# New Squat Lobsters (Galatheidae) from the Pacific Ocean: Mariana Back Arc Basin, East Pacific Rise, and Cascadia Basin

Austin B. Williams and Keiji Baba

ABSTRACT: **Three species of squat lobsters new to science are described and illustrated. *Munidopsis marianica*, collected with the aid of DSRV *Alvin* from a hydrothermal vent area in the Mariana Back Arc Basin in the western Pacific, is distinguished from a northeastern Pacific species, *M. tuftsi* Ambler, by the erectness of its eye spines and ornamentation of the body, form of telson plates, and spination of dactyls on walking legs. *Munidopsis lignaria*, collected in association with submerged wood with the aid of RV *Yaquina* in trawl samples from the eastern Pacific Cascadia Basin off Oregon and DSRV *Alvin* from the East Pacific Rise off south central Mexico, is distinguished from its nearest congener, *M. ciliata* Wood-Mason, by blunter ornamentation and smaller body size. *Munidopsis granosicorium* from Cascadia Basin is represented by a unique specimen, the carapace of which has a distinctive unspined ornamentation but a much more broadly triangular rostrum and more pronounced anterior elevation than that of its apparent closest relative, *M. follirostris* Khodkina.**

On a recent *Alvin/Atlantis II* expedition to the Mariana Back Arc Basin in the western Pacific, 28 dives were made, 6 of them entirely devoted to biology. Those dives focused on 3 active low temperature (10°–25°C) vent sites at which anemones, mollusks, shrimps, squat lobsters, crabs, and other invertebrates were observed or collected (R. Hessler[1]; Hessler et al. 1988). We here describe a new species of *Munidopsis* collected during 3 of the dives.

A subsequent *Alvin/Atlantis II* expedition (Cruise 118, Leg 32) focused on geological exploration of the East Pacific Rise between lat. 10°55′N and 11°55′N. Small fields of past and present hydrothermal activity were found along the axis of this region, and among samples of biological specimens collected from both vent and nonvent environments was a piece of wood colonized by a variety of invertebrates, including a species of *Munidopsis* (see Van Dover 1988). These specimens are identical to specimens taken during extensive collections of benthic megafauna made at stations of the RV *Yaquina* on the Oregon continental margin and nearby abyssal plains from 1962 to 1983 (Ambler 1980; Carney and Carey 1982; Carey[2]). A pattern of stations was sampled to determine the distribution and abundance of mega-epifauna and to study the ecological influence at sea of radionuclides originating from the Hanford (WA) Nuclear Reservation. Collections at these and other study areas in the region were made with a 7.1 m semiballoon otter trawl (1.3 cm mesh) and with a 3 m beam trawl (1.3 cm mesh) equipped with paired odometer wheels (Carey and Heyamoto 1972). We reviewed all of this material and here describe the species as new. Finally, a unique but fragmentary specimen of *Munidopsis* from Professor Carey's sampling program is described.

Specimens studied, except where otherwise indicated, were from the Oregon State University Benthic Invertebrate Museum (OSUBI), Corvallis, OR; the Museum of Comparative Zoology, Harvard University (MCZ), Cambridge, MA; and the Division of Crustacea of the United States National Museum of Natural History, Smithsonian Institution (USNM), Washington, DC. Types of new species are deposited in crustacean collections of the USNM and OSUBI.

## *Munidopsis marianica* New Species

**Figures 1, 2*a*, 3*a*, *b***

*Material studied.*—Western Pacific Ocean,

[1]Robert Hessler, Scripps Institution of Oceanography, La Jolla, CA 92093, pers. commun. September 1987.

[2]A. G. Carey, Jr., College of Oceanography, Oregon State University, Corvallis, OR 97331, pers. commun. September 1988.

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Mariana Back Arc Basin. USNM 240198. Holotype ♀ (ovig.). Burke Field, 18°11′N, 144°43′E, 3,680 m, *Alvin* Dive 1837, 28 April 1987, Pilot Salzig, Observers Hessler, France.—USNM 240199. Paratypes, 2 ♀ (ovig.), 1 ♂, same.—USNM 240200. Paratype ♀. Illium, 18°15′N, 144°42′E, 3,620 m, *Alvin* Dive 1829, 14 April 1987, Pilot Tibbets, Observers Craig, Farley.—USNM 240201. Paratype ♀. 18°11′N, 144°43′E, 3,727 m, *Alvin* Dive 1847, 8 May 1987, Pilot Salzig, Observers J. and D. Hawkins; transferred to collection of the Zoological Laboratory, Kyushu University (ZLKU). The material was graciously donated to us by R. Hessler, Scripps Institution of Oceanography, La Jolla, CA.

*Measurements in mm.*—Holotype ♀ (ovig.), carapace length including rostrum 52.1, margin of orbit to posterior edge of carapace 38.0, maximum carapace width 30.8; same (respectively). Paratypes USNM 240199, ♀ (ovig.) 33.9, 25.6, 21.8, ♀ (ovig.) 36.0, 25.8, 21.1, ♂ 26.2, 19.0, 15.3; USNM 240200, ♀ 40.7, 30.2, 26.0; USNM 240201, ♀ 38.0, 28.1, 23.7.

*Description.*—Carapace (Fig. 1*a–c*) exclusive of rostrum distinctly longer than broad, moderately arched transversely; anterior and posterior cervical grooves apparent, transverse depression in anterior part of cardiac region. Rostrum almost horizontal, narrow to moderately broad triangular, lateral margin with denticles on distal third, tip exceeding eyestalks by more than their length, variably obscure to distinct dorsal carina bearing obsolescent tiny tubercles that merge into median tubercles on gastric region. Slightly raised concave frontal margin sweeping to antennal spine followed by irregularly oblique margin leading to acutely spined anterolateral angle. Gastric region somewhat inflated but slight posterolateral concavity at either side defining meso-metagastric area; anterior gastric region bearing moderate spine on either side of midline, and lateral to each another variably developed spine in moderately arched transverse row; remainder of gastric region lightly rugose. Anterior branchial region bearing strong anterolateral spine followed by 5 or 6 successively diminishing lateral spines, and scattered moderate tubercles dorsally. Short rugae and obscure tubercles clustered behind juncture of anterior and posterior cervical grooves. Posterior branchial region bearing strong anterolateral angle, sometimes spiniform, and distinct oblique and transverse rugae laterally; rugae with tendency to being transversely continuous across central part of cardiac region. Posterior margin concave, preceded by narrow raised rim with slightly cupped crown. Lateral plate obliquely rugose, projecting anteriorly below antennal peduncle; rugosities on anterodorsal margin minutely serrated, and angular anterior tip bearing minute spine.

Abdomen (Fig. 1*a*) unarmed; transverse ridge of segments 2 and 3 smooth, divided into narrow anterior and broader posterior parts by concave trough, that of segment 4 obsolescent; segments 5 and 6 smooth, 6 slightly raised posteriorly in middle, posteromedian margin strongly produced, overreaching lateral lobe on each side. Telson divided into 8 plates (Fig. 2*a*), length-width ratio 0.79 ± SD 0.052, $n = 6$, midlateral plate markedly convex on distolateral margin.

Eyes (Figs. 1*b*, *c*, 3*a*) moderate in size; well exposed, smoothly ovate cornea cupped within movable broad-based ocular peduncle; peduncle extended into strong mesiodorsal spine directed horizontally or obliquely upward at very low angle and ornamented with tiny, irregular, obsolescent spinules; a much shorter lateral spine near base of cornea; behind that an alate basal process, either acutely spined or multispinose at tip, posterolaterally paralleling concave frontal margin.

Basal article of antennular peduncle with distal margin irregularly crenulate; slender dorsolateral carina continued into anterior spine, below it a broader anterior spine directed obliquely laterad, flanked by inflated surface bearing cluster of irregular small spines or spinules; mesiodorsal spine much smaller. Antennal peduncle with fixed basal article extended into stout, flat ventral spine with subdivided mesial margin and shorter, sometimes crenulate, lateral spine; succeeding articles short, second bearing appressed lateral angle, third with serrate distal margin, fourth with scalloped distal margin.

Third maxilliped (Fig. 1*d*) with ischium shorter than merus; bearing mesial crest armed with finely uniform, evenly spaced corneous tipped spines and a distodorsal spine. Basis with 3 or 4 corneous spines similar to and in line with crest on ischium. Merus with 6 irregular acute spines on flexor margin and strong spine at distodorsal corner. Carpus, propodus, and dactyl folded on merus-ischium and about as long as those 2 articles together, flexor surface of each bearing dense setation mesially, and distally on propodus and dactyl. Sternite at base of third maxilliped (Fig. 1*e*) forming apposed lobe at either side of midline, outline of each irregularly polygonal but with anteromesial process irregularly serrate on margin and divergent.

Epipod on coxa of first pereopod (cheliped), but rudimentary on left side and absent on right side of paratype USNM 240201.

Chelipeds (Fig. 1*f*) subequal, with many spines and fewer rugosities tending to arrangement in longitudinal tracts; ischium with mesial row of 8 acute spines, irregular smaller spines on distoventral margin, and smaller spines and rugosities ventrally; merus reaching end of rostrum, bearing row of 7 mesial spines, terminal one strongest, about 10 spines along

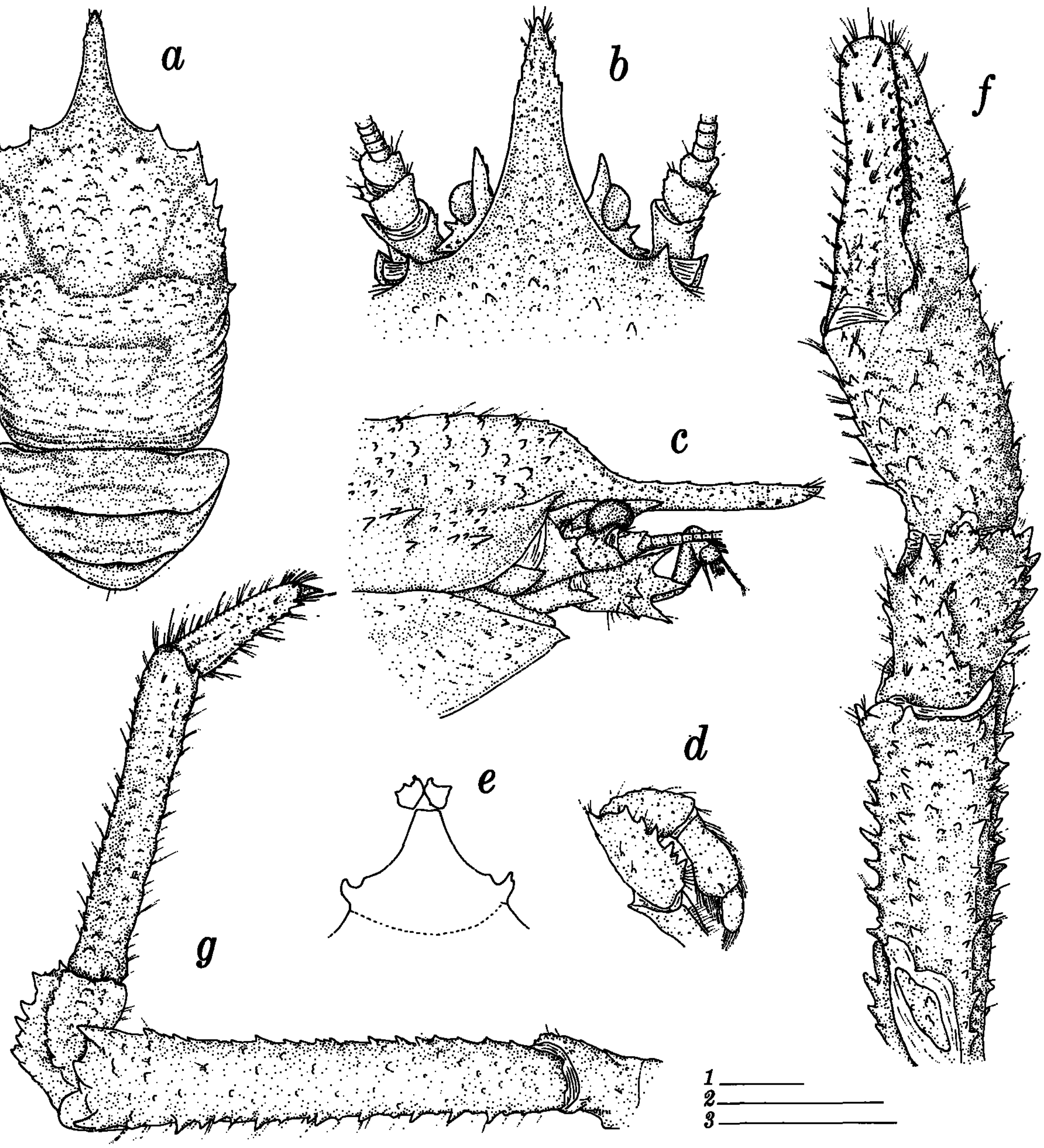


FIGURE 1.—*Munidopsis marianica*, holotype ♀: *a*, carapace, abdominal segments 2–4 in folded position, dorsal; *b*, parts of anterior carapace and associated appendages, dorsal; *c*, parts of anterior cephalothorax and associated appendages, lateral; *d*, merus of right third maxilliped with parts of adjacent articles; *e*, sternites at base of third maxillipeds and chelipeds; *f*, right cheliped; *g*, left first walking leg. Scales: 1(*a*), 2 (*b*, *c*, *f*), 3 (*d*, *e*, *g*) = 10 mm.

lateral margin; carpus spiny except on ventral surface; palm strongly spiny on mesial and lateral surfaces, less so dorsally but with scattered rugosities there as well; fingers about as long as palm, spooned, especially at tips, prehensile edges almost entire but imperceptibly crenulate, tips close fitting.

Walking legs rather long, first walking leg (Fig. 1*g*) reaching almost to tip of chela, second and third walking legs reaching almost to base of dactyl on preceding leg (right second walking leg missing from holotype); corresponding articles of respective legs approximately equal in length except for meri which decrease posteriorly; each merus with spiny dorsal crest ending in strong distal spine; prehensile surface with 2 rows of rugae, spines, and tubercles; carpi each with longitudinal dorsal and lateral rib, each ending in

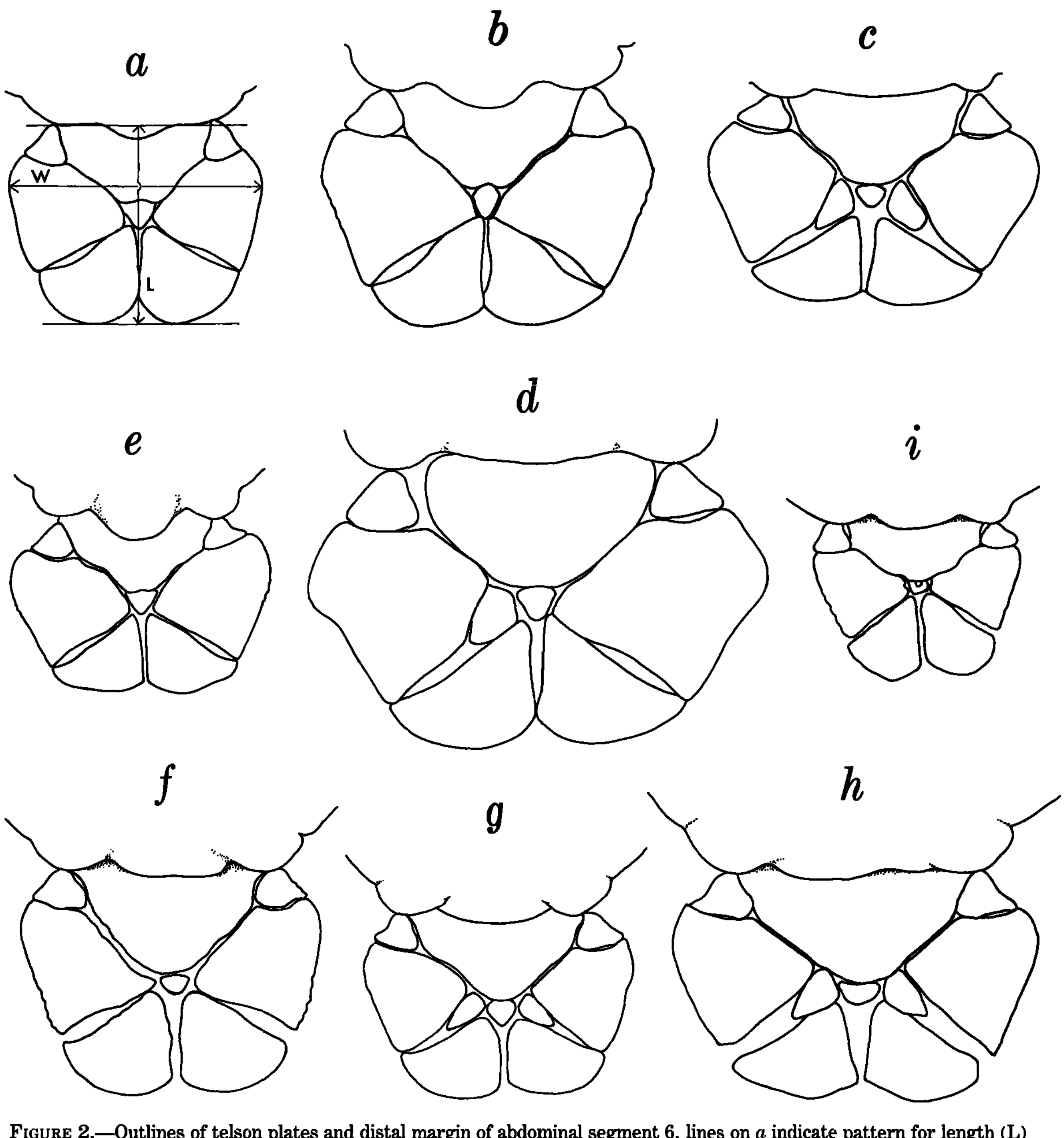


FIGURE 2.—Outlines of telson plates and distal margin of abdominal segment 6, lines on *a* indicate pattern for length (L) and width (W) measurements: *a*, *Munidopsis marianica*, paratype ♀ USNM 240201; *b*, *M. tuftsi*, holotype ♂, USNM 171336; *c*, *M. subsquamosa*, syntype BM 88:33; *d*, *M. subsquamosa aculeata*, holotype ♂, BM 88:33; *e*, *M. crassa* holotype ♀, USNM 8536; *f*, *M. lignaria*, holotype ♂, USNM 240202; *g*, *M. ciliata*, ♀, USNM 151856, Celebes, Indonesia; *h*, *M. nitida*, ♂, USNM 150580, St. Croix Basin, Caribbean Sea, note atypically sinuous terminal margin on median lobe of segment 6; *i*, *M. granosicorium*, holotype ♀, USNM 240205.

well-developed terminal spine, and with secondary spine on distal margin between them, dorsal rib spiny, lateral rib less so; each propodus slender, with dorsal, dorsolateral, and lateral ridges spiny in proximal half but less so distally, dorsal spines pronounced; each dactyl slender, acute corneous tip preceded by row of 14 or more movable spines on prehensile edge. Chela on slender fifth leg with well-developed cleaning brush (chelae missing on holotype).

Eggs on holotype ♀ few, large, principal axes measuring 1.3 × 1.6 mm.

*Remarks.*—Observations televised during *Alvin* Dive 1845, 18°13′N, 144°42′E, 3,716 m, 6 May 1987, Pilot Hollis, Observers Ohta, Kono, included views of *Munidopsis* that may be this species.

*Munidopsis marianica* resembles a number of species in the genus that normally have epipods restricted to the first pereopods, eyespines extending beyond the cornea, and chelipeds lacking a denticulate carina on the distolateral margin of the chela, including *M. crassa* Smith, 1885; *M. similis* Smith, 1885; *M. subsquamosa* Henderson, 1885; *M. barnardi* Kensley, 1968; *M. tuftsi* Ambler, 1980; and *M. geyeri* Pequegnat and Pequegnat, 1970. *Munidopsis similis*, originally considered to be a variety (subspecies) of *M. crassa* (see Smith 1885:496), is different from this group in lacking epipods on all pereopods (Pequegnat and Pequegnat 1970:139). *Munidopsis geyeri* was synonymized with *M. subsquamosa* (see Ambler 1980:26), and *M. barnardi* from South Africa (Kensley 1968:290) will in all probability be merged with *M. subsquamosa* (unpubl. data). Therefore, the remaining three species are compared with the present new species.

The closest relative to this new species seems to be *M. tuftsi*, known from off Oregon (Ambler 1980:24). The shared characters are relatively long chelipeds, particularly meri that extend nearly to the rostral tip, the anterior half of the carapace that bears tubercles or spines rather than rugae, and the strongly convex posteromedian margin of the sixth abdominal segment that distinctly overreaches the lateral lobe on each side. However, *M. tuftsi* differs from *M. marianica*—the walking legs are more strongly spinose but the chelipeds are less spiny; the anterior half of the carapace, especially the anterior branchial region, bears distinct dorsal spines; the telson is relatively wide (length-width ratio, 0.71 in the holotype of *M. tuftsi*, 0.79 [$\bar{x}$] in *M. marianica*), the midlateral plate is more markedly convex on the distolateral margin; and the rostrum is distinctly carinate dorsally, relatively high and strongly upcurved. Most clearly different in the 2 species are dactyli of the walking legs (Fig. 3*b*, *c*); they terminate in a short corneous, curved spine. In *M. tuftsi*, the ultimate ventral tooth is distinctly closer to the tip of the terminal spine than to the penultimate

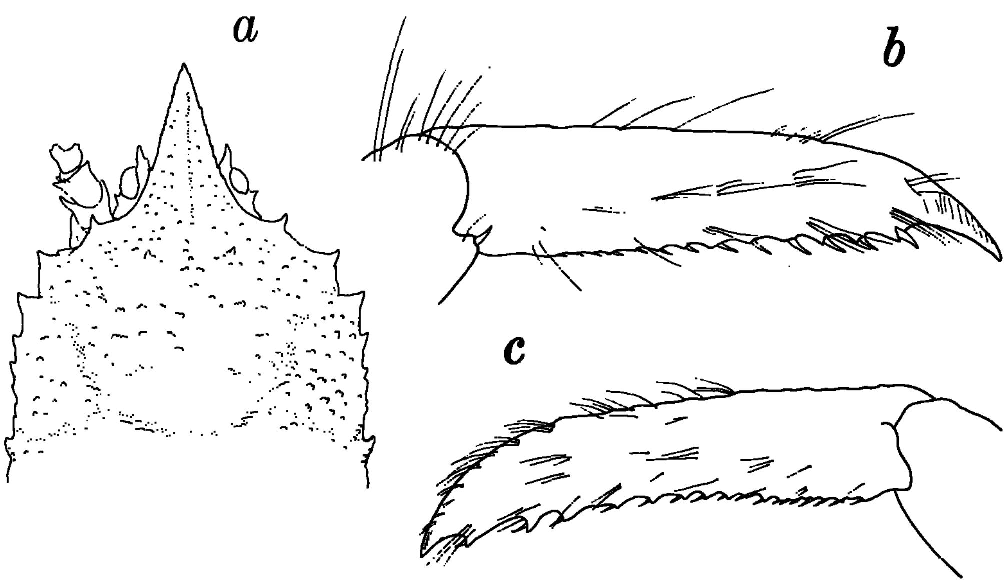


FIGURE 3.—*Munidopsis marianica*, paratype ♀, USNM 240201: *a*, anterior carapace with parts of appendages, dorsal; *b*, dactyl of first walking leg; *c*, *M. tuftsi*, holotype ♂, USNM 171336, dactyl of first walking leg.

ventral tooth, while in *M. marianica* the terminal spine is elongate and the ultimate ventral tooth is nearer to the penultimate one. The above listed differences were confirmed by examination of the holotype of *M. tuftsi* (USNM 171336) as well as an additional male specimen of *M. tuftsi* taken at *Galathea* station 450 in the Celebes Sea (unpubl. data).

*Munidopsis subsquamosa* and *M. crassa* are also similar to *M. marianica*. General characteristics of *M. subsquamosa* were examined on 2 snytypes (♂, and softened remains, BM 88:33; and the holotype ♂ of *M. subsquamosa aculeata*, BM 88:33), both described by Henderson (1885, 1888) now deposited in the British Museum (Natural History), and on 2 examples of *M. subsquamosa* taken rather near its type locality by the *Soyo Maru*, reported earlier by Baba (1982:114). Examined also were the abdominal fragment of the holotype of *M. crassa* (USNM 8536) in which both the telson and the sixth abdominal segment are intact, and 2 specimens (1 ♂, 1 ♀) referable to *M. crassa* (USNM 231328) that taken by the RV *Alvin* from the North Atlantic Ocean southeast of Massachusetts (lat. 38°18'24"N, long. 69°35'30"W, 3,506 m) very near the type locality. The anterior branchial region of the carapace usually bears elevated, scalelike striae in *M. subsquamosa* instead of tubercles or spinules as in *M. crassa* and *M. marianica*. The posteromedian margin of the sixth abdominal segment is feebly convex and never exceeds the end of the lateral lobes in *M. subsquamosa*, but it is markedly produced, overreaching the lateral lobes in *M. crassa* and *M. marianica*. The telson (Fig. 2*a–e*) is relatively narrower in *M. marianica* (length-width ratios: 0.61–0.65 in *M. subsquamosa*; 0.68–0.70 in *M. crassa*; 0.79 [$\bar{x}$] in *M. marianica*). The fingers of the cheliped are distally narrowed in *M. subsquamosa* and *M. crassa*, but uniformly wide throughtout the length so as to form a sharply defined ventral spoon in *M. marianica*. The merus of the cheliped in *M. subsquamosa* and *M. crassa* is middorsally ridged, more sharply so toward the proximal end, instead of being bluntly ridged as in *M. marianica*. The mesial eyespine is directed anterolaterad in *M. subsquamosa* and *M. crassa*, while in *M. marianica* it is directed nearly straight forward. The rostrum is straight and horizontal in *M. marianica*, but usually curving dorsad in *M. subsquamosa* and *M. crassa*. Finally, the merus of the third maxilliped is more spinose on the flexor margin in *M. marianica* (bearing about 6 spines) than in *M. crassa* and *M. subsquamosa* (3 or 4 spines).

*Etymology*.—Named for the type locality.

## ***Munidopsis lignaria*** New Species

**Figures 2*f*, 4**

*Munidopsis ciliata*, Ambler, 1980:19, fig. 4.—not *M. ciliata* Wood-Mason *in* Wood-Mason and Alcock, 1891:200.

*Munidopsis* sp. Van Dover, 1988:6, unnumbered fig.

*Material studied*.—Eastern Pacific Ocean, Cascadia Basin off Oregon: USNM 240202. Holotype ♂. 44°39.8'N, 125°36.4'W, 2,875 m, RV *Yaquina* cruise Y 7001 B, stn CP-1-E, BMT 184, 16 March 1970, transferred from OSUBI 00188.—USNM 240203. Allotype ♀. 45°18.6'N, 126°31.5'W, 2,750 m, RV *Yaquina* cruise Y 7001 B, stn CP-2-C, BMT 265, 18 February 1971, transferred from OSUBI 01578.—OSUBI 00189. Paratypes, 19 ♂, 13 ♀. 44°53.7'N, 126°33.4'W, 2,774 m, RV *Yaquina*, cruise Y 7001 B, stn CP-2-D, from log collected in beam trawl 162, 19 January 1970.—USNM 171342. Paratype ♀. 45°55.3'N, 125°36.1'W, 2,030 m, RV *Yaquina* cruise Y 7003B, stn CP-1-A, BMT 194, 20 March 1970.—USNM 171343. 6 ♂, 7 ♀. 45°52.5'N, 126°40.8'W, RV *Yaquina* cruise Y 7001 B, stn CP-2-A, BMT 154, 16 January 1970.

East Pacific Rise off south central Mexico: USNM 240204. Paratypes, 8 ♂, 12 ♀. Western limb of overlapping spreading center near 11°52'N, 103°51'W, 2,750 m, *Alvin* Dive 2000, 22 March 1988, from a piece of wood measuring about 15 × 30 cm, Pilot Ralph Hollis, Observers W. Bryan and R. Hekinian (IFREMER). This material was donated to us by Cindy Van Dover, Woods Hole Oceanographic Institution, Woods Hole, MA.

*Measurements in mm*.—Holotype ♂, carapace length including rostrum 15.0, margin of orbit to posterior edge of carapace 10.2, maximum carapace width 9.0; Allotype ♀, same (respectively), 16.5, 11.6, 10.2; smallest Paratype ♂, USNM 240204, same 9.0, 6.7, 6.3; smallest Paratype ♀, USNM 240204, same, 9.2, 6.5, 5.5.

*Description*.—Carapace (Fig. 4*a–b*), exclusive of rostrum, longer than broad, moderately arched transversely; anterior and posterior

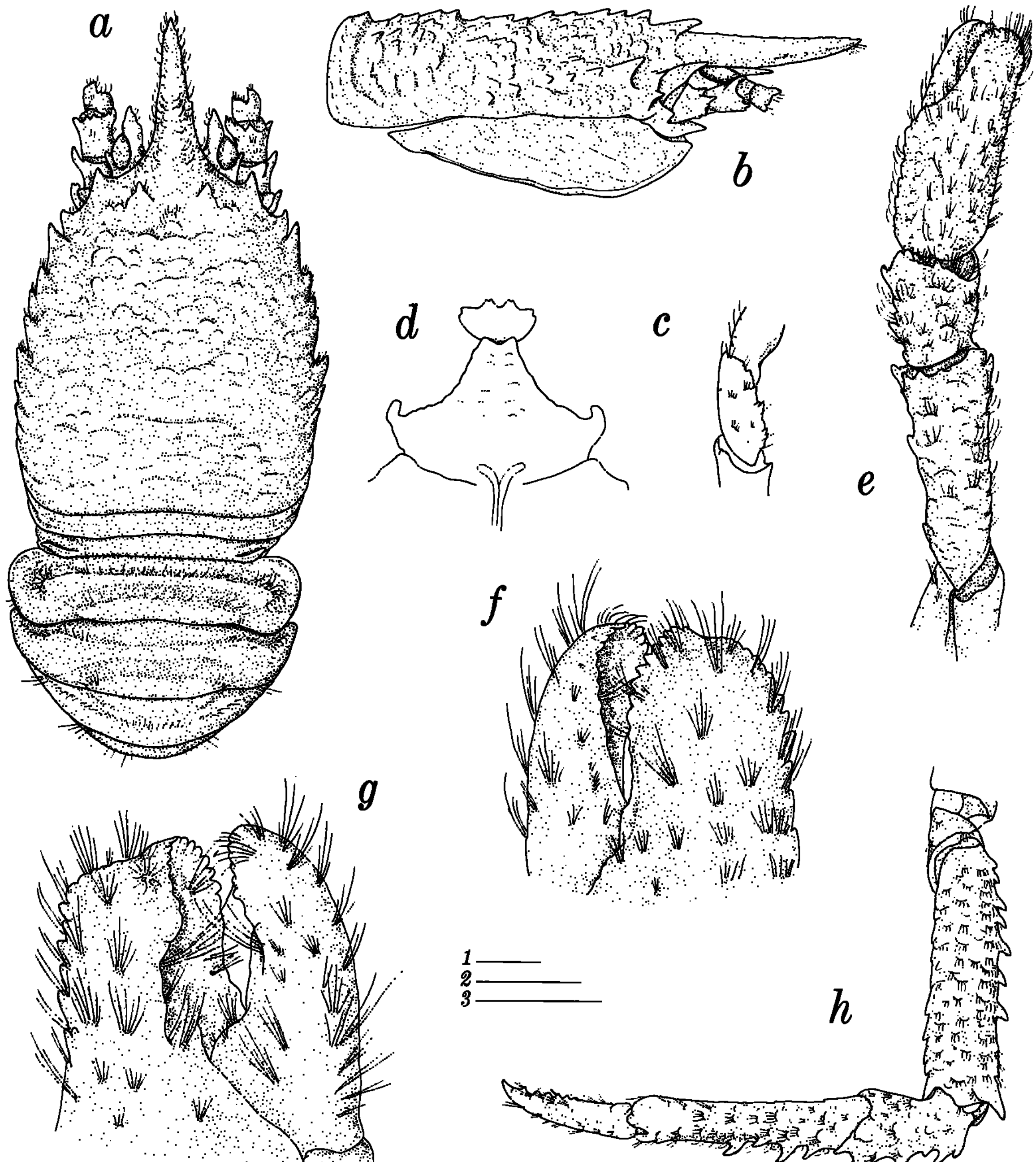


FIGURE 4.—*Munidopsis lignaria*, holotype ♂, USNM 240202: *a*, carapace and parts of anterior appendages, abdominal segments 2–4 in folded position, dorsal; *b*, cephalothorax and parts of anterior appendages, lateral; *c*, merus of right third maxilliped and parts of adjacent articles; *d*, sternites at base of maxillipeds and chelipeds; *e*, right cheliped, and views of fingers; *f*, dorsal; *g*, ventral. Scales: 1(*c*, *d*), 3(*f*, *g*) = 1 mm, 2(*a*, *b*, *e*, *h*) = 3 mm.

cervical grooves apparent, transverse depression in anterior part of cardiac region. Rostrum narrowly triangular, tip exceeding eyestalks by their own or slightly greater length; horizontal dorsal surface nearly smooth, with low but distinct carina becoming obsolescent between prominent gastric spines. Frontal margin with acuminate, slightly hooked antennal spine lateral to eyestalk followed by concavity ending in small, acute anterolateral angle. Gastric region bearing short setose rugosities arranged in more or less concentric arcs behind strong gastric spine at either side of midline (reduced secondary gastric spine lateral to each in large individuals). Anterior branchial region bearing less prominent ciliated rugosities, its lateral margin with strong anterior spine followed by 4 spines successively smaller in size. Posterior branchial region with moderately developed spine at anterolateral corner and more distinct and transversely developed setose rugae, with tendency in larger adults for these to be most elongate across anterior and central part of cardiac region. Shallowly concave posterior margin preceded by prominent raised, ciliated submarginal rim of nearly uniform width. Lateral plate obliquely rugose, projecting anteriorly below antennal peduncle, its rather rounded tip bearing minute spine.

Abdomen (Fig. 4*a*) unspined, but segments 2 and 3 boldly ridged transversely; ridging of segment 4 transitional; segments 5 and 6 smooth, latter with posterior margin trilobate, distal margin of lateral lobes convex, that of broader median lobe very shallowly concave. Telson (Fig. 2*f*) composed of 8 plates, length-width ratio in holotype 0.85, in smaller ♀ paratype 0.83, midlateral plate convex on distolateral margin.

Eyes (Figs. 4*a–b*) moderate in size; well exposed, smoothly ovate cornea cupped within broad-based slightly movable ocular peduncle extended into elongate mesiodorsal spine; spine horizontal or directed obliquely upward at low angle; peduncle ornamented with few setae and tiny irregular obsolescent spinules, much shorter mesioventral spine, and intermediate length lateral spine.

Basal article of antennular peduncle with crested dorsal margin minutely and irregularly serrate, extended into slender dorsolateral spine, broader lateral spine below, base of each flanked laterally by cluster of irregular, small, obsolescent spinules on inflated lateral side of article; mesial edge with crenulate scalloped margin. Antennal peduncle with fixed basal article extended into stout, flat, ventral spine and shorter lateral spine with crenulate margin; succeeding articles short, second bearing slender lateral angle, third with scalloped and crenulate distal margin, fourth with scalloped distal margin, its dorsolateral projection stoutly spine-like.

Third maxilliped with ischium shorter than merus; bearing mesial crest armed with finely uniform, evenly spaced corneous-tipped spines; anteroventral angle acute. Basis with 2 low spines in line with crest on ischium. Merus (Fig. 4*c*) with few obsolescent spines preceding 3 principal spines on flexor margin, proximal and middle spines incompletely doubled; extensor margin broadly arched, strong, acute spine at anterodistal corner. Carpus, propodus, and dactyl folded on merus-ischium and about as long as those 2 articles together, dense setation on dorsal surface of each, and distally on flexor surface of propodus and dactyl. Sternite at base of third maxilliped (Fig. 4*d*) with crenulate anterior margin on angular mesial and lateral lobes.

Epipod present on first pereopods (chelipeds).

Chelipeds (Fig. 4*e–g*) stout, subequal, ornamented with moderately developed, variably setose rugosities tending to arrangement in longitudinal tracts; ischium with short lateral spine and mesial ridge bearing obsolescent subterminal spines; merus bearing 3 principal mesial spines, 1 distodorsal spine, and distoventral spine on mesial and lateral margins; carpus with dorsolateral row of tubercles and mesiodorsal row of 3 spines; palm nearly smooth, few obsolescent tubercles on dorsomesial surface; stout fingers shorter than palm, spooned at tips, prehensile edges close fitting, crenulate; crest of small spines at distolateral angle of fixed finger.

Walking legs rather long, first walking leg (Fig. 4*h*) exceeding tip of chela, second and third reaching to near base of dactyl on preceding leg; corresponding articles of respective legs approximately equal in length except for meri which successively decrease posteriorly; each merus with crest on dorsal margin ending in distal spine, and corresponding crest on ventrolateral margin; carpi with longitudinal spiny dorsal and tuberculate dorsolateral crest, each ending in more or less well-developed spine; each propodus slender, bearing crests in line with those of carpus, dorsal crest bearing 2 remote spines in proximal half, each with small movable spine distolaterally at base of dactyl, another sometimes preceding it in distal ⅓ of length, and smaller movable spine at distomesial corner; each dactyl slender, acute corneous tip preceded by row of 10–12 movable spines on flexor margin. Slender, chelate fifth leg with well-developed cleaning brush on palm and somewhat pointed but flattened dactyl opposed by similar setae on distal end of propodus.

*Variation.*—There is minor variation in ornamentation of the specimens available for study, large adults being relatively more coarsely ornamented than smaller individuals.

*Remarks.*—*Munidopsis lignaria* is allied to *M. ciliata* Wood-Mason of the western Indo-Pacific, *M. nitida* (A. Milne-Edwards, 1880) of the western Atlantic, and more distantly, *M. verrilli* Benedict, 1902 of the eastern Pacific. Ambler (1980:19) correctly differentiated, from *M. ciliata*, the new species with "shorter, stouter spines on the carapace and legs; shorter setae covering the carapace and legs; rostrum with a narrower base; and no extra spine between the anterolateral and antennal spines, as sometimes occurs in the *Albatross* specimens." However, she regarded the differences between these 2 forms as racial or varietal rather than specific, a view paralleling that of Faxon (1895:84), who identified eastern Pacific specimens collected by the *Albatross* as *M. ciliata*, and stated that differences between *M. nitida* and *M. ciliata* "appear to be of racial or varietal, rather than specific, value." However, he reserved judgment until the distribution of each might become better known. It does appear that the specimens seen by Faxon closely resemble *M. ciliata*, although only those from *Albatross* stations 3392 and 3393 are now present in the MCZ crustacean collection, and there is no record of specimens from stations 3353 and 3363 in the MCZ crustacean catalog[3]. There are minor differences in spination of the walking legs of *M. ciliata* and those of the available specimens seen by Faxon, but before deciding the status of this eastern Pacific material a search for the missing material should be made.

*Munidopsis ciliata* reaches noticeably larger size as an adult than does *M. lignaria*. *Munidopsis ciliata* is characterized by much longer and more slender spination, and much longer and more prominent setae springing from rugosities of the carapace and legs than on *M. lignaria*.

*Munidopsis nitida* has well-developed acute spines on legs and cephalothorax, but rugae are far less prominent than in either *M. ciliata* or *M. lignaria*, and unlike either of these has the rostrum upturned distally at a low angle.

*Munidopsis ciliata*, *M. lignaria*, and *M. nitida* have a distally trilobate margin on the sixth abdominal segment (Fig. 2*f–h*), each with a convex lobe to either side and a broader median lobe; the middle portion of the median lobe of *M. lignaria* usually has a very shallowly concave distal margin, that of *M. ciliata* is slightly convex and slightly arched dorsally, and that of *M. nitida* is almost transversely straight except for a slight concavity at either side where it joins the respective lateral lobes. *Munidopsis lignaria* has 8 plates in the telson (Fig. 2*f*) whereas the other species have 10. The telson of *M. lignaria* has a length-width ratio of 0.85 in the holotype, and 0.83 in a much smaller paratype; that ratio in *M. ciliata* is 0.70, and in *M. nitida* it is 0.72.

The chelae of these 3 species are similar, having close fitting, crenulate distal edges on the tips of the spooned fingers, and a serrate distolateral angle on the fixed finger. Width-length ratios of the chelae are 0.50 in *M. lignaria* and *M. ciliata*, and 0.41 in *M. nitida*. Both *M. lignaria* and *M. nitida* have been collected in association with wood (see material studied; Williams and Turner 1986), and Van Dover (1988) found numerous wood fragments in the stomachs of *M. lignaria* collected off Mexico. The chelae of the latter 2 species look as if they could be used for boring, tunneling in, or shredding wood. There are no published habitat data for *M. ciliata*. However, Wolff (1979) recorded the association of *M. vicina* Faxon, 1895, *M. hendersoniana* Faxon, 1895, and *Munidopsis* sp. with wood. The first two of these species, having chelae similar to those discussed here (see Faxon 1895: pl. XVIII, fig. 2*a* and pl. XXIV, figs. 2, 2*c*) were listed as utilizing wood for food, and the third sheltering in it.

*Munidopsis verrilli*, with which Ambler (1980) also compared the new species, is much more distant, being a larger species with conspicuously setose legs, relatively longer and stronger chelipeds lacking epipods, more coarsely ornamented cephalothorax with rugosities in a different pattern on both carapace and side plates, a relatively shorter rostrum, and more globose eyes from the margin of which the 3 spines project prominently at divergent angles, to mention the most obvious differences.

*Etymology.*—From the Latin "lignarius", of or belonging to wood, for the association of the species with pieces of wood.

## *Munidopsus granosicorium* New Species

**Figures 2*i*, 5**

*Material studied.*—USNM 240205. Holotype ♀ (ovig.), eastern Pacific Ocean off Strait of Juan de Fuca, 48°38.7′N, 126°57.6′W, 2,020 m, RV *Destiger*, DWD-BMT 10, 11 September 1971.

*Measurements in mm.*—Carapace length including rostrum 9.7, margin of orbit to posterior

[3]Ardis B. Johnston, Harvard University Museum of Comparative Zoology, Cambridge, MA 02138, pers. commun. October 1988.

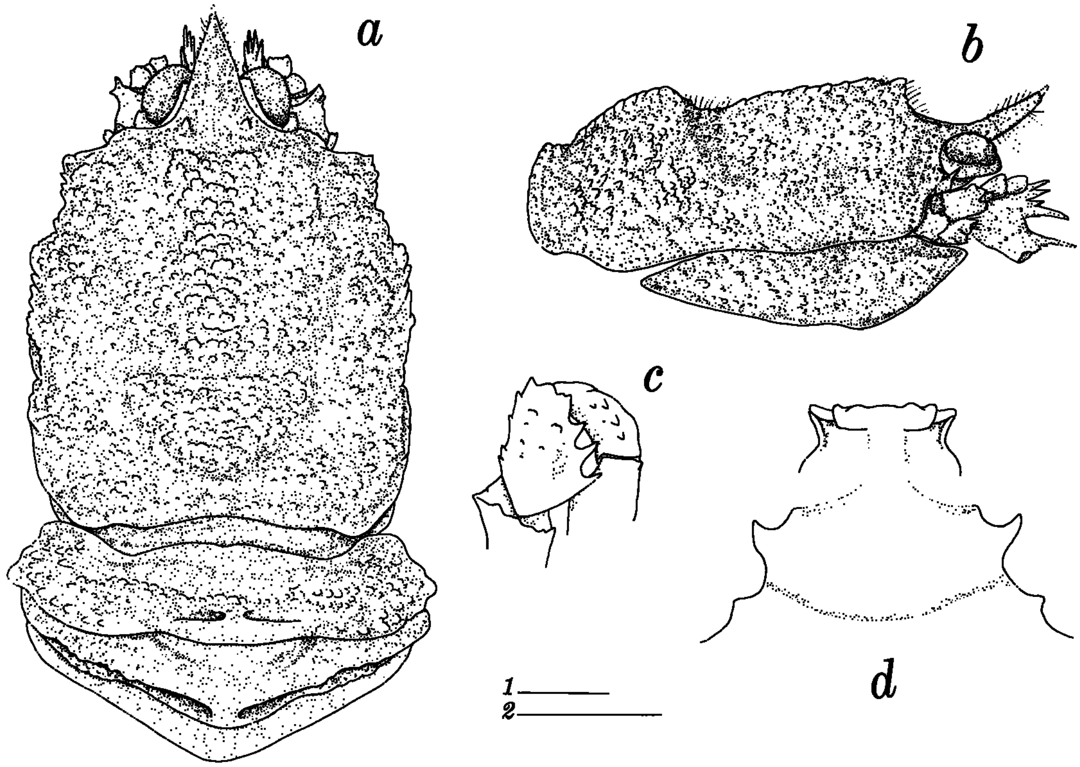


FIGURE 5.—*Munidopsis granosicorium*, holotype ♀, USNM 240205: *a*, carapace and parts of anterior appendages, abdominal segments 2–4 in folded position, dorsal; *b*, cephalothorax and parts of anterior appendages, lateral; *c*, merus of right third maxilliped and parts of adjacent articles; *d*, sternites at base of maxillipeds and chelipeds. Scales: 1(*c*, *d*) = 1 mm, 2(*a*, *b*) = 3 mm.

edge of carapace 7.4, maximum carapace width 7.7

*Description.*—Integument iridescent. Carapace (Fig. 5*a*, *b*), exclusive of rostrum approximately as long in midline as broad, sculptured, variably ridged longitudinally; anterior and posterior cervical grooves apparent but obscure, prominent transverse ridge across anterior part of raised cardiac region; crowded rugae on dorsal surface moderately elevated, most closely clustered and transversely elongated on median prominences, especially on cardiac region, giving an overall uneven, variably pebbled appearance; a nearly smooth and slightly concave spot to either side of midline at anterolateral corner of cardiac region. Rostrum broadly subtriangular, transversely arched, base broader than midsagittal length; dorsal surface in lateral view with concave base smoothly curving into upwardly inclined distal part having almost straight dorsal margin, apparently acute tip slightly blunted by damage; lateral margins anterior to eyes serrate, but concave posterior margins adjacent to eyes nearly smooth; scattered tubercles on anterior 5/8 of length much smaller and more numerous than larger, symmetrically arranged rugae on posterior 3/8; anterior part with noticeable brush of plumose setae, densest ventrally. Sinuous frontal margin with broad angle lateral to eyestalk continued laterad as thin raised edge curving into a small serrate lobe proximolateral to basal article of antenna; anterolateral angle densely and sharply rugose, followed by similar but somewhat more broadly projecting lateral margin of anterior branchial region, margin thinner on posterior branchial region. Posterior margin broadly and shallowly concave, slightly sinuous; preceded in turn by submarginal narrow rugose ridge, and transverse narrow smooth tract. Lateral plate projecting anteriorly below antennal peduncle, its rather angular anterior tip bearing minute spine in line with base of eye; strongly rugose posterior part separated from somewhat less strongly rugose anterior part surrounded by impressed groove running submarginal to anteroventral aspect, then sweeping posterodorsally and recurving anteriorly below line of rugae bordering lateral suture to point behind anterior tip.

Abdomen (Fig. 5*a*) unarmed but deeply sculptured; transverse ridges of segments 2–4 lightly rugose centrally but more strongly so laterally; segments 5 and 6 punctate, lightly rugose laterally. Telson (Fig. 2*i*) composed of 8 plates, length-width ratio 0.85, midlateral plates slightly convex on proximolateral margin.

Eyes (Figs. 5*a–b*) prominent; well exposed; smoothly ovate cornea cupped within broad based, fixed ocular peduncle bearing small anteromesial rugose patch but no spine; small, subtriangular plate posterolaterally adjacent to eye and anterior to frontal margin.

Basal article of antennular peduncle with distal margin irregularly crenulate; crest of slender compound dorsolateral spines and stronger anterolateral spine flanked by inflated lateral surface with irregular, small spinules at periphery; mesiodistal spine obsolescent. Antennal peduncle with fixed basal article extended into fimbriate distal margin, flat ventral spine, and shorter crenulate lateral spine; succeeding articles short, second bearing stout compound lateral angle and small, simple, distomesial angle; third with acute mesiodorsal angle; fourth with scalloped distal margin.

Third maxilliped with ischium shorter than merus, bearing mesial crest armed with finely uniform, evenly spaced corneous tipped spines, an acute distodorsal angle, and subrectangular distoventral angle flanked laterally by obsolescent spine. Basis with 0 or 1 obsolescent spine in line with crest on ischium. Merus (Fig. 5*c*) with 3 strong spines on flexor margin; distal margin irregular; extensor margin broadly arched, bearing 4 obsolescent spines and a more prominent spine distally; ventral surface lightly rugose. Carpus, propodus, and dactyl folded on merus-ischium and about as long as those 2 articles together; dense setation on dorsal surface of each, and distally on flexor surface of propodus and dactyl. Sternite at base of third maxilliped (Fig. 5*d*) rather slender, anterior margin bilobed, mesial lobe surmounted by small spine.

Epipods present on coxae of pereopods 1–3. Pereopods missing.

Eggs few, large, principal axes measuring 1.3 × 1.9 mm.

*Remarks*.—The distinctiveness of *Munidopsis granosicorium* leads us to describe it as a new species even though it is represented by a single imperfect specimen. This species seems close to *M. follirostris* Khodkina, 1973, from off the Pacific coast of South America (30°13′9″S, 78°47′W, 1,280 m) in general features of the carapace, the abdomen and telson, and in the relatively large cornea; however, it differs in having the rostrum triangular rather than markedly constricted near the base, and the gastric region elevated in anterior profile rather than evenly rounded (see Khodkina 1973).

More distantly, presence of epipods on the chelipeds and first two ambulatory legs links the species to *M. rostrata* (A. Milne Edwards, 1880) and *M. spinosa* (A. Milne-Edwards, 1880), but lack of any spine on the gastric region of the carapace separates it from these 2 species. The rostrum also differs from that of *M. rostrata* in lacking distinct lateral teeth, and from that of *M. spinosa* in having some very small marginal spines or tubercles (see Chace 1942). The short, immovable, spineless eyestalks link the new species to *M. espinis* Benedict, 1902, but it differs from that species in the deeper sculpturing of the carapace and abdomen, and in the dense scattering of small rugae but lack of spines on the carapace, and in having the merus of the third maxilliped armed with 3 rather than 2 spines on the flexor surface. There is only one record of *M. spinosa* from the western Pacific, and *M. rostrata* is represented by records from a circumglobal band between lat. 40°N and 35°S (see Baba 1988).

*Etymology*.—The specific name is a noun in apposition from the Latin, "granosus", full of grains, and "corium", leather, for the pebble-grained surface of the carapace resembling Scotch grained leather.

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