n. sp. Male (holotype). 1. abdomen, dorsal; 2. leg 5 and abdomen, lateral; 3. antenna; 4. mandible; 5. maxillula.

furnished with many short spinules scattered marginally and anteriorly, armed with three short apical spines, each of which is thick and bears two rows of serrations; a slender seta arising from anterior face near inner apical angle. Exopodite rather slender; first segment as long as apical two segments combined, its first inner seta located almost medially; all setae slender and with short spinules. Endopodite much thicker than exopodite, a little longer than four exopodite

segments combined, armed with four serrate spines, the first located medially, and four slender setae which are reciprocally arranged along distal half of inner edge; two slender setae occurring apically; numerous short spinules occurring marginally and anteriorly. *Maxillula* (Fig. 25-5). Arthrite of praecoxa not constricted at

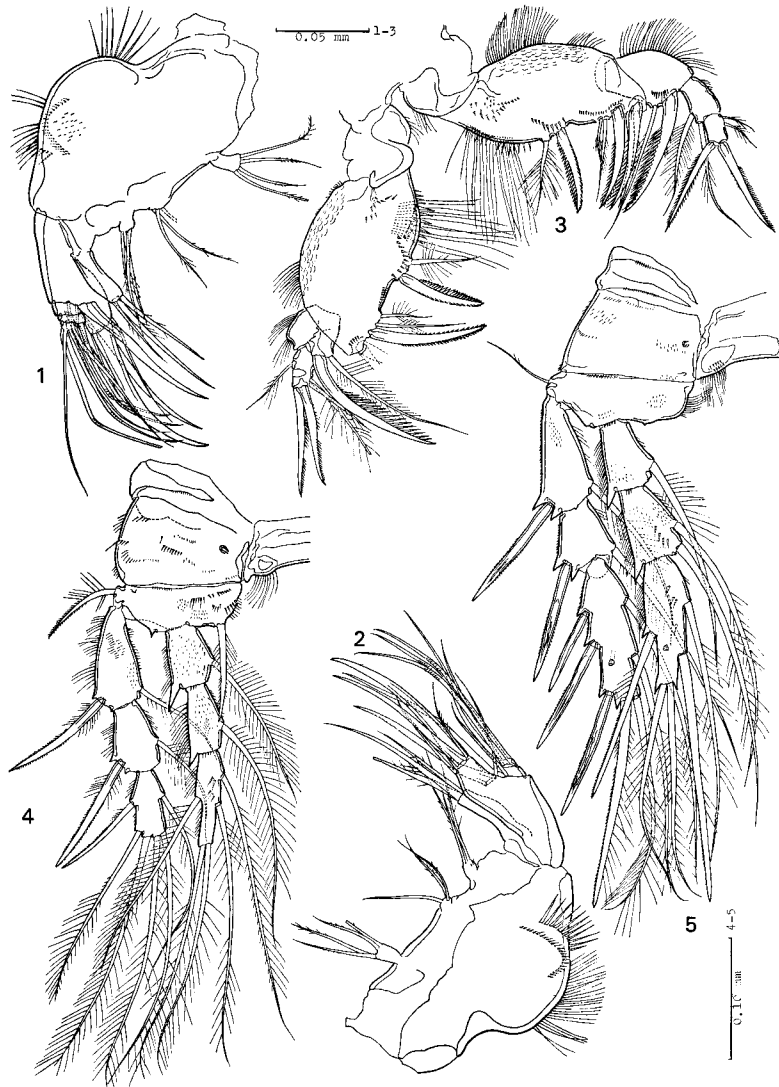


Fig. 26. *Pontostratiotes robustus* n. sp. Male (holotype). 1. maxilla; 2. abnormal right maxilla; 3. a pair of maxillipedes; 4. leg 1; 5. leg 2.

its base, armed with 11 spines or setae along inner edge, and one hairy seta on posterior surface; two parallel setae of anterior face slender and bare; a few spinules occurring near base of parallel setae. Inner process of coxa not reaching inner edge of arthrite of praecoxa, armed with six apical setae in all, ventroposterior two of which are thicker than others and spinulose. Epipodal seta well developed, furnished with long hairs sparsely. Inner process of basis thick, a little extending beyond coxal process, armed with 13 apical or subapical setae in all, of which the dorsal three setae are stout and finely spinulose. Endopodal setae hairy. *Maxilla* (Fig. 26-1). Syncoxa markedly swelling out outwards, furnished with long spinules along outer edge, two arched rows of spinules on anterior surface near outer edge; first endite armed with four slender setae, the dorsalmost and ventralmost setae hairy, and the rest two finely spinulose; second endite rudimentary, armed with three slender setae; third endite represented by a small protuberance bearing three slender setae; fourth endite cylindrical, apically armed with one slender spine, one spiniform seta, and one slender short seta. Basis: inner process short; apical claw and spine and posterior spine almost bare; two separate slender setae (each basal portion of these setae is illustrated) attached onto distal end close to anterior base of endopodite. Endopodite: inner seta of first segment very short (not clearly observed); anterior seta of first segment, two setae of second segment, and one apical seta of third segment spiniform and medially geniculate; other three apical setae of third segment slender and bare. Endopodite of the right maxilla (Fig. 26-2) is probably aberrant. *Maxillipede* (Fig. 26-3). Praecoxa short, with hairs on inner edge. Coxa elongate oval in outline, twice longer than wide, armed with seven appendixes along distal half of inner margin, the first represented by a short hairy seta, the second a bilaterally serrate strong spine and close to the first, each of the third and fourth a slender hairy seta, and each of the fifth, sixth, and seventh a strong spinulose spine; very long pubescences arising from proximal half of inner edge; long hairs occurring along outer edge. Basis widening apically, furnished with long hairs along outer edge, armed with one slender long seta on inner subapical edge and one strong claw which bears a comb-like row of spinules dorsally and is located on inner distal edge. Endopodite: first segment armed with two hairy inner setae; second segment smaller than first segment, armed with two spinulose apical spines and two hairy setulae on outer edge. The right maxillipede is apparently aberrant as shown in the figure.

Leg 1 (Fig. 26-4). Free edge of intercoxal plate a little swelling out bilaterally, furnished with long hairs on each swelling. Coxa with short spinules marginally and anteriorly. Basis scarcely protruded outwards over coxa; outer seta stout, shorter than first exopodite segment, bilaterally spinulose; inner seta moderately separated from inner base of endopodite, thick, not reaching third endopodite segment; spinous projection between rami rudimentary. Exopodite: first segment shorter than apical two segments combined, about twice as long as its greatest width, scarcely pointed at outer distal edge dorsal to the outer spine; apical two segments subequal in length; first outer appendix of third segment represented by a

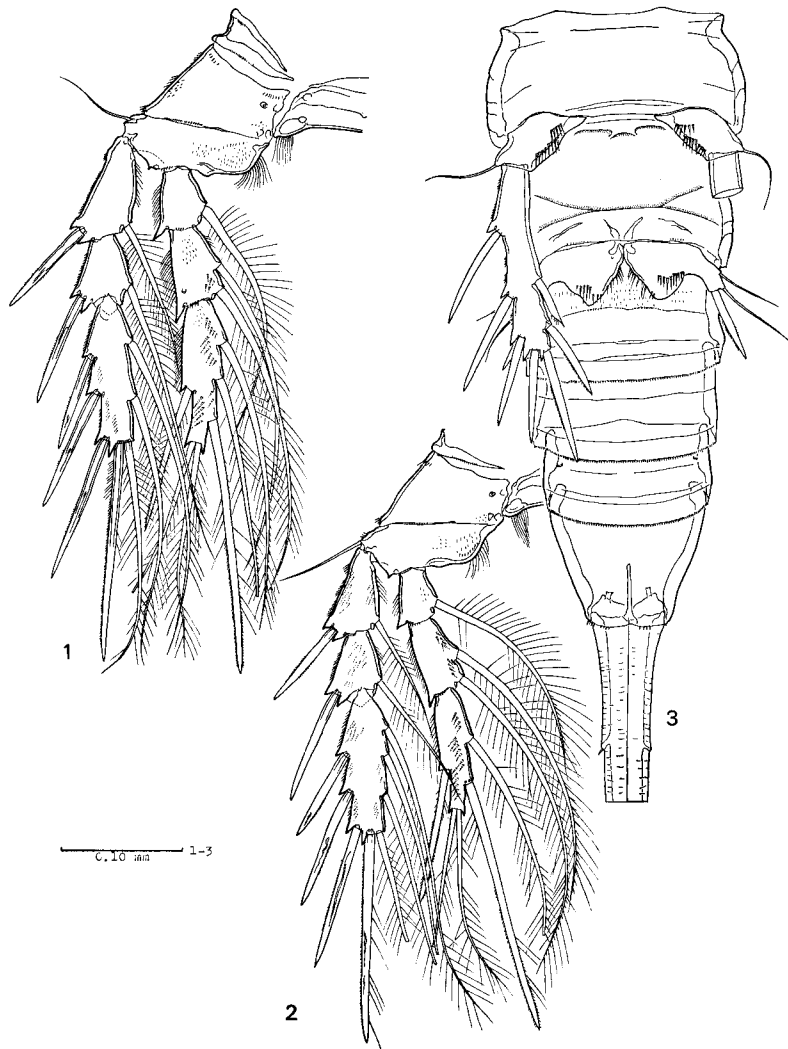


Fig. 27. *Pontostratiotes robustus* n. sp. Male (holotype). 1. leg 3; 2. leg 4; 3. leg 5 and abdomen, ventral.

rather slender spine with short spinules. Endopodite: first segment about as long as second segment, with no projection at inner distal angle, armed with an inner seta at a point two-thirds of the length from the base; first two segments forming a straight spinous projection at each outer distal angle, furnished with hairs along each outer edge; third segment slender, a little longer than second segment, with a

hairy outer seta arising from clearly stepped edge located almost medially. *Leg 2* (Fig. 26-5). Free edge of intercoxal plate scarcely swelling out, furnished with hairs marginally and short spinules anteriorly. Coxa as in leg 1. Basis scarcely protruding over coxa; outer seta small; spinous projections between rami and on inner distal edge very small, rudimentary; hairs occurring on inner edge. Exopodite: first segment shorter than third segment; outer spines of each segment well-developed; of third segment, space between second and third outer spines wider than that between first and second outer spines. Endopodite: first segment shortest, third segment longest; first two segments forming a spinous projection on each outer distal angle; outer spine of third segment located on stepped edge at three-fifths the length from the base; second inner seta of third segment rod-shaped. *Leg 3* (Fig. 27-1). Free edge of intercoxal plate scarcely swelling out, bearing hairs. Basis scarcely protruded over coxa; outer seta slender; spinous projection between rami rudimentary; no spinous projection occurring on inner distal edge. Exopodite: first segment a little swelling at a subproximal portion of outer edge. Proportion of each segment of both rami almost as in leg 2. Third endopodite segment: outer spine located on stepped edge at three-fifths the length from the base; third inner seta rod-shaped. *Leg 4* (Fig. 27-2). Intercoxal plate, coxa, and basis almost as in leg 3. Proportion of exopodite segments and endopodite segments as in leg 3 but somewhat narrower. Endopodite: second segment armed with two inner setae; second inner seta of third segment rod-shaped. *Leg 5* (Fig. 27-3) consisting of two subcylindrical segments. Basal segment with spinules on anterior face near inner edge; outer seta slender, arising from a rudimentary protuberance. Exopodite approximately five times longer than wide, armed with seven spines in all, two of which arise from stepped inner edge. *Leg 6* (Fig. 27-3) represented by a plate which forms a spinulose swelling internally and a short process outwards; one apical spine and two bare slender setae arising from the outer process.

Remarks. Generic identification of the present new species is dubious because this species is lacking in an important characteristic of the genus *Pontostratiotes*, the cephalic shield with at least two spinous projections, which are present in all of the *Pontostratiotes* species previously known. *P. sixtorum* Por, however, fairly resembles the present new species in various respects: spinous projections of cephalic shield and posterolateral extension of thoracic pleurotergites moderate; body integuments with superficial reticulation; rostrum prominent; first exopodite segment and first endopodite segment of leg 1 not so elongate; inner distal edge of first endopodite segment of leg 1 with no spinous projection; and, exopodite of male leg 5 consisting of one segment (ascertained in *P. sixtorum mindanaoensis* described in the present paper).

On the other hand, the new species is rather similar to the genus *Herdmaniopsis* Brotzkaja, 1963 in the general appearance of the body, though it differs clearly from the latter in some respects, especially in the setal armature of the first endopodite segment of the maxillipede and the third exopodite segment of leg 4;

moreover, the known male of *Herdmaniopsis* which will be noted later has the two-segmented exopodite on the leg 5.

Although the present new species is tentatively belonged to this genus, its taxonomic situation is still problematic, and it will be discussed again in a later section together with the relationship to some other genera.

Remarks to the genera *Ameriotes* and *Stratiopontotes*

The genus *Stratiopontotes* Soyer, 1970 (Type-species: *S. mediterraneus* Soyer, 1970) was regarded as a synonym of *Ameriotes* Por, 1969 (Type-species: *A. malagasicus* Por, 1969) by Montagna (1981, p. 1217). Although these two monotypic genera are similar to each other especially in the unarmed cephalic shield and thoracic pleurotergites, two clear differences attracted my attention. The difference was first noticed in the shape of the rostrum: Rostrum of *Stratiopontotes* is prominent in dorsal view, well extends toward front, but not prominent, probably bending down, in *Ameriotes*. The second difference was found in the maxillipede: The first endopodite segment (subapical segment) of *Stratiopontotes* bears three well-developed setae, but the segment of *Ameriotes* bears none. Such the characteristic in the maxillipede had already been found certainly in a separate genus, *Herdmaniopsis* Brodskaja, 1963 (Type-species: *H. abyssicola* Brodskaja, 1963), and a comparative study of these two species revealed me some unexpected resemblances. The two species share the following common characteristics: cephalic shield and thoracic pleurotergites unarmed with spinous projection; rostrum not prominent in dorsal view; furcal rami about as long as posterior three abdominal somites combined; first two segments of antennule short, especially the first thickening toward apical; exopodite and endopodite segments of mandible stumpy; first segment of each ramus of leg 1 not longer than apical two segments combined; first endopodite segment of leg 1 without spinous projection at inner distal edge; each basis of leg 2, leg 3, and leg 4 without spinous projection on inner distal edge; third exopodite segment of leg 4 with two inner setae. The first two segments of the antennule of the *Pontostratiotes* species so far known are quite alike between sexes, though the second segment of the male is somewhat modified and bears more setae (cf. *P. pubescens* Por, 1969, and *P. pacificus* and *P. unisetosus* described in the present paper). With respect to this characteristic, *Ameriotes* and *Herdmaniopsis* also show a close resemblance in their antennule, though the former has been known for only the male and the latter the female. The appearance of the first two antennular segments of these two species is markedly different from that of *Stratiopontotes*. Because of these reasons mentioned above, I regard *Ameriotes* as a synonym of *Herdmaniopsis*, and *Ameriotes malagasicus* should be referred to as:

Herdmaniopsis malagassica (Por, 1969) comb. nov.

Although the taxonomic relation of *Herdmaniopsis* and *Stratiopontotes* is still problematic, I do not touch it any longer here, and will describe a new material which is referable to *S. mediterraneus*.

***Stratiopontotes mediterraneus* Soyer, 1970**

(Figs. 28~32)

Stratiopontotes mediterranea: Soyer, 1970, p. 379, figs. 4-5.*Ameriotes mediterraneus* (Soyer, 1970): Montagna, 1981, p. 1217.

Material. An adult female and a fifth copepodid female (Southeast off Mindanao, the Pacific Ocean; 6-II-1979, Murano's net).

Female. Body (Figs. 28-1, 28-2) about 1.4 mm long, colorless, semitransparent. Exoskeleton rather soft. Rostrum (Fig. 29-3) prominent in dorsal view, triangular, extending toward front. Cephalic shield (Fig. 28-3) unarmed with spinous projection, with very obscure reticulation (? internal structure) on posterior hyaline frill which covers over first thoracic somite. First thoracic somite rudimentary; pleurotergite fairly shortening dorsally, but each lateral portion well remaining. Second, third, and fourth thoracic somites unarmed with spinous projection on each pleurotergite, with reticulation on each posterior hyaline frill; short hairs (? spinules) scattered on each dorsal surface of second and fourth somites. Although the figure (Fig. 28-3) shows fine serration along each hind edge of cephalic shield and thoracic pleurotergites, the serration is, in fact, not so clear as illustrated. Genital double-somite (Figs. 29-1, 29-2) subdivided with a clear suture dorsally; genital area as shown in figure (Fig. 31-3), with a pair of leg 6, each represented by a cylindrical segment with three apical setae, the longest about as long as this segment. Posterior three abdominal somites furnished with fine spinules on each ventral surface. Anal somite pyriform in dorsal view (Fig. 29-1): operculum rounded, defined at base. Furcal rami confluent, about 31% of body length, with lateral and apical setae.

Antennule (Fig. 28-4) eight-segmented; first two segments subequal in length, about twice as long as each proximal diameter; first segment somewhat thickening toward apical, forming a protuberance on subproximal anterior face, armed with an apical seta (missing; cf. Fig. 29-3), furnished with delicate spinules anteriorly and ventrally; second segment pointed anteroapically, furnished with spinules anteriorly; third segment a little longer than preceding segment, about three times as long as its proximal diameter, bearing a slender aesthetasc; fourth segment short; apical four segments slender; fifth segment as long as third segment; apical segment as long as subapical two segments combined. *Antenna* (Fig. 29-4). Coxa short, with spinules distally. Allobasis internally with a clear transverse suture which indicates the border of fused basis and endopodite, externally with no such a suture, armed with two long setae anteriorly. Exopodite consisting of four segments; four segments combined about as long as apical endopodite segment; first segment as long as apical three segments combined, armed with one long apical seta (missing), a few spinules anteriorly and distally; second and third segments short, each with a long spinulose seta apically; fourth segment about twice as long as preceding two segments combined, armed with two long spinulose setae apically. Apical endopodite segment about as long as allobasis, armed with three closely set setae on anterior face at about a proximal third of the length, and seven long apical setae,

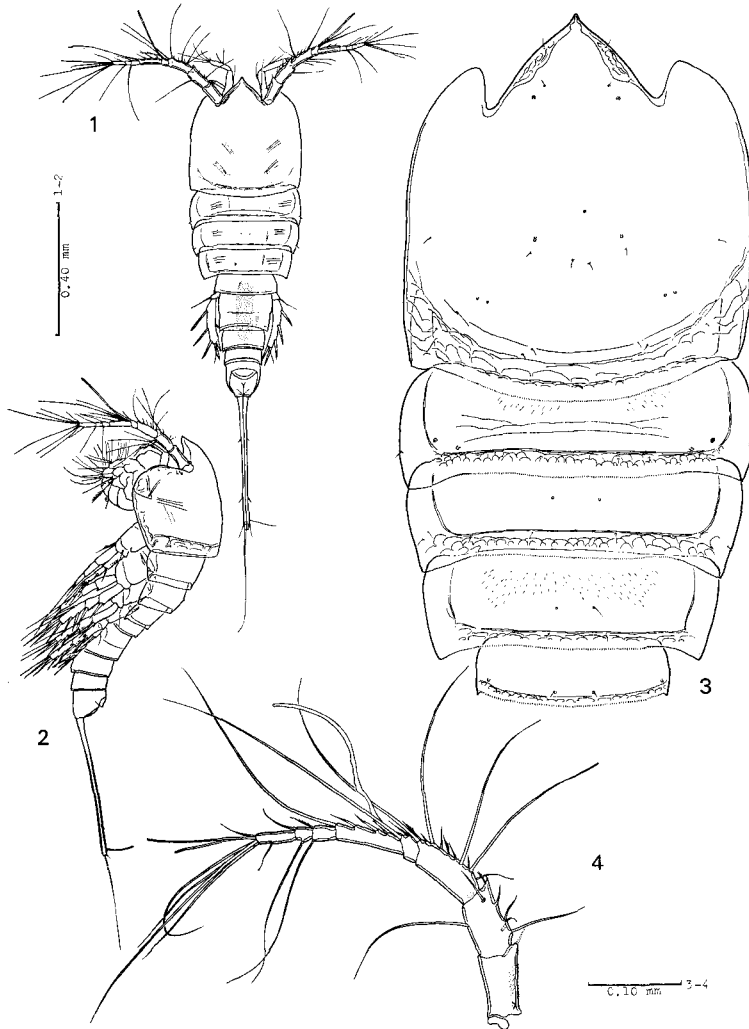


Fig. 28. *Stratiopontotes mediterraneus* Soyer. Female. 1. habitus, dorsal; 2. habitus, lateral; 3. cephalon and thorax, dorsal; 4. antennule.

two of which are juxtaposed, and furnished with a few rows of spinules on outer face. *Mandible* (Fig. 29-5). *Praecoxa* furnished with a row of spinules proximally, armed with dents and a spinulose seta along cutting edge. *Coxa-basis* longer than wide, armed with one hairy long seta on subapical anterior surface and three thick apical setae which are spinulose or hairy; fine spinules, which are arranged in roughly transverse rows, attached onto anterior surface. Both rami stumpy in

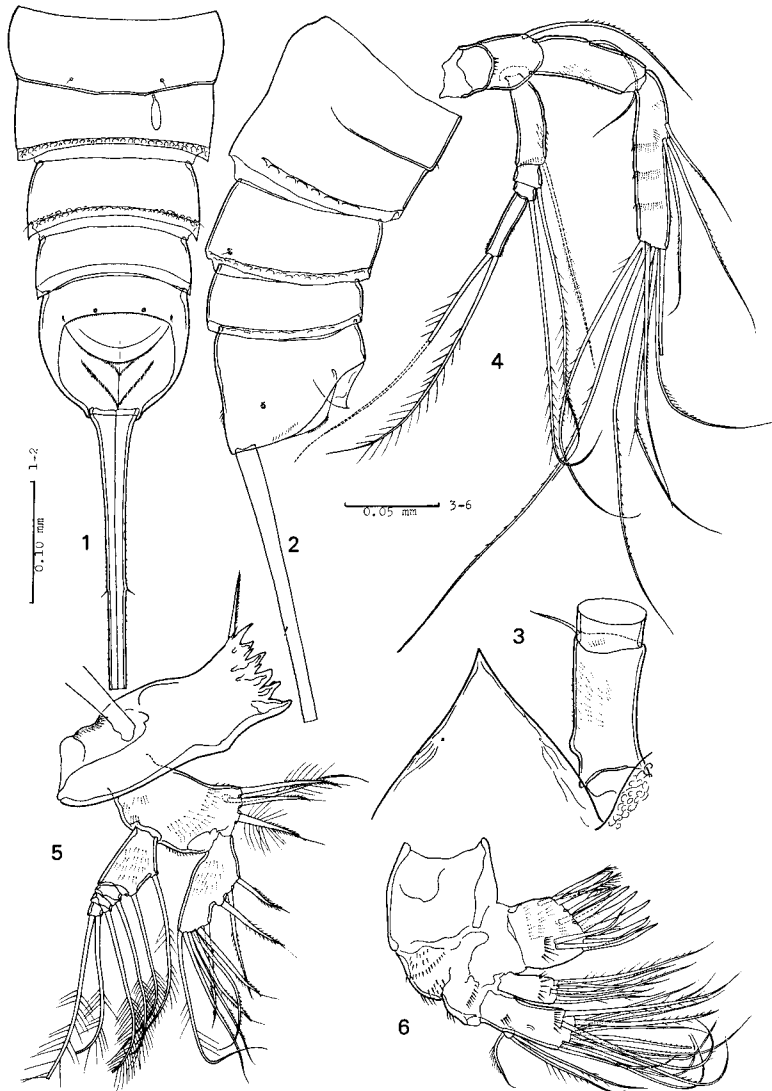


Fig. 29. *Stratiopontotes mediterraneus* Soyer. Female. 1. abdomen, dorsal; 2. abdomen, lateral; 3. rostrum and first antennular segment; 4. antenna; 5. mandible; 6. maxillula.

appearance. Exopodite four-segmented; first segment about twice as long as apical three segments combined, with spinules on its anterior face, armed with two inner setae, the first located medially; second and third segments each with one

inner seta; fourth segment with two apical setae; all setae bilaterally hairy. Endopodite consisting of one segment about 2.5 times as long as its greatest width, armed with four short spinulose inner setae, one of which is located subapically, others almost medially; six setae on apical edge, the outermost hairy and the rest spinulose. *Maxillula* (Fig. 29-6). Arthrite of praecoixa not constricted at

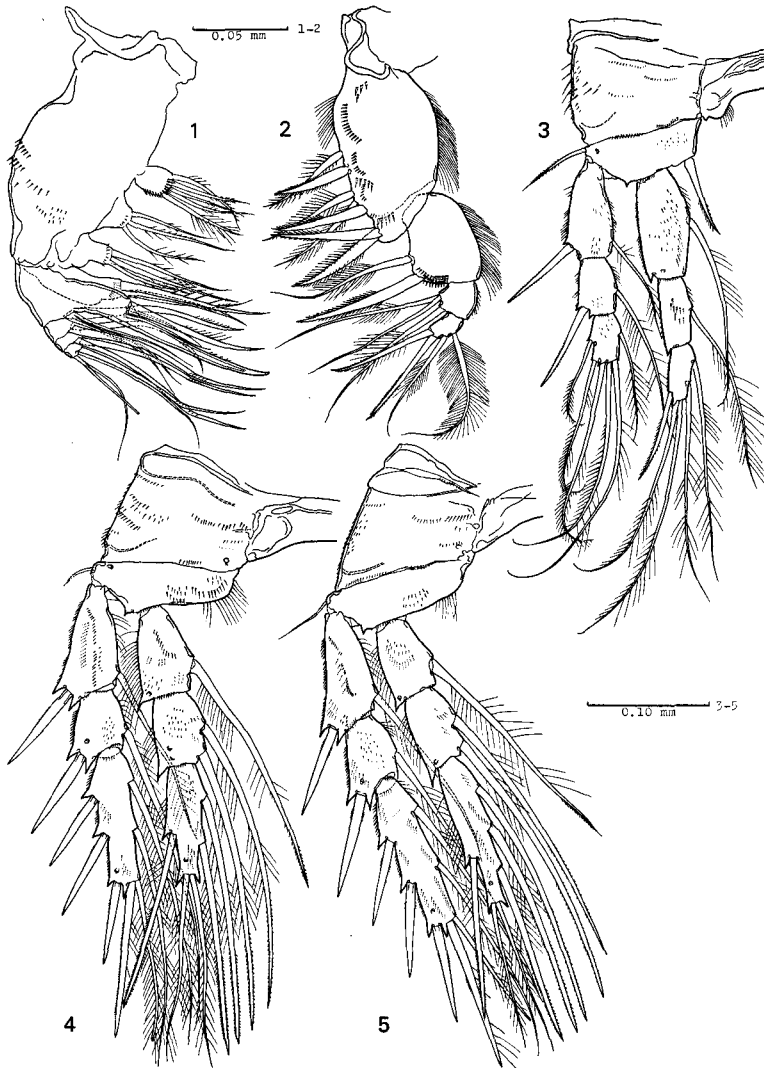


Fig. 30. *Stratiopontotes mediterraneus* Soyer. Female. 1. maxilla; 2. maxillipede; 3. leg 1; 4. leg 2; 5. leg 3.

base, almost quadrate, armed with two parallel setae on anterior face, ten spines or setae along inner edge, one spinulose seta on posterior surface near inner edge; a vertical row of spinules on anterior face near parallel setae, some spinular rows on posterior face. Inner process of coxa armed with six more or less spinulose setae apically or subapically. No epipodal seta present. Inner process of basis a little extending beyond coxal inner process, armed with 14 setae in all apically or subapically. Endopodite represented by a rudimentary segment armed with three slender setae which are sparsely hairy. *Maxilla* (Fig. 30-1). Syncoxa about twice as long as its greatest width, furnished with four closely set endites; first endite basally constricted, armed with five setae, which are subequal in length and more or less spinulose; second endite represented by a rounded protuberance with three similar setae which are sparsely spinulose; third endite subcylindrical, with three sparsely spinulose setae apically; fourth endite well developed, cylindrical, armed with two setae and one long spine which bears prominent spinules sparsely. Basis forming a strong claw, with one long spine together with two slender setae, and armed with one long spine on posterior surface near distal edge close to endopodite, three basally fused slender setae on anterior distal edge. Endopodite consisting of three small segments, the first armed with one thick seta and one geniculate spiniform seta, the second with two geniculate spiniform setae, and the third with one geniculate spiniform seta and three slender setae. *Maxillipede* (Fig. 30-2). Praecoxa short, confluent with basis. Basis oval in outline, broad, about 1.8 times longer than wide, armed with seven inner setae in all (three sets of two, three, and two setae), the second, fifth, sixth, and seventh setae very thick spiniform and more or less spinulose; normal setae similar to each other, with hairs bilaterally; outer edge and proximal half of inner edge fringed with long hairs; arched rows of spinules occurring near inner edge. Basis broad, 1.5 times longer than wide, armed with one long hairy seta at almost the middle of inner edge and bilaterally spinulose; outer edge fringed with long hairs. Endopodite consisting of two short segments; first segment as long as wide, armed with two closely set setae on inner edge and one seta on inner distal edge, all setae subequal in length and as long as coxa; second segment with two long apical spines and two well-developed outer setae, the first plumose.

Leg 1 (Fig. 30-3). Free edge of intercoxal plate clearly swelling out bilaterally, fringed with hairs. Coxa furnished with short spinules on and near outer edge. Basis scarcely protruding outwards over coxa; outer seta shorter than first exopodite segment, with short spinules; inner seta moderately separated from endopodite, thick, shorter than first endopodite segment; spinous projection between both rami rudimentary. Both rami three-segmented; number of setae and spines of each segment as in the *Pontostratiotes* species previously described in the present paper. Exopodite: first segment as long as apical two segments combined; inner seta of third segment located at about the middle of its length, slender; each segment sparsely with short spinules marginally and anteriorly; spinous projection, which is close to each outer spine of first two segments, quite

rudimentary. Endopodite longer than exopodite; first segment approximately as long as apical two segments combined, twice longer than wide, forming a rudimentary spinous projection at its outer distal edge, without any spinous projection at inner distal angle, its inner seta located medially and well developed; third segment smaller than second segment, its outer spine located subapically and finely spinulose; each segment furnished with short spinules marginally; short spinules attached onto each posterior face of first two segments; all of inner and terminal setae sparsely with hairs or long spinules. *Leg 2* (Fig. 30-4). Free edge of intercoxal plate not swelling out, almost naked. Coxa furnished with short spinules marginally and anteriorly. Basis scarcely protruding outwards over coxa; outer seta short; spinous projection between rami rudimentary; inner distal edge with no spinous projection but with long hairs. Both rami three-segmented; number of setae and spines of each segment as in the *Pontostratiotes* species described. Outer edge of first exopodite segment not swelling out at any subproximal portion. Endopodite: second inner seta of second segment and two inner setae of third segment rod-shaped, but not very much thick; outer spine of third segment located at a point three-fifths the length from the base. *Leg 3* (Fig. 30-5). Free edge of intercoxal plate not swelling out. Basis: outer seta short; spinous projection between rami rudimentary; no spinous projection occurring on inner distal edge. Segmentation and principal setal and spinal armature of each ramus as in the *Pontostratiotes* species described. Endopodite: third segment as long as two proximal segments combined, about 4.5 times longer than wide; second inner seta of second segment and three inner setae of third segment rod-shaped, but not very thick. *Leg 4* (Fig. 31-1). Free edge of intercoxal plate scarcely swelling out, bare. Basis scarcely protruding outwards over coxa; outer seta short; spinous projection between rami rudimentary; no spinous projection occurring on inner distal edge. Segmentation of both rami and principal setal and spinal armature of first two exopodite segments as in the *Pontostratiotes* species described. Third exopodite segment armed with three outer spines, one spine and one seta on distal end, and two inner setae. Endopodites markedly differ from each other, the endopodite of the right leg is probably aberrant: second segment of the right armed with two inner setae, the second rod-shaped; second segment of the left (Fig. 31-2) armed with one inner seta which is rod-shaped: outer spine of third segment of the right leg located more distally rather than in the left leg. Inner seta of first endopodite segment shorter than other inner setae of endopodite. Two inner setae of third endopodite segment rod-shaped. *Leg 5* (Fig. 31-3) consisting of two segments. Basal segment armed with one slender seta which arises from a rudimentary distal process. Exopodite six times longer than wide, armed with five spines and a slender apical seta. Exopodite of the left leg probably aberrant, bears a supernumerary seta which arises from about the middle of inner edge.

Fifth copepodid female. Body 1.17 mm long, colorless, semitransparent. Genital double-somite not formed. Furcal rami (Fig. 32-3) about as long as

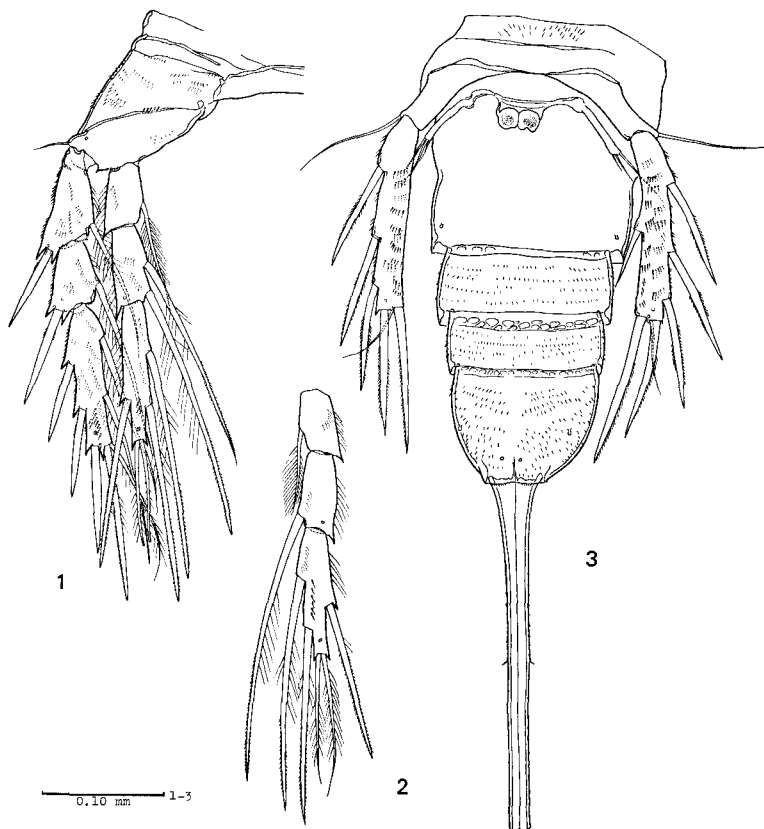


Fig. 31. *Stratiopontotes mediterraneus* Soyer. Female. 1. leg 4; 2. endopodite of left leg 4; 3. leg 5 and abdomen, ventral.

posterior four somites combined, 21% of body length. *Antennule* (Fig. 32-1), *antenna*, and *oral appendages* principally the same as in the adult described.

Leg 1 as in the adult. *Leg 2*. Second inner seta of third endopodite segment rod-shaped. *Leg 3*. Third inner seta of third endopodite segment rod-shaped, and second inner seta of this segment somewhat thickened like rod-shaped seta. *Leg 4* (Fig. 32-2). Free edge of intercoxal plate a little swelling out bilaterally. Inner seta of first endopodite segment long. Second endopodite segment armed with one inner seta. Second inner seta of third endopodite segment rod-shaped. *Leg 5* (Fig. 32-3). Exopodite not articulated at base, armed with five spines and one apical seta. *Leg 6* represented by a short cylindrical process terminating in three setulae.

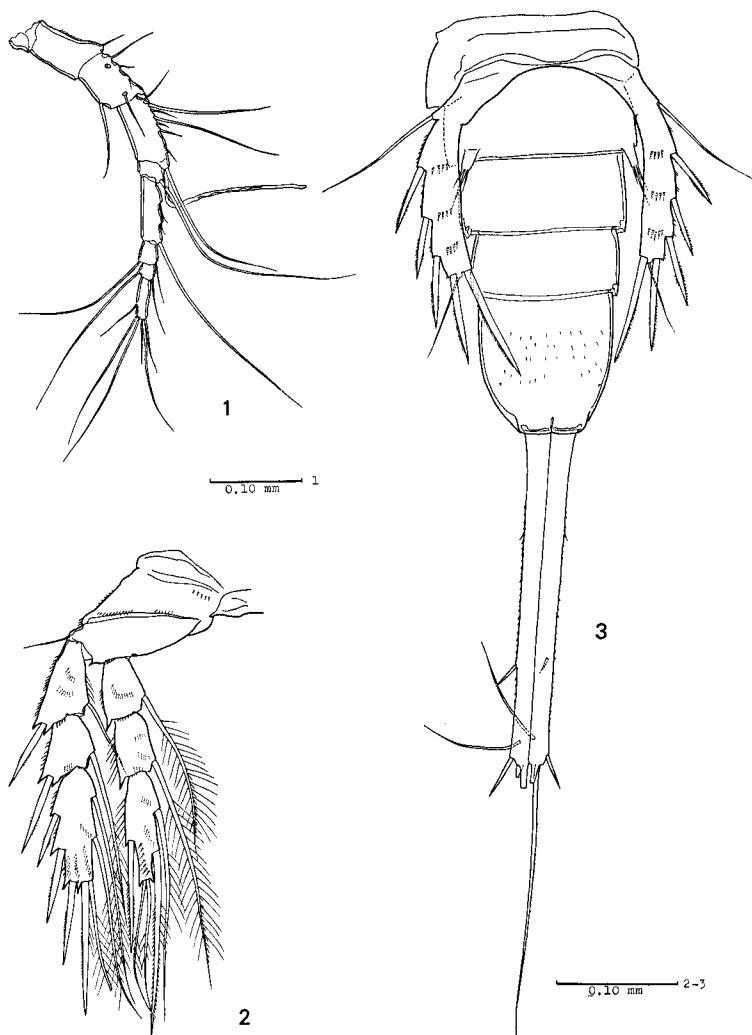


Fig. 32. *Stratiopontotes mediterraneus* Soyer. Fifth copepodid female. 1. antennule; 2. leg 4; 3. leg 5 and abdomen.

Remarks. According to the original description and figures of this species (Soyer, 1970, pl. V, E), no slender apical seta is present on the exopodite of leg 5. I suppose this seta was broken off in his specimen. No pleurotergite of first thoracic somite is illustrated in Soyer's figure. It is fairly degenerative in the present specimen, and he probably overlooked it. No other particular difference is found between Soyer's description and the present specimen of the adult female examined.

Although the male of this species is still unknown, it is probably of the following characteristics: first antennular segment as in the female, second endopodite segment of leg 4 bearing two inner setae, and exopodite of leg 5 as in the female but with an inner seta medially. The first two characteristics mentioned are reliable, though the last is my arbitrary supposition. I, in fact, imagine the leg 5 of the unknown male is represented by the aberrant left leg 5 (Fig. 31-3) since such the exopodite, which is one-segmented and bears a supernumerary seta at the inner edge, is known in *Pontostratiotes sixtorum mindanaoensis*. The female described has two inner setae on the second endopodite segment of the right leg 4: This characteristic is also regarded as of the male.

***Tonpostratiotes* n. gen.**

This new genus is monotypic, and a preliminary description is given: cephalic shield without spinous projection on its hind edge; rostrum well developed; first thoracic somite short, incerted under cephalic shield, furnished with rudimentary pleurotergite; integuments of body with superficial reticulation; furcal rami confluent, much longer than abdomen; female antennule consisting of seven slender segments, bearing an aesthetasc on its third segment; antenna wanting; mandible with four-segmented exopodite and one-segmented endopodite; maxilla with four endites on syncoxa and its endopodite three-segmented; maxillipede consisting of praecoxa, coxa, basis, and two endopodite segments, the first endopodite segment with three inner setae; rami of first four pairs of legs three-segmented, armed with spines and setae principally as in *Pontostratiotes* except for leg 4 endopodite; first exopodite segment and first endopodite segment of leg 1 not elongate; endopodite of leg 4 very slender, its two apical setae dwarf; exopodite of female leg 5 consisting of a subcylindrical segment with five spines; leg 6 of female represented by a cylindrical process terminating in two setulae.

The gender is masculine. The generic name was formulated as an anagram from *Pontostratiotes*. The new species which is described below is designated as the type-species.

***Tonpostratiotes tenuipedalis* n. sp.**

(Figs. 33~37)

Material. Two adult females were dissected and designated as the holotype and a paratype. Type-locality: Southeast off Mindanao, the Pacific Ocean. These specimens were collected with Murano's net (6-II-1979).

Female (Holotype). Body (Figs. 33-1, 33-2) about 1.8 mm long, colorless, semitransparent. Rostrum (Fig. 33-4) prominent, extending toward front, triangular, furnished with a pair of short sensory hairs subapically. Labrum much swelling out, spinulose. Integuments of body (Fig. 33-3) with superficial reticulation of very fine internal network (Fig. 33-4; cf. Fig. 34-1, paratype).

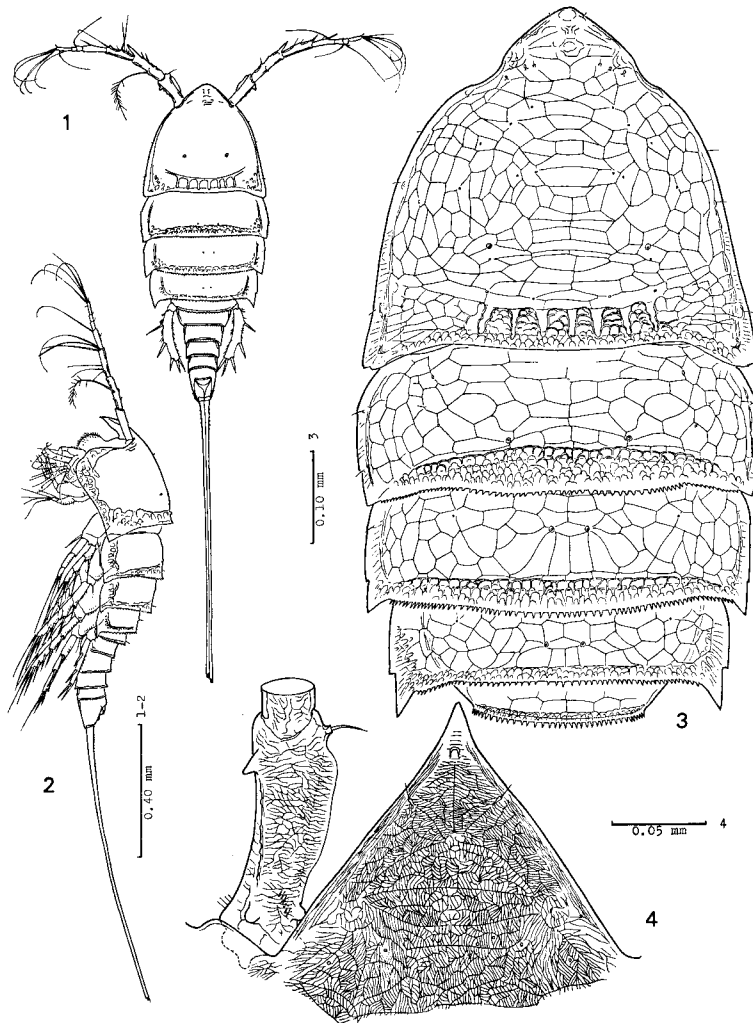


Fig. 33. *Tonpostratiotes tenuipedalis* n. gen. et n. sp. Female (holotype). 1. habitus, dorsal; 2. habitus, lateral; 3. cephalon and thorax, dorsal; 4. rostrum and first antennular segment.

Cephalic shield with no spinous projection on its hind edge, covering over first thoracic somite. First thoracic somite short; pleurotergite very thin, medially (dorsally) reduced in length, with no particular structure. Each pleurotergite of second, third, and fourth thoracic somites posteriorly serrated, pointed out posterolaterally. Genital double-somite (Figs. 34-2, 34-3) subdivided dorsally

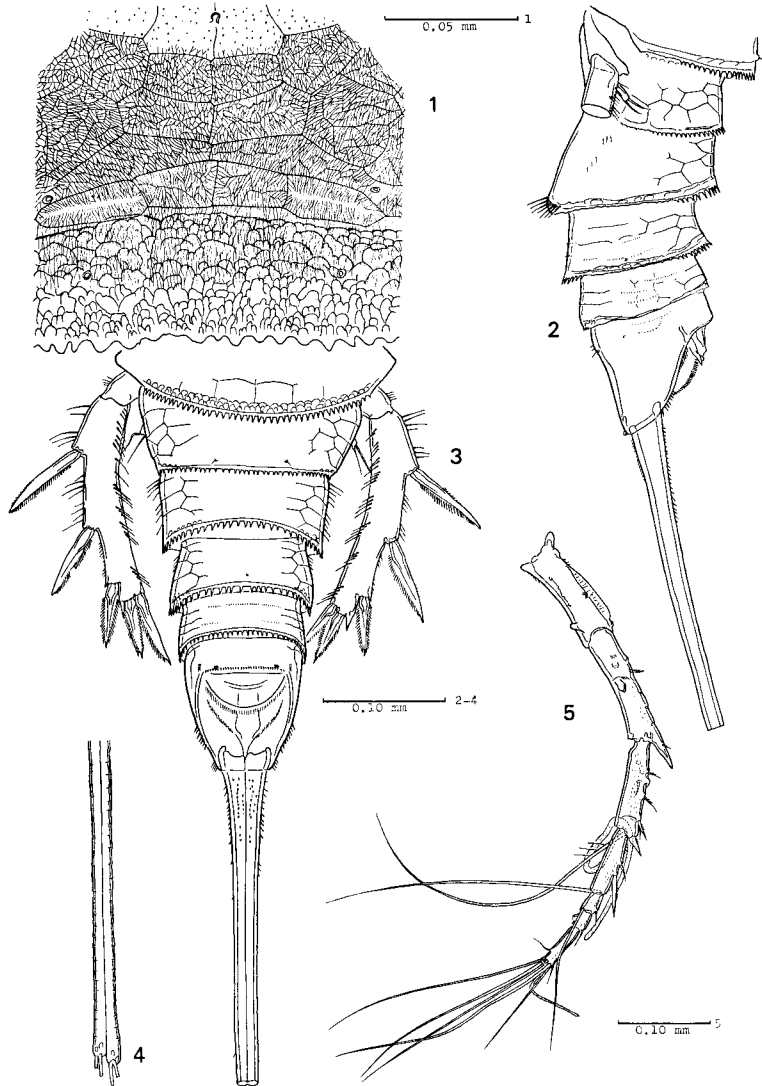


Fig. 34. *Tonpostratiotes tenuipedalis* n. gen. et n. sp. Female (1, paratype; 2-5, holotype). 1. reticulation of second thoracic pleurotergite; 2. abdomen, lateral; 3. leg 5 and abdomen, dorsal; 4. furcal rami; 5. antennule.

and laterally, serrated along hind edge of each subdivision; each leg 6 represented by a cylindrical process terminating in two setulae; posterior subdivision ornamented with rows of long spinules laterally and ventrally (Fig. 35-1). Antepenultimate and penultimate somite serrated along each hind dorsal edge, with fine spinules on

each ventral face. Anal somite tapering posteriorly, with many scattered spinules on ventral surface; anal operculum prominent. Furcal rami confluent, 0.8 mm long, about 44% of body length, ornamented with very short spinules dorsally and laterally. Furcal setae are missing (Fig. 34-4).

Antennule (Fig. 34-5) consisting of seven slender segments; first segment (Fig. 33-4) about three times as long as diameter, with a short seta which arises from a small protuberance at subapical anterior (internal) edge, forming a longitudinal membranous extension anteriorly, and armed with a spinous projection on subapical dorsoposterior face accompanied by a longitudinal row of small protuberances (? roughly serrate membranous extension) toward proximal; second segment longer than first segment, forming a strong spinous projection antero-distally, with a long hairy seta which arises from a crateriform protuberance located dorsomedially; third segment as long as first segment, with a rudimentary transvers suture subapically, armed with a slender aesthetasc; fourth segment shorter than third segment; fifth and sixth segments short, seventh segment about as long as preceding two combined; short setae on second, third, and fourth segments spinulose; reticulation occurring on proximal segments, gradually dimming distally; short spinules scattered on each segments. *Antenna* wanting. *Mandible* (Figs. 35-2, 35-3; cf. Fig. 35-7, paratype). Praecoxa with many spinules proximally, armed with dents and a slender spinulose seta along cutting edge. Coxa-basis almost rectangular, armed with three setae apically, one seta on anterior face near distal edge, all setae thick and spinulose; many spinules scattered on anterior surface. Exopodite four-segmented; first segment a little longer than apical three segments combined, armed with two widely spaced inner setae; second and third segments each armed with one inner seta; fourth segment armed with two apical setae; all setae well developed, hairy or plumose. Endopodite one-segmented, about four times longer than wide, armed with three, rather short, spinulose setae along proximal half of inner edge, one spinulose seta on subapical inner edge, and six slender setae apically. *Maxillula* (Fig. 35-4). Arthrite of praecoxa not constricted basally, rectangular, armed with two parallel setae on anterior surface, 10 spines and setae along inner edge, one seta on posterior surface, and one seta on the middle of dorsal edge. Coxa: inner process short, armed apically or subapically with six setae which are more or less spinulose. Epipodite represented by a short hairy seta. Inner process of basis thicker than coxal process, armed with 13 (?) setae apically or subapically, at least two of which are rather spiniform and with long spaced spinules. Endopodite represented by a rudimentary segment, armed with three hairy or spinulose setae, the innermost much elongated. *Maxilla* (Fig. 35-5). Syncoxa swelling outwards, twice as long as its greatest width, with spinules on and near outer margin, furnished with four rather closely set endites; first endite armed with five small setae, three of which are spinulose; second endite represented by a low protuberance bearing three setae; third endite armed with three setae; fourth endite subcylindrical, armed with three setae, one of which is spiniform and with a few long spinules.

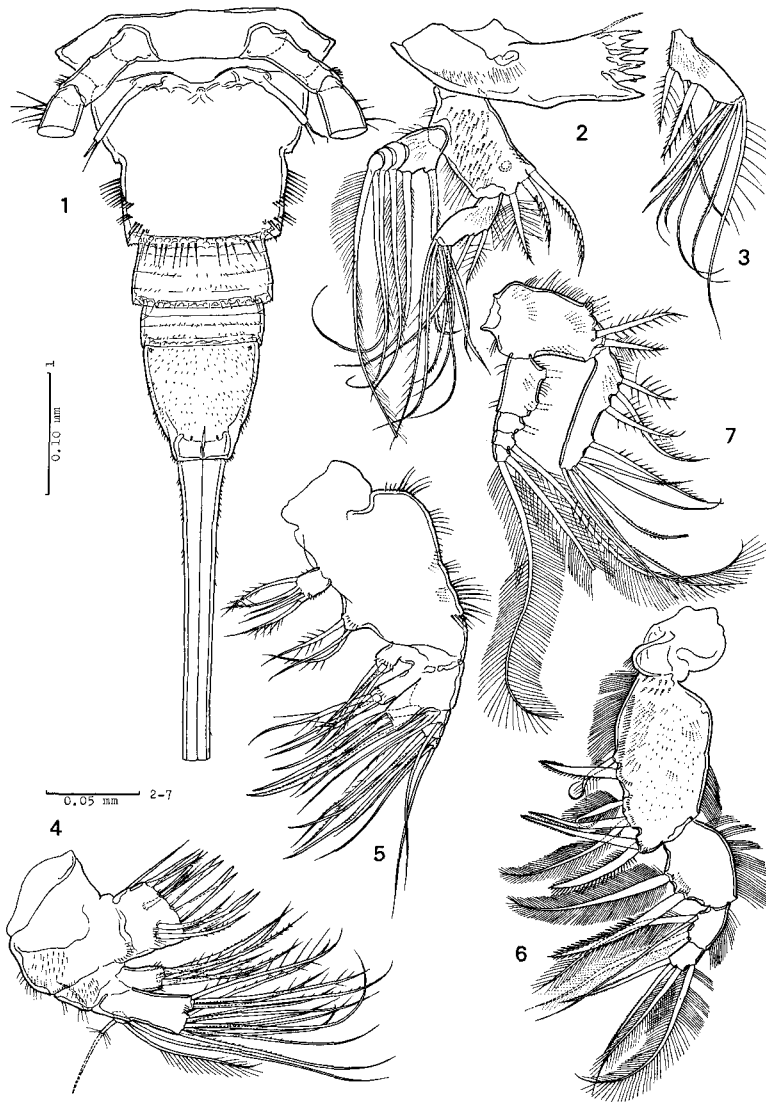


Fig. 35. *Tonpostratiotes tenuipedalis* n. gen. et n. sp. Female (1-6, holotype; 7, paratype). 1. abdomen, ventral; 2. mandible; 3. mandibular endopodite; 4. maxillula; 5. maxilla; 6. maxillipede; 7. coxa-basis, exopodite, and endopodite of mandible.

Basis: inner process rather short, forming a strong claw, furnished with one spine anteriorly and a setula anteriorly, one slender seta dorsoposteriorly; one spine arising from posterior face near base of inner process; three basally fused

slender setae attached onto anterodistal edge. Endopodite consisting of three small segments, the first armed with two slender setae each located on anterior distal edge and on inner edge; second segment with two spiniform setae which are indistinctly geniculate medially; third segment with one spiniform seta and three slender setae. *Maxillipede* (Fig. 35-6). Praecoxa short, confluent with coxa, furnished with hairs on inner edge. Coxa markedly constricted basally, approximately twice longer than wide, armed with seven appendixes along distal half of inner edge, the first represented by a short hairy seta, the second a thick spinulose spine close to the first, the third a short plumose seta, the fourth and the fifth closely set, the anterior a spinulose spine and the posterior a plumose long seta, the sixth and the seventh closely set, each a spinulose spine, the posterior very thick; many long hairs attached onto proximal half of inner edge and distal half of outer edge; a number of short spinules scattered on posterior surface. Basis 1.5 times longer than wide, armed with one big inner seta which is plumose and located almost medially, and one big inner spine which is bilaterally spinulose and located subapically; outer edge fringed with long hairs. Endopodite consisting of two segments, the first armed with three well-developed inner setae, two of which are plumose and thick, the rest slender; second segment smaller than first segment, armed with two finely spinulose apical setae and two well-developed outer seta which are plumose.

Leg 1 (Fig. 36-1). Free edge of intercoxal plate clearly swelling out bilaterally, with long hairs marginally and spinules anteriorly; a long row of short spinules occurring on posterior surface along free edge. Coxa furnished with many spinules on anterior surface and along outer edge. Basis scarcely protruded outwards over coxa, with very short spinules scattered on anterior surface; outer seta shorter than first exopodite segment, spinulose; a spinulose spine arising from inner distal edge, moderately spaced from endopodite, longer than first endopodite segment; spinous projection between rami prominent. Both rami three-segmented, markedly spinulose anteriorly; number of spines and setae of each segment as in the *Pontostratiotes* species described (see p. 65). Exopodite: first segment about 1.6 times longer than wide, shorter than apical two segments combined, its spinous projection above outer spine rudimentary; second segment as long as first segment; each inner seta of all segments rather short, bilaterally hairy; each segment furnished with spinules marginally. Endopodite: first segment about 1.3 times longer than wide, shorter than apical two segments combined, forming a prominent spinous projection on outer subapical edge, scarcely protruding at inner distal edge, its inner seta well-developed and located at a point two-thirds of the length from the base; second segment narrower than first segment, about 1.5 times as long as third segment; each segment furnished with spinules marginally; two oblique rows of spinules occurring on posterior surface of second segment. *Leg 2* (Fig. 36-2). Intercoxal plate broad, its free edge a little swelling out bilaterally, furnished with long hairs marginally and short spinules scattered anteriorly. Coxa furnished with spinules anteriorly and marginally. Basis not

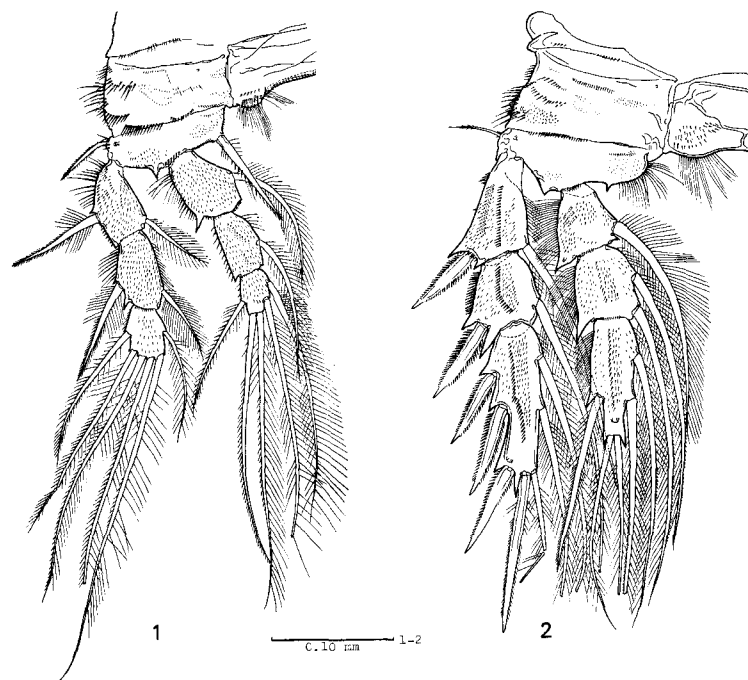


Fig. 36. *Tonpostratiotes tenuipedalis* n. gen. et n. sp. Female (holotype). 1. leg 1; 2. leg 2.

protruded outwards over coxa; outer seta small, with a few spinules; spinous projections between rami and on inner distal edge rather small; long hairs attached onto inner edge. Both rami consisting of three broad segments, furnished with numerous short spinules on each anterior surface, most of them arranged vertically; number of spines and setae of each segment as in the *Ponostriatiotes* species described; inner setae well developed, thick and plumose. Exopodite: all outer spines thick, bilaterally serrated; of third segment, space between second and third outer spines wider than space between first and second outer spines. Endopodite: first segment a little shorter than second segment; each segment fringed with many long hairs along outer edge; outer spine of third segment about 1.5 times as long as this segment, arising from clearly stepped edge at two-thirds of the length from the base; second inner seta of third segment rod-shaped, but not so different from other inner setae. *Leg 3* (Fig. 37-1). Free edge of intercoxal plate scarcely swelling out, almost bare. Basis scarcely protruding over coxa; outer seta small (missing in the right leg); spinous projection between rami prominent; no spinous projection on inner distal edge. Both rami three-segmented, furnished with many short spinules on each anterior surface; number of spines and setae of

each segment as in the *Ponostrotratiotes* species described. Spines and setae as in leg 2 in general appearance. Third inner seta of third endopodite segment rod-shaped. *Leg 4* (Fig. 37-2). Intercoxal plate low, not swelling out. Demarcation between coxa and basis markedly inclined. Basis scarcely protruded over coxa; outer seta small; spinous projection between rami small; no spinous projection on inner distal edge. Both rami three-segmented, smaller than those of leg 3. Number of spines and setae of each exopodite segment as in the *Ponostrotratiotes* species described, but inner terminal seta of third segment extremely dwarfed, rather hair-like; inner setae of all segments slender. Endopodite consisting of three very narrow segments (the specific name denotes this characteristic); first segment shortest, about 1.5 times longer than wide, bearing one inner seta which is slender and located almost medially; second segment 1.8 times as long as first segment, armed with one long inner seta on subapical edge; third segment elongate, much longer than proximal two segments combined, armed with one outer spine on subapical stepped edge, two inner setae which are slender and widely spaced, and two dwarfed terminal setae which are rather hair-like (Fig. 37-3); a prominent row of spinules longitudinally occurring on posterior face of third segment. *Leg 5*

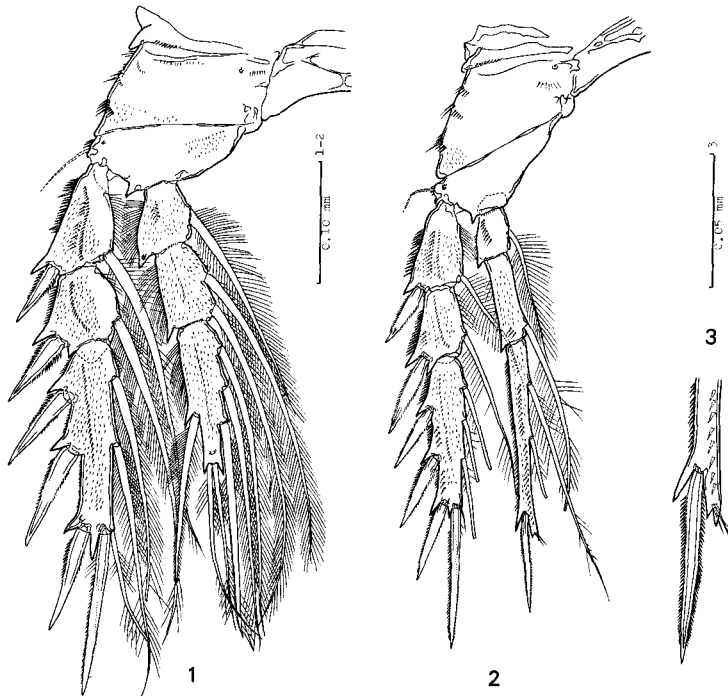


Fig. 37. *Tonpostratiotes tenuipedalis* n. gen. et n. sp. Female (holotype). 1. leg 3; 2. leg 4; 3. apical portion of endopodite of leg 4.

(Fig. 34-3) consisting of two segments. Basal segment forming a short process apically, which bears a seta (missing). Exopodite elongate, about five times as long as its median width, armed with three outer spines each arising from stepped edge, and two apical or subapical spines; all spines thick, serrated unilaterally or bilaterally.

Remarks. When I found a female specimen without antennae, which has been designated as the paratype, I thought her antennae had been broken off accidentally because this specimen was fairly damaged in various parts and I had known no harpacticoid species without antennae. Another specimen I found later, however, had no antennae either. I have examined this specimen with a dissecting microscope very carefully and found no scar of antennae. Even if the lack of the antennae was accidental, the validity of this new genus is not affected by it because the species is very clearly demarcated from all of the known genera of Cerviniopsinae (see Montagna, 1981) by the possession of unique characteristics such as the transformed leg 4 (ascertained for the paratype too) and the antennule consisting of seven segments. The last mentioned characteristic can be easily induced from the eight-segmented antennule of *Pontostratiotes* and others because the third segment is indubitably a fused segment derived from the third and the fourth of eight-segmented antennule.

The present new species is apparently close to certain species of *Pontostratiotes* (*P. sixtorum*, especially *P. sixtorum mindanaoensis*, and *P. robustus*), *Herdmaniopsis*, and *Stratiopontotes* in general characteristics of body somites and some of the appendages.

Concluding remarks

Up to the present, many good characters have been overlooked or underestimated for the taxonomy within the genus *Pontostratiotes*, and special attention has been paid upon the armature and shape of cephalic shield, thoracic pleurotergites, and antennule (see Por, 1969, p. 2; Dinet, 1977, p. 1197). As already shown in the present paper, antenna and oral appendages, especially maxilla and maxillipede, provide good taxonomic characters: In the antenna, for example, setal armature of allobasis and first exopodite segment and proportion of certain segments are quite useful to distinguish most of the *Pontostratiotes* species described (Table 1).

On the other hand, significance of the proportion of each segment of exopodite and endopodite of the leg 1 is discussed here in order to clear up each taxonomic situation of *P. sixtorum* and *P. robustus* as far as possible. The leg 1 of the majority of the *Pontostratiotes* species so far known is characterized as follows: each first segment of both rami elongate, much longer than two apical segments combined (especially in endopodite); first endopodite segment forming a spinous or horny projection not only at outer distal angle but also at inner distal angle. Such the "typical" leg 1 is represented by *P. pacificus* (see Fig. 5-1) and

Table 1. Comparison of antennal characters among five species of *Pontostratiotes*.

character	species				
	<i>pacificus</i>	<i>unisetosus</i>	<i>abyssicola</i>	<i>sixtorum</i>	<i>robustus</i>
number of setae of allobasis	0	2	2	2	2
number of setae of first exopodite segment	2	1	2	2	2
apical endopodite segment much longer than allobasis	yes	no	no	no	no
first exopodite segment much longer than second and third segments combined	yes	yes	yes	no	yes

many other species. Dinet (1977) reported 12 species of *Pontostratiotes* from the Bay of Biscay, and all of them have these characteristics. *P. sixtorum*, however, is clearly different in these characters: each first segment as long as two apical segments combined; first endopodite segment with no projection at its inner distal angle. The leg 1 of *P. robustus* is more different from "typical": each first segment of both rami shorter than two apical segments combined; first endopodite segment with no projection at its inner distal angle. Incidentally, the leg 1 of *P. inermis* Por, 1969 approaches to that of *P. sixtorum* in the proportion of each segment.

Other than the characters in the leg 1, as already pointed out partially, *P. sixtorum* and *P. robustus* are alike in several characters which discriminate them from other congeneric species: presence of superficial reticulation on body integuments, prominent triangular rostrum, less developed armature of cephalic shield and thoracic pleurotergites, one-segmented exopodite of male leg 5, broad coxa of maxillipede, etc. In fact, if *P. sixtorum* had no spinous projection on the hind edge of its cephalic shield, I would remove the species from the genus and transfer it into a separate genus, probably together with *P. robustus*.

Connecting with the taxonomic status of these two species, treatment of *Stratiopontotes* and *Herdmaniopsis* is also problematic. Although it is uncertain whether *Herdmaniopsis* species have the pleurotergite on the first thoracic somite, I suppose rudimentary pleurotergite is present under cephalic shield as in *Stratiopontotes mediterraneus* reported in the present paper. In *P. sixtorum*, the first thoracic pleurotergite is well defined (though more reduced rather than in *P. pacificus* and others). The first thoracic pleurotergite of *P. robustus* is somewhat reduced dorsally, and of *S. mediterraneus* fairly reduced and very thin: Thus, it appears that a tendency toward degeneration is present among them. In addition to this tendency, degeneration of setal armature is probably present in certain appendages. The first endopodite segment of maxillipede is furnished with three or two setae in *Pontostratiotes* and *Stratiopontotes* species but none in *Herdmaniopsis* species. The third exopodite segment of leg 4, moreover, is furnished with three inner setae in *Pontostratiotes* species but two inner setae in

Stratiopontotes as well as *Herdmaniopsis*. It will be noteworthy that the last mentioned characteristic, the third exopodite segment of leg 4 with two inner setae, is commonly found in most genera and species of the family Cerviniidae, especially the subfamily Cerviniinae (see, for example: Brotzkaja, 1963; Por, 1969; Montagna, 1979, 1981). *Tonpostratiotes tenuipedalis* shows another extreme case of degenerative tendency; namely, two antennular segments fused (probably due to incomplete segmentation in certain copepodid stage), antenna lacking, and certain setae of leg 4 markedly dwarfed. *Tonpostratiotes*, however, has three inner setae on the third exopodite segment of leg 4 and three setae on the first endopodite segment of maxillipede as in the "typical" *Pontostratiotes* species.

Considering complicate relations of similarities and dissimilarities among these genera and species as discussed above, I chose to postpone rearrangement of problematic species and genera.

References

- Brady, G.S. 1883. Copepoda. In: Report on the scientific results of the voyage of H.M.S. Challenger during the years 1873-76, Zoology, 8(23): 1-142, pls. 1-55.
- Brodskaya, V.A. 1959. Deep sea Harpacticoida. Part I. A revision of the genus *Pontostratiotes* Brady, 1883. Zool. Zh. 38: 1785-1789. (In Russian with English summary).
- 1963. A survey of the family Cerviniidae (Crustacea, Copepoda). *Ibid.* 42: 1785-1803. (In Russian with English summary).
- Dinet, A. 1977. Le genre *Pontostratiotes* Brady, 1883, dans l'étage abyssal du golfe de Gascogne (Copepoda, Harpacticoida). Bull. Mus. natn. Hist. nat., Paris, sér. 3, 499, Zool. 348: 1165-1199.
- Lang, K. 1948. Monographie der Harpacticiden. 1682 pp. Hakan Ohlsson, Lund.
- Montagna, P.A. 1979. *Cervinia langi* n. sp. and *Pseudocervinia magna* (Copepoda: Harpacticoida) from the Beaufort Sea (Alaska, USA). Trans. Amer. micros. Soc. 98: 77-88.
- 1981. A new species and a new genus of Cerviniidae (Copepoda: Harpacticoida) from the Beaufort Sea, with a revision of the family. Proc. biol. Soc. Wash. 93: 1204-1219.
- Por, F.D. 1969. Deep-sea Cerviniidae (Copepoda: Harpacticoida) from the western Indian Ocean, collected with R/V Anton Brunn in 1964. Smiths. Contr. Zool. 29: 1-60.
- Scott, T. 1910. Notes on Crustacea found in the gizzard of a deep sea cephalopod. Ann. Mag. nat. Hist., Ser. 8, 5: 51-54, pls. 2-3.
- Soyer, J. 1970. Contribution a l'étude des Copépodes Harpacticoides de Méditerranée. I. Cerviniidae Sars, Lang. Vie Milieu, Sér. B, 20: 367-386.
- Yamanaka, N. 1973. *Pontostratiotes acanthoferens* new species (Crustacea, Copepoda, Harpacticoida). Bol. Zool. Biol. Mar., N.S. 30: 449-456.