

## Four New Species of Galatheidean Crustacea from New Zealand Waters

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### Abstract

A collection of Crustacea Galatheidea made by the Japanese Fisheries Research Vessel "Kaiyo Maru" off the east coast of the South Island, New Zealand, contains four new species described here: *Gastroptychus novaezelandiae* sp. nov., *Uroptychus tomentosus* sp. nov., *Munida chathamensis* sp. nov., and *Munidopsis kaiyoae* sp. nov.

### INTRODUCTION

Under the auspices of the Fisheries Agency of Japan a biological survey was made by the Japanese Research Vessel "Kaiyo Maru" during June-July 1968 to explore the fishing potential of the Chatham Rise, off the east coast of the South Island, New Zealand. During the cruise a collection of invertebrates was made by myself with a simple hand-made dredge which has a mouth of  $20 \times 50$  cm and which was set up behind the trawl net at a distance of about 3 m from the cod end. Sorted out from the collection made at 36 stations were 434 specimens of galatheid crustaceans, which were distributed among four new species in addition to three known species already recorded from New Zealand waters, i.e., *Phylladiorhynchus* [previously *Galathea*] *pusillus* (Henderson), *Munida gregaria* (Fabricius) and *Munida gracilis* Henderson.

The holotypes designated in this paper are deposited in the collection of the Zoological Laboratory, Kyushu University (ZLKU), Fukuoka, Japan, and some of the paratypes are in the National Museum of New Zealand (NMNZ), Wellington.

### DESCRIPTION OF NEW SPECIES

#### FAMILY CHIROSTYLIDAE

#### *Gastroptychus novaezelandiae* sp. nov. (Figs. 1, 2)

*Holotype*. Male, ZLKU, 15123. "Kaiyo Maru" St. 28 ( $43^{\circ} 14.5' S$ ,  $174^{\circ} 43.0' E$ ), 440 m deep, mud and sand, 13 July 1968, 1413-1540 hours.

*Paratype*. One male, NMNZ, Z. Cr. 1922. "Kaiyo Maru" St. 32 ( $43^{\circ} 55.5' S$ ,  $179^{\circ} 09.0' W$ ), 410 m deep, mud and sand, 15 July 1968, 0815-0935 hours.

#### *Description of holotype.*

Carapace, including distinct rostrum, about twice as long as its greatest breadth. Lateral margins subparallel and moderately convex at mid-branchial region, with further weak convexity near cervical groove. Dorsal surface densely covered with spinules. There are also rather large, stout, scattered spines distributed as follows: behind eyes, and single spines occupying following positions: mid-posterior portion of gastric area; small area of anteriormost branchial region on each side just posterior to cervical groove; anterior branchial region on each side behind the preceding; mid-cardiac region, and at posterior end of cardiac

region; two large spines in front of posterior margin of carapace. Gastric region distinctly defined and swollen. Cervical groove rather distinct. Cardiac region somewhat swollen but ill-defined laterally and posteriorly. Hepatic region somewhat swollen and separated from gastric region by a broad, poorly-developed groove. Anterior portion of branchial area just behind cervical groove well-defined into small area.

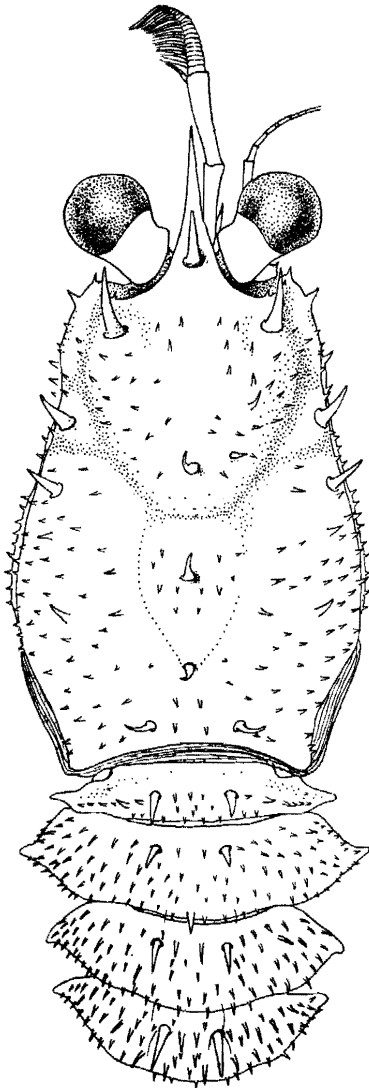


FIG. 1.—*Gastroptychus novaezelandiae* sp. nov., holotype, dorsal aspect; thoracic appendages omitted.

5 mm

Rostrum well-developed, spiniform, almost horizontal, dorsobasally having a rather stout spine directed upwards and forwards. Outer orbital angle rounded.

Abdomen spinulated above, additionally each segment with a pair of rather large spines placed dorsally. First abdominal segment rather well-developed, with pleura produced. Pleura of second to fifth segments bluntly tapering, but that of sixth segment rounded. Telson constricted at base, just at level of distal portion of protopod.

Eyes well-developed; cornea somewhat dilated distally.

Basal antennular segment with a well-developed stylocerite divided distally into two spines. Ultimate segment of antennal peduncle about three times as long as penultimate, with an inner marginal spine distally placed. Proximal second segment with an outer distal marginal spine. Antennal scale very small, but distinctly present.

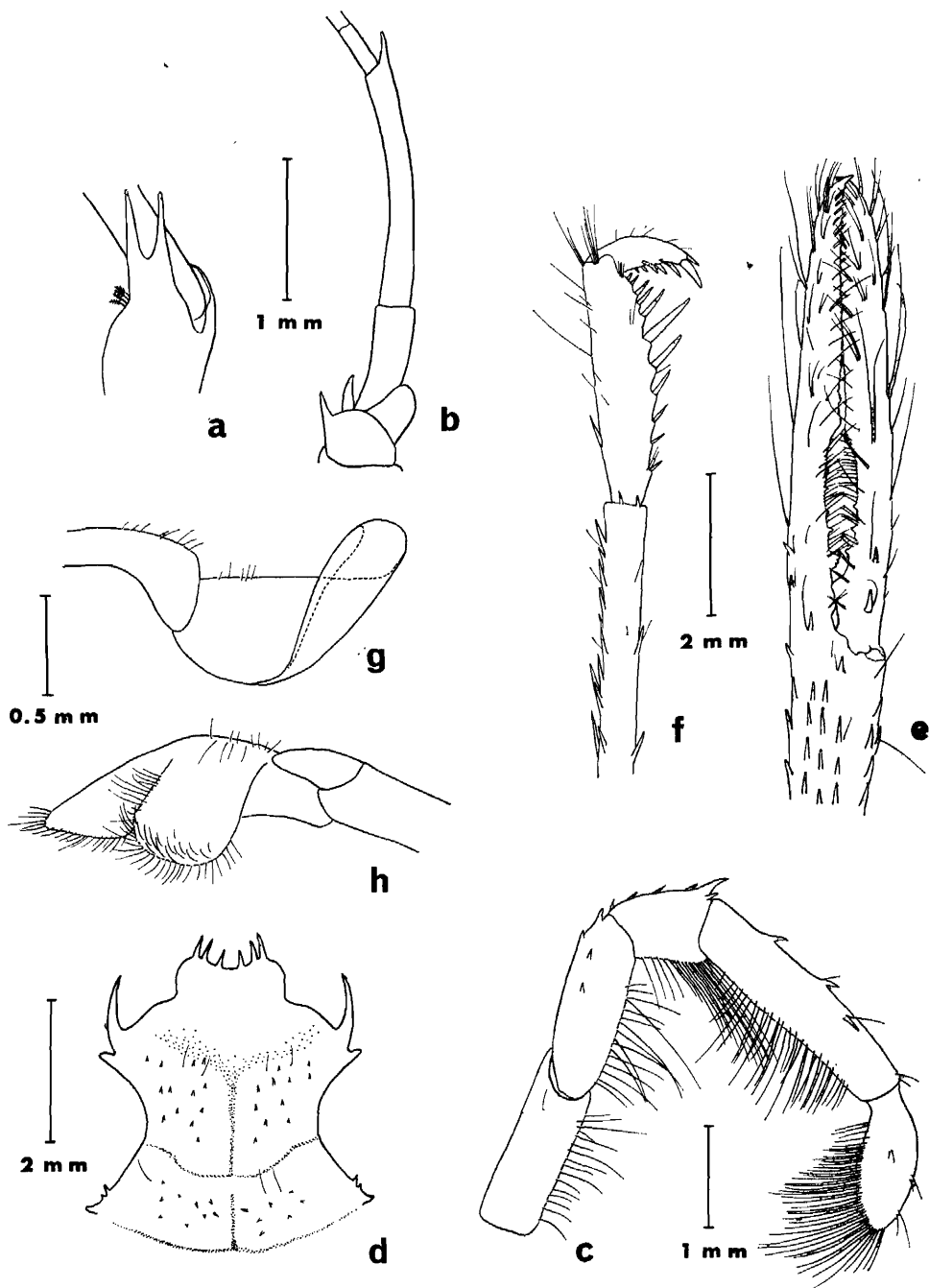


FIG. 2.—*Gastroptychus noveazelandiae* sp. nov., holotype, a, basal segment of right antennule; b, right antennal peduncle; c, endopod of right third maxilliped; d, anterior part of sternal segments; e, fingers of left cheliped; f, distal segments of right first ambulatory leg; g, distal part of right first pleopod; h, distal part of right second pleopod.

External margin of third maxilliped with four slender spines on merus, six on carpus (distal two of them paired), and three on propodus. Thoracic sternal segments spinose ventrally and marginally. Anterior margin of foremost thoracic sternite concave, with six long spines. Anterior margin of second sternal segment armed with a strong spine on each side which is directed forwards and curved inwards. Following two segments each with two or three small spines marginally.

Chelipeds slender, subcylindrical, very spinulose, measuring about six times length of carapace, and distally furnished with long coarse setae. Arm about 12 times as long as broad, slightly shorter than wrist and twice as long as finger. Fingers gaping on proximal half, closely in apposition on distal half. Closed distal half with minute denticles on cutting edge; gaping portion sparsely provided with rather large tubercles among thick furnishing of short setae; a stout protuberance also present proximally at gaping portion of each finger.

Ambulatory legs slender, spinose and similar to each other. Merus provided with about 50 spines on each of outer (anterior) and inner (posterior) margins; dorsal and ventral surfaces spinulose. Outer margin of carpus with about 60 spinules, inner margin with about 35 spinules; dorsal and ventral surfaces scattered with spinules; dorsal spinules rather close to outer margin. Propodus short, 1/7 of carpus length, widest at distal third; inner margin with 11 or 12 slender spines, distal 6th of them largest, placed at widest portion; a single outer marginal spine present proximally, one dorsal spine close to the preceding one, and three ventral spines proximally placed. Dactylus slightly less than half length of propodus, with 7 or 8 internal marginal spines, the penultimate largest.

First two pleopods as represented in Figure 2 g, h.

*Colour in life.* Carapace and abdomen light brown and with reddish orange chromatophores scattered marginally. Alimentary tract brownish orange. Eyestalk reddish orange proximally and pale brown distally. Corneal region golden, covered with dark grey. Cheliped pale brown in ground colour; palm, fingers and distal portions of both arm and wrist reddish orange. In addition reddish orange chromatophores distributed on arm and wrist. Ambulatory legs pale brown, distal portion of meral and carpal segments reddish orange. Dactyli yellowish especially along inner margin.

*Ecology.* The holotype specimen was taken from a dorsal groove of *Balticina willemoesii* (Kölliker), a pennatularian identified by the courtesy of Prof. H. Utinomi of the Seto Marine Biological Laboratory, Kyoto University, Japan.

*Measurements of holotype* (mm)

Length of carapace including rostrum	11.5
Breadth of carapace	6.3
Length of cheliped (right)	65.3
Length of wrist	16.0
Length of palm	13.5
Breadth of palm	1.1
Length of movable finger	6.5

*Remarks.* It was previously reported that the group which possesses the antennal scale and the rostrum should be known as *Gastroptychus* (Miyake and Baba 1968). In the present material the rostrum is well-developed and the antennal scale is small but distinctly present (Fig. 2, b). As regards the generic characters, Miss Janet Haig kindly suggested to me that there might be variation within the genus in the form of the antennal scale, for instance from well-developed to rudimentary or sometimes absent. The same may be applied to the rostrum; however, the present species is referred to *Gastroptychus* for the time being, due to the distinctive presence of the rostrum. So far only 11 species of this genus are known from the Pacific (van Dam 1933; Tirmizi 1964; Haig 1968; Miyake and Baba 1968). The first record of this genus from New Zealand waters was that of Pike and Wear (1969). They described the newly hatched first larval stage of an undescribed species of *Gastroptychus* from the Bay of Plenty. This species can now be identified as the new *G. novaezelandiae* (R. B. Pike, pers. comm.). Specifically, this new species is readily distinguished from the other members of the genus by the extremely short propodi of the ambulatory legs.

*Uroptychus tomentosus* sp. nov. (Figs. 3, 4)

*Holotype.* Male, ZLKU 15125. "Kaiyo Maru" St. 3 (45° 14.3' S, 171° 29.2' E), 116 m deep, sandy mud, 19 June 1968, 0830-0940 hours.

*Paratypes*. One male and one female, ZLKU 15126. "Kaiyo Maru" St. 4 ( $44^{\circ} 50.3' S$ ,  $171^{\circ} 51.8' E$ ), 118-120 m deep, sandy mud, 19 June 1968, 1216-1336 hours.

One male, ZLKU 15128. "Kaiyo Maru" St. 9 ( $44^{\circ} 23.0' S$ ,  $172^{\circ} 56.2' E$ ), 135 m deep, sand, 22 June 1968, 1605-1742 hours.

One male, NMNZ, Z. Cr. 1923. "Kaiyo Maru" St. 19 ( $44^{\circ} 34.9' S$ ,  $172^{\circ} 37.5' E$ ), 138-126 m deep, sand, 1 July 1968, 1300-1430 hours.

One male, ZLKU 15130. "Kaiyo Maru" St. 25 ( $43^{\circ} 08.7' S$ ,  $178^{\circ} 14.4' E$ ), 382 m deep, mud, 12 July 1968, 1215-1335 hours.

One male, ZLKU 15131. "Kaiyo Maru", no station number,  $43^{\circ} 22.0' S$ ,  $175^{\circ} 31.0' E$ , 180 m deep, rocks, 24 June 1968, 1630-1640 hours.

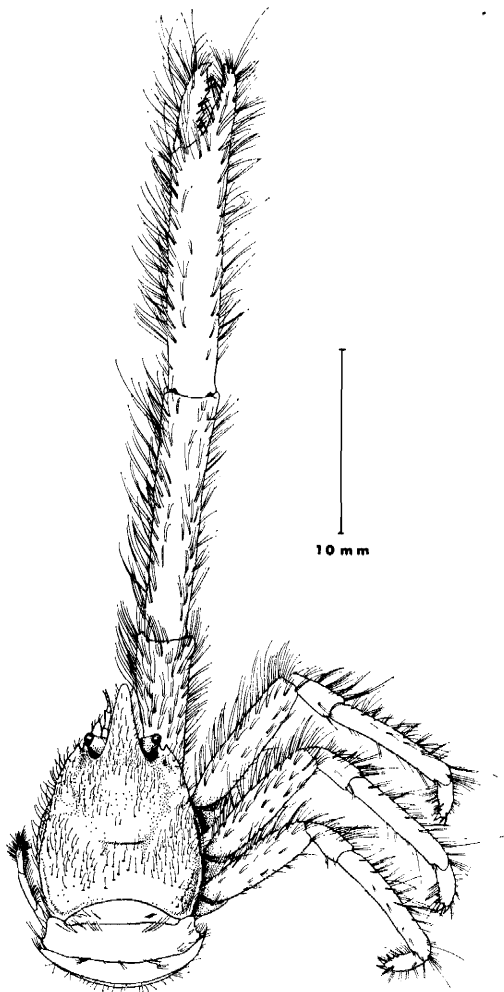


FIG. 3.—*Uroptychus tomentosus* sp. nov., holotype, dorsal aspect.

#### *Description of holotype.*

Carapace slightly broader than long, excluding rostrum. Lateral margins diverging posteriorly, with gently arched convexity; greatest breadth measured between second ambulatory legs. Dorsal surface covered with fine setae. Gastric region rather distinct, with a moderate convexity, providing behind a shallow transverse groove which borders cardiac region. A ridge present slightly dorsally along posterior third of lateral margin of carapace. Anterolateral angle with a rather distinct spine. Lateral margin furnished with minute tubercular teeth from anterolateral angle to posterior two-thirds; similar teeth also distributed slightly dorsally.

Rostrum rather broad, triangular in shape, nearly half of remaining carapace length; ending in rounded tip, ventrally carinated; dorsal surface slightly concave longitudinally, covered with fine setae. Outer orbital angle spinulated.

Basal segment of antennule somewhat globular; inner distal marginal angle with a large, rather flattened spine. Proximal second segment of antennal peduncle armed with a minute spine at outer distal margin just near base of antennal scale. Fourth (penultimate) segment almost equal to fifth (ultimate), with an inner distal marginal spine. Antennal scale rather broad, terminating at middle of fifth segment of peduncle. Flagellum of about 17 segments.

Third maxilliped rather setose, without any spine. Merus widest at distal third; anterior margin produced forwards. Anteriormost thoracic sternite raised dorsally from the level of other sternal segments; anterior margin smoothly concave, with a deep, almost U-shaped embayment at middle.

Cheliped slightly depressed, smooth, furnished with long fine setae; its length, measured from tip of rostrum, about three times combined length of carapace and rostrum. Ischium with stout spine on dorsal surface. Arm slightly scaly proximally. Palm and wrist subequal in length, each more than twice as long as movable finger. Fingers not gaping, touching each other with minute tubercular teeth; cutting edge slightly undulated.

Ambulatory legs similar; third leg shortest. All legs externally unarmed but furnished with long setae. Dactylus (Fig. 4, d) rather straight, setose externally and internally, with 6 internal marginal spines; the penultimate strongest. Propodus with a pair of minute spines at inner distal margin.

First and second pleopods simple, as represented in Figures 4, e, f.

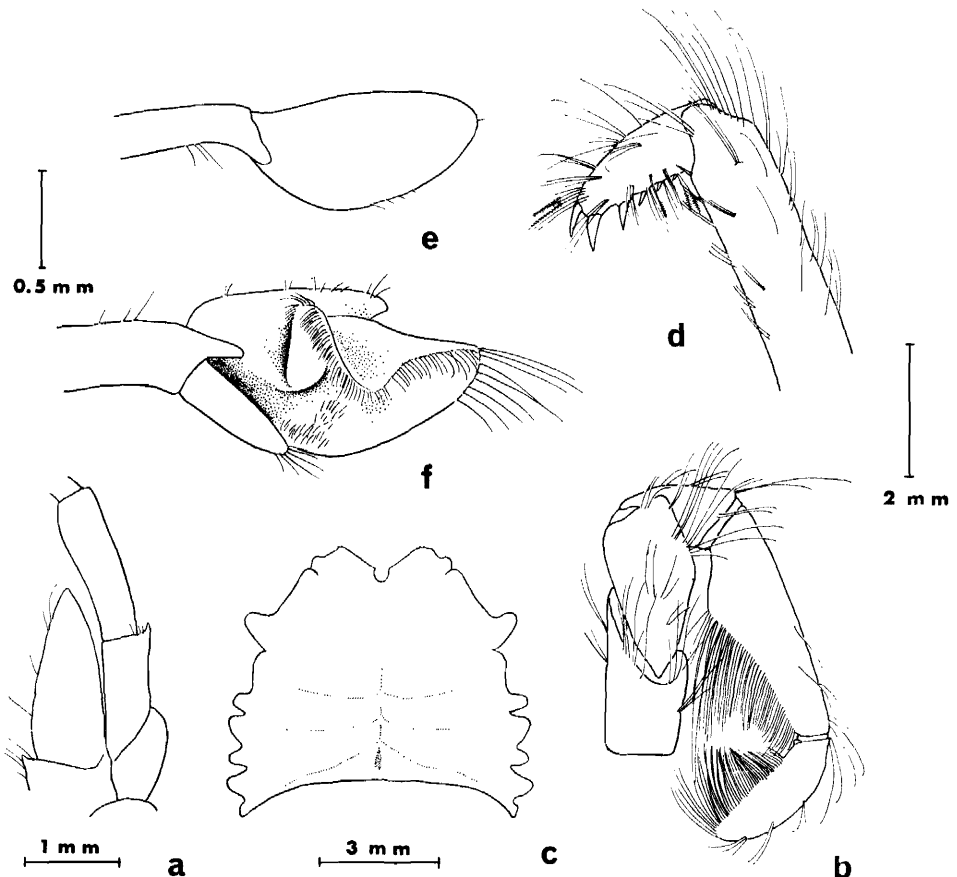


FIG. 4.—*Uroptychus tomentosus* sp. nov., holotype, a, right antennal peduncle; b, endopod of right third maxilliped; c, sternal segments; d, distal segments of right first ambulatory leg; e, distal part of right first pleopod; f, distal part of right second pleopod.

*Colour in life.* Body wholly light pink. Cornea with small blackish spot dorsally.

*Measurements of holotype (mm)*

Length of carapace including rostrum	11.8
Breadth of carapace	8.9
Length of cheliped (right)	44.9
Length of wrist	13.5
Length of palm	13.1
Breadth of palm	3.3
Length of movable finger	5.3

*Variation.* Setae on the carapace and legs are considerably thickly furnished, but to some degree variable in thickness, as in one specimen (female) they are quite undeveloped on the cheliped. The dactylus of the ambulatory leg usually bears 6 conical spines as in the holotype, while those of three specimens both from Station 4 and Station 9 have three to four spines, the penultimate of which is the strongest as in the holotype. In coloration the body varies from pale brown or pink to light yellowish brown.

*Remarks.* Recorded from New Zealand waters inclusive of the Kermadec Islands are five species of the genus *Uroptychus*, two of which are from off the north coast of the North Island (*U. novaezealandiae* Borradaile and *U. maori* Borradaile) and three others are from the Kermadec Islands (*U. spinimarginatus* Henderson, *U. politus* Henderson, and *U. australis* Henderson). The present new species is closely related to *Uroptychus australis* Henderson, but differs in that the antennal scale fails to reach the distal end of the ultimate segment of the antennal peduncle, and the arm of the cheliped has no internal marginal row of tubercular

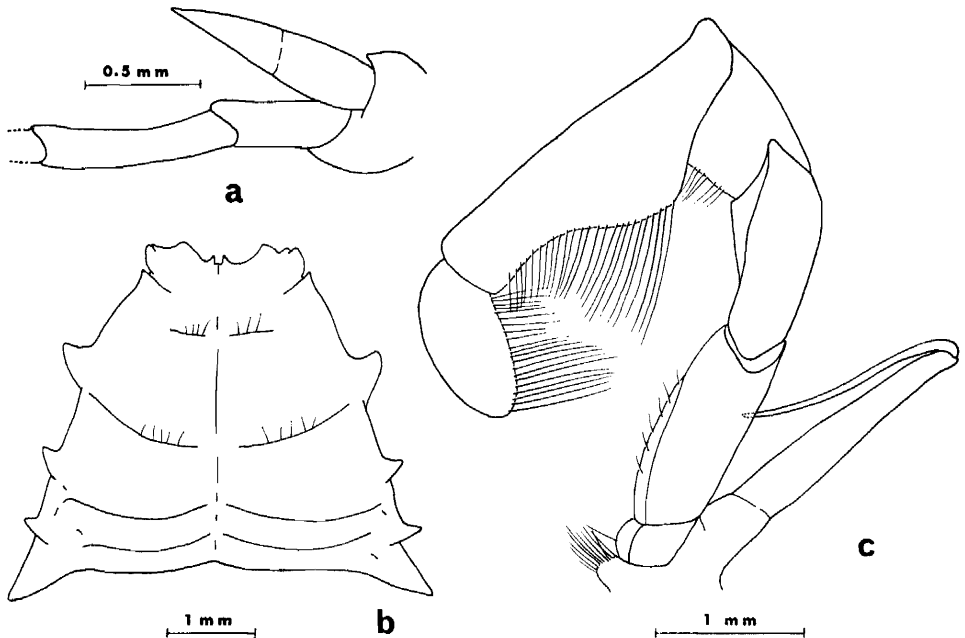


FIG. 5.—*Uroptychus politus* Henderson, holotype, a, left antennal peduncle; b, sternal segments; c, left third maxilliped (Camera lucida drawings by R. W. Ingle).

teeth. This species is also very closely allied to *U. politus* Henderson, from which it differs in having the body thickly covered with fine setae. Further detailed comparison is not possible, owing to the brevity of the accounts of *U. politus* given by Henderson (1885, 1888). It is, however, very kind of Dr R. W. Ingle of the British Museum to send me camera lucida drawings of the holotype of

*U. politus* (BM, reg. no. 88.33). According to the illustration prepared by him (Fig. 5) the present species is quite distinct from *U. politus*; the anterior margin of the thoracic sternite has a simple U-shaped embayment in *U. tomentosus* while a pair of spines is present there outside of the embayment in *U. politus*; the penultimate segment of the antennal peduncle has an inner terminal spine in *U. tomentosus*, whereas it is unarmed in *U. politus*.

#### FAMILY GALATHEIDAE

#### *Munida chathamensis* sp. nov. (Figs. 6, 7)

*Holotype*. Female, ZLKU 15553. "Kaiyo Maru" St. 36 (44° 44.0' S, 175° 42.0' E), 995-1,110 m deep, mud, 16 July 1968, 1830-1935 hours.

#### *Description of holotype.*

Carapace coarse above, about twice as long as broad including rostrum. Transverse ridges distinct and rather raised. Gastric region anteriorly scattered with tubercular teeth; one pair of prominent gastric spines just behind supraorbitals. A small spine also present behind and outside each gastric spine. Cervical groove distinct, rather deep. Anterolateral spine well-developed, and one other spine following behind, in front of cervical groove. Branchial region with 5 sharp spines marginally, and one dorsally which is placed behind the anterior bifurcation of cervical groove.

Rostrum slightly more than a half of remaining carapace length, spiniform, horizontal. A weak lateral carina developed proximally, with very small tubercles. Dorsal surface minutely tuberculate, furnished proximally with several long setae. Supraorbital spine directed upwards and slightly outwards, with several long setae dorso-laterally; it reaches slightly beyond eye, failing to reach the middle of rostrum. Orbit delimited below by a thin crest with a small spine.

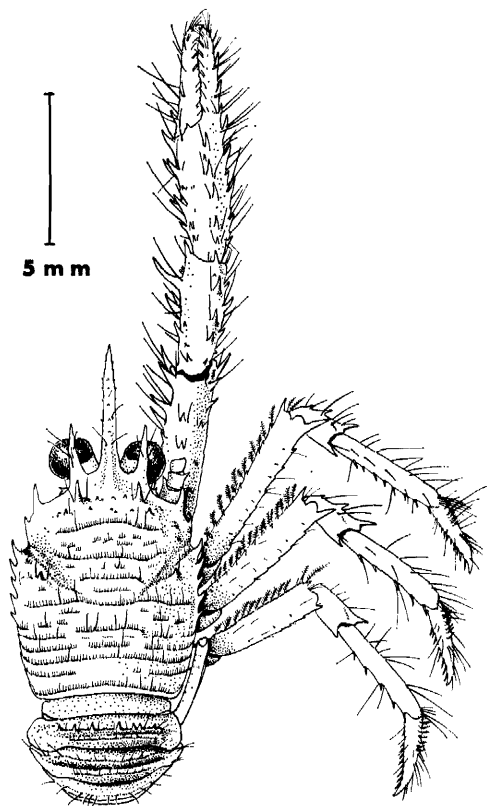


FIG. 6.—*Munida chathamensis* sp. nov., holotype, dorsal aspect.



Second to fourth abdominal segments each with two raised transverse ridges dorsally; anterior ridge of second segment armed with 7 spines; second and third spines on right side close to each other.

Antennular basal segment with two outer lateral and two terminal spines; inner terminal spine shorter. A small spine also present inside of proximal lateral spine. Spinulation in antennal peduncle distinct; inner distal marginal spine of first segment rather stout with several plumose setae internally; second segment with an outer and an inner distal marginal spine, both moderately developed; third segment slightly produced at outer distal margin to form a minute spine.

Third maxilliped moderately setose. Ischium as long as merus; one (left appendage) or two (right) small spines placed on inner distal margin; inner cutting edge well-developed, with many closely placed denticles. Two inner marginal spines on merus; one of them placed distally and the other (stouter) at middle. Propodus not foliaceous, but moderately depressed.

Anterior part of sternal segments as represented in Figure 7, c; anterior margin minutely tuberculate with a central notch weakly developed; transverse ridge absent from surface.

Cheliped, measured from tip of rostrum, nearly as long as combined carapace and rostrum; markedly spinose and sparsely furnished with long setae. Distal two segments depressed but others subcylindrical. Palm three times as long as broad, slightly longer than finger. Fingers not gaping, but touching each other with tubercular teeth on cutting edge.

Merus of first ambulatory leg sparsely furnished with short plumose setae; anterior margin with about 12 spines of subequal size, distal of them strong; posterior margin with 7 spines, distal one strongly developed but others decreasing in size proximally. A row of dorsally placed minute tubercles close to posterior margin. Carpus with three outer and one inner marginal spines; the latter placed distally as in other species. Propodus furnished posteriorly with about 8 movable spines, and anteriorly with long setae. Dactylus slightly shorter than preceding segment, internally (posteriorly) having no marked serration but about 12 broad setae. Second ambulatory leg very similar to first; spinulation on propodus less prominent. Third leg similar to second except for armature; merus with a single distal spine only on both margins.

Epipods absent from all pereiopods.

*Colour in life.* Body wholly light pink, rostrum and supraorbital spines slightly orange. Eyes golden.

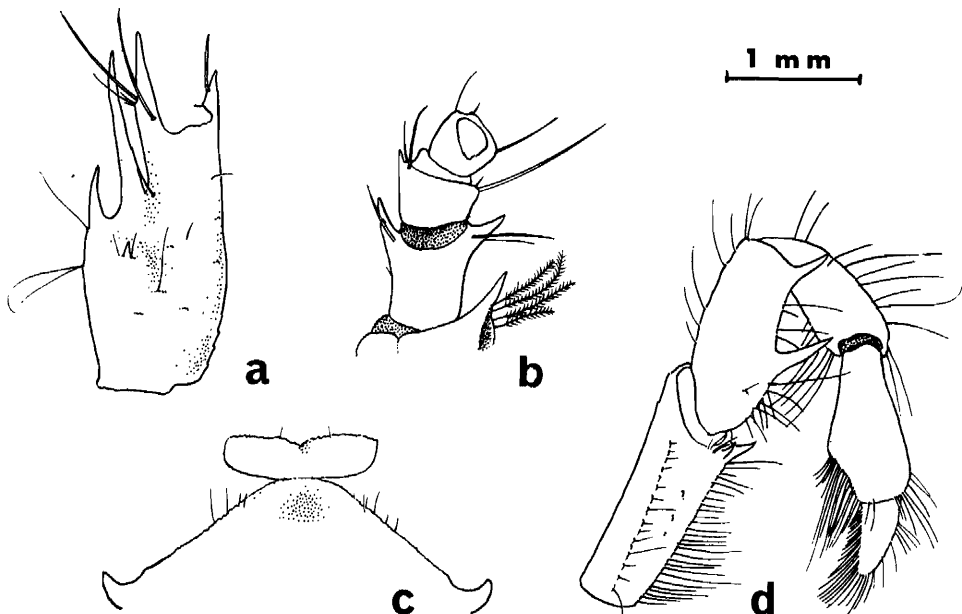


FIG. 7.—*Munida chathamensis* sp. nov., holotype, a, basal segment of right antennule; b, right antennal peduncle; c, anterior part of sternal segments; d, endopod of right third maxilliped.

*Measurements of holotype (mm)*

Length of carapace including rostrum	11.6
Breadth of carapace	6.0
Length of cheliped (right)	20.0
Length of wrist	3.8
Length of palm	4.5
Breadth of palm	1.5
Length of movable finger	4.1

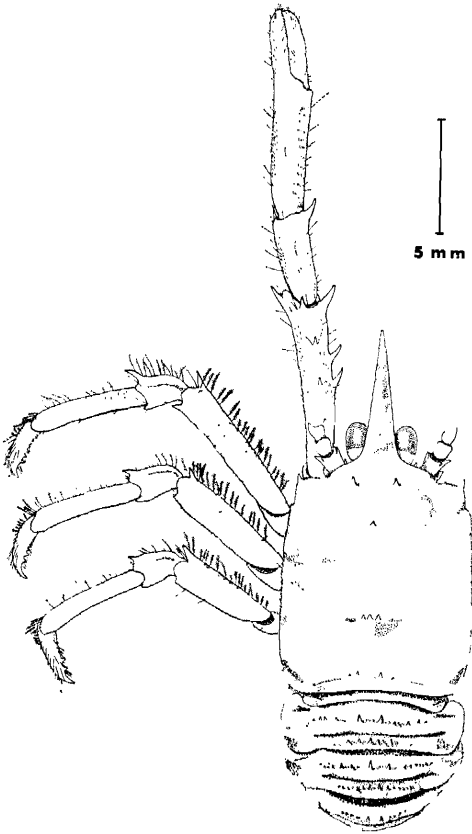


FIG. 8.—*Munidopsis kaiyoae* sp. nov., holotype, dorsal aspect.

*Remarks.* This species somewhat resembles *Munida gracilis* Henderson, common in New Zealand waters, but it differs in the following respects: (1) The cheliped of *Munida gracilis* is much more slender than that of *M. chathamensis*. (2) The inner terminal spine of the basal antennular segment is the larger in *M. chathamensis*.

*Munidopsis kaiyoae* sp. nov. (Figs. 8, 9)

*Holotype.* Female, ZLKU 15554. "Kaiyo Maru" St. 33 (44° 20.5' S, 179° 17.5' W), 750 m deep, mud, 15 July 1968, 1315-1440 hours.

*Paratypes.* One female, ZLKU 15555; one female, NMNZ, Z. Cr. 1925. Collected with holotype.

*Description of holotype.*

Carapace longer than broad, covered with very short setae. Gastric region moderately convex with three spines; two paired and placed foremost and other placed behind the pair. Lateral margins not divergent but subparallel. Border between hepatic and branchial

regions distinct with rudimentary cervical groove. Anterolateral spine distinct. Posteriormost transverse ridge of carapace with four spines. Cardiac region greatly raised transversely; anterior edge forming a cliff, armed with three small spines.

Rostrum spiniform, proximally having a weak lateral carina, curving upwards distally, and measuring more than a half of remaining carapace length. A distinct spine present between eye and antennal peduncle.

Second and third abdominal segments each with two transverse ridges dorsally which are not well carinated but each bear more than 8 tubercular teeth. Anterior ridge of fourth segment with similar equipment of tubercular teeth, but posterior ridge unarmed.

Eyestalk rather large, unarmed; corneal region somewhat dilated.

Basal antennular segment stocky, with two stout subequal spines on outer terminal margin; inner margin slightly produced forwards with a few tubercles. Antennal peduncle not distinctly spinose; outer distal margin of second segment with a stout spine; minute tubercles visible on inner terminal margin.

Ischium of third maxilliped as long as merus, triangular in cross section; inner distal marginal spine distinct; inner toothed ridge with about 16 denticles. Merus widest at proximal third; inner margin bispinose, larger spine placed at widest portion, and another situated at distal fourth; outer margin with a distally placed spine. Carpus smooth.

Sternal segments rather broad. Anterior sternal segment raised dorsally; anterior margin with two rounded protrusions, and anterolaterally weakly expanded.

Chelipeds proximally subcylindrical but somewhat depressed distally, sparsely furnished with fine setae. Ischium with a stout spine dorsoventrally. Arm particularly spinose, with about 11 spines, seen from a dorsal aspect, of which four are around distal margin and the others on dorsal surface and inner margins. Wrist as long as finger, with two spines distally placed, that on the inner marginal angle stouter, the other on ventral surface. Palm about one and a half times length of wrist, without any spine. Fingers not gaping, touching each other with rather large tubercular teeth along entire length of cutting edge; tips rounded, crossing each other with two stout teeth when closed.

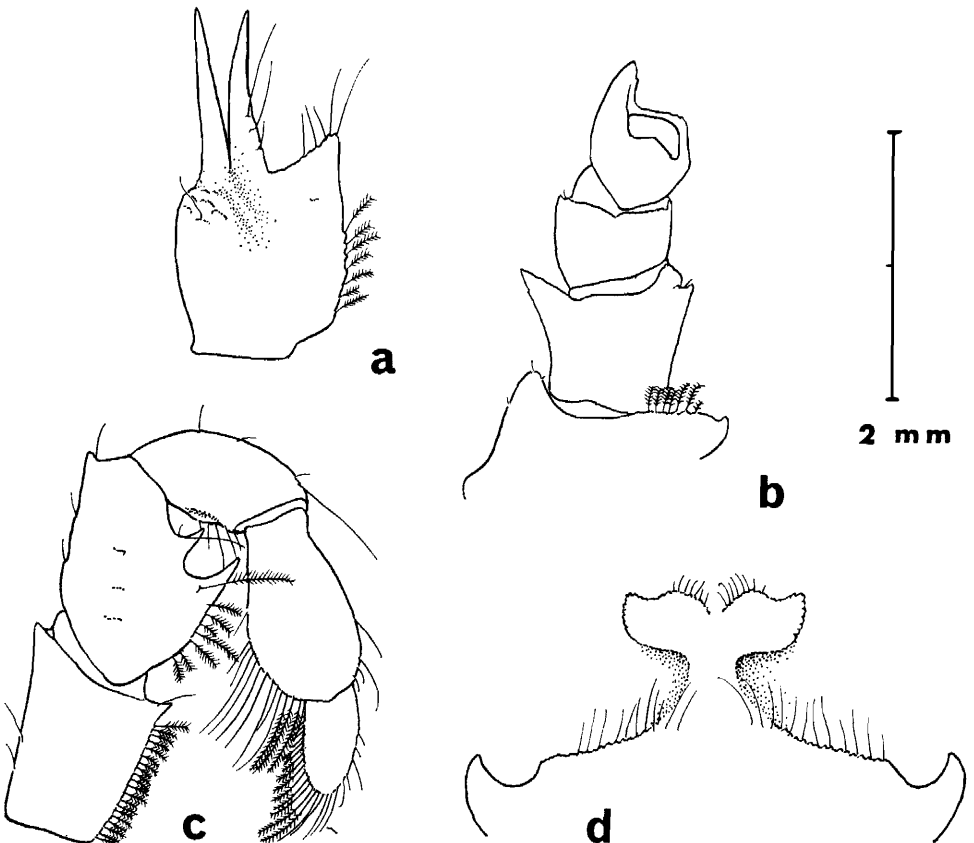


FIG. 9.—*Munidopsis kaiyoae* sp. nov., holotype, a, basal segment of right antennule; b, right antennal peduncle; c, endopod of right third maxilliped; d, anterior part of sternal segments.

Ambulatory legs stout, anteriorly furnished with very fine plumose setae; surface with many very short ridges from which setae arise. Outer meral margin of first leg with 5 to 7 minute tubercular teeth; inner and outer angles of distal margins each with a rather developed spine. Carpus ridged longitudinally on dorsal surface; anterior margin minutely tuberculate, its distal corner developed into a strong spine. Propodus smooth, without any spine. Dactylus bent inwards, with 9 teeth internally. Second and third legs very similar to first; merus shorter, lacking posterior distal marginal spine.

Epipods absent from all pereopods.

*Colour in life.* Body whitish. Corneal region yellowish.

*Measurements of holotype (mm)*

Length of carapace including rostrum	16.3
Breadth of carapace	8.6
Length of cheliped (left)	26.5
Length of wrist	4.2
Length of palm	6.2
Breadth of palm	1.6
Length of movable finger	4.1

*Variation.* Examination of three females shows that the spines on the carapace are variable in number. The gastric pair which lies immediately behind the rostrum is constant and the following gastric spine is distinct in the holotype, rudimentary in the smaller paratype and lacking in the larger. The number of spines behind the mid-cervical groove is three in the holotype and two in both the paratypes. Furthermore, the hind ridge of the carapace has four spines in the holotype, one in the smaller paratype and four in the larger. The anterolateral angle of the carapace is well-developed in the larger two specimens including holotype, but rounded in the smaller.

*Remarks.* The only species of *Munidopsis* known from New Zealand (*M. marginata* Henderson from the Kermadec area) is not related to the present new species. One of closest allies appears to be *Munidopsis curvirostra* Whiteaves known from the Atlantic, from which the new species differs in the following respect: the second to fourth abdominal terga bear each a single spine in *M. curvirostra*, while in the present species the second and the third terga have each two transverse ridges, each with a row of more than 8 tubercular teeth, and the fourth has the anterior transverse carina with tubercular teeth only.

#### ACKNOWLEDGMENTS

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#### REFERENCES

- BORRADAILE, L. A. 1916. Crustacea. Part 1.—Decapoda. *British Antarctic ("Terra Nova") Expedition, 1910. Natural History Report Zoology* 3(2): 75–110, figs. 1–16.
- DAM, A. J. VAN 1933. Die Decapoden der Siboga-Expedition. VIII. Galatheidea: Chirostylidae. *Siboga-Expeditie, monographie* 39a: 1–46, figs. 1–50.
- HAIG, J. 1968. First report of the crab family Chirostylidae off California, and description of a new species of *Chirostylus*. *California Fish and Game* 54(4): 270–277, figs. 1–3.
- HENDERSON, J. R. 1885. Diagnoses of the new species of Galatheidea collected during the "Challenger" expedition. *Annals and Magazine of Natural History* (5), 16: 407–421.
- 1888. Report on the Anomura collected by H.M.S. Challenger during the years 1873–76. *Report on the Scientific Results of the Voyage of H.M.S. Challenger, Zool.* 27: i–xi, 1–221, pls. 1–21.

- MIYAKE, S., and BABA, K. 1968. On the generic characters of *Chirostylus*, with description of two Japanese species (Crustacea, Anomura). *Journal of the Faculty of Agriculture, Kyushu University* 14: 379–387, figs. 1–3.
- PIKE, R. B., and WEAR, R. G. 1969. Newly hatched larvae of the genera *Gastroptychus* and *Uroptychus* (Crustacea, Decapoda, Galatheidae) from New Zealand waters. *Transactions of the Royal Society of New Zealand, Biological Sciences* 11(13): 189–195, 14 figs.
- TIRMIZI, N. M. 1964. Crustacea: Chirostylidae (Galatheidea). *Scientific Reports John Murray Expedition 1933-34*. 10(8): 385–415, figs. 1–43.
- WHITEAVES, J. F. 1874. On recent deep-sea dredging operations in the Gulf of St. Lawrence. *American Journal of Science* (3), 7: 210–219.

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