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BULLETIN OF THE VANDERBILT MARINE MUSEUM
VOLUME VI

# Scientific Results of the World Cruise of the Yacht "Alva," 1931, William K. Vanderbilt, Commanding

## CRUSTACEA: ANOMURA, MACRURA, EUPHAUSIACEA, ISOPODA, AMPHIPODA AND ECHINODERMATA: ASTEROIDEA AND ECHINOIDEA

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# THE CRUSTACEA: ANOMURA, MACRURA, EUPHAUSIACEA, ISOPODA, AMPHIPODA AND ECHINODERMATA: ASTEROIDEA AND ECHINOIDEA OF THE "ALVA" WORLD CRUISE, 1931, WILLIAM K. VANDERBILT, COMMANDING

*by*

LEE BOONE

## INTRODUCTION

The present Bulletin, sixth in the scientific series of the Vanderbilt Marine Museum, contains the second report on the Crustacea and first report on the Echinodermata secured by Mr. William K. Vanderbilt during a world cruise in his yacht "Alva" in 1931. The narrative of this voyage, "West Made East With the Loss of a Day," has been entertainingly told by Mr. Vanderbilt in a beautifully illustrated volume with a map of the voyage. The preceding Bulletin contains a report of the Indo-Pacific Crustacea Stomatopoda and Brachyura secured by the "Alva." The present volume consists of two separate reports, the first of which treats of the Crustacea Anomura, Macrura, Euphausiacea, Isopoda, and Amphipoda. This material is from the Indo-Pacific region, except a few hundred specimens from deep-sea dredgings in the eastern Atlantic Ocean, off the Canary Islands.

The bathymetric occurrence of the species secured ranges from terrestrial, freshwater and littoral to true deep-sea forms, from depths ranging from 140 to 400 fathoms. The collection is extensive and contains many representatives of the littoral fauna from the fascinating coral reefs and tidal zone of the Marquesas Islands, Society Islands, Fiji Archipelago, Samoan Islands, New Caledonia, Bali, Banka Island and the Durian Straits, Dutch East Indies, Penang and Singapore. Some terrestrial Crustacea from the Society Islands were obtained. Members of the freshwater fauna of the Society Islands, Fiji Islands and Malay Straits were secured. The deep-sea dredgings represented are from stations in the Dutch East Indies; off the Marquesas Islands, and off

the New Hebrides, in the Pacific, and off the Canary Islands, in the Atlantic Ocean.

The annotated discussion of the species is presented with reference to their systematic classification. A list of the species obtained in each archipelago, or other major locality is also given.

Published records evidence a deplorable paucity of Indo-Pacific Crustacea in the collections of American museums. Prof. Dana's great collection was mostly destroyed, or badly injured by drying and varnishing. Mr. Stimpson's invaluable types and collections, given the Smithsonian Institute, are vanished or inaccessible. The great majority of the "Alva" Crustacea are not represented in any other American museum. In addition to a number of very rare specimens, hitherto known only from one or two specimens in Asiatic or European museums, the "Alva" collection has one new genus and eleven new species. The new genus and species, *Vanderbiltia rosamondae*, from Tahiti, is remarkably interesting, possessing most unusual specialization in adaptation to its life in the coral crevices. Three new species of the family *Apheidae* are described. *Athanas gracilis* Boone, from Raiatea Island, adds another species to this small genus of snapping shrimps with well developed eyes. *Alpheus exploratator* Boone from Flores Strait, Dutch East Indies, depth 140 fathoms, is closely related to the rare *Alpheus makrosceles* Alcock and Anderson, a nearly blind deep-sea species from the Bay of Bengal, but differs in having well developed ocular lobes. *Alpheus braschi* Boone, from Samoa, belongs to the *Macrochirus* group of reef-dwelling *Alpheus*. Two more new species of *Alpheus* are included in the collection from Bali, but unfortunately are imperfect specimens. *Leptochela pellucida* Boone, from the Durian Straits, adds another member to this primitive genus. *Corallio-caris tahitoei* Boone, from Rariatea Island, is the seventh Indo-Pacific member of this unique coral reef-dwelling genus; four species of which are included in the "Alva" collection. *Pontophilus vanderbilti* Boone, from Durian Straits, is one of the most exquisitely sculptured species of this genus of beautiful *Crangonids*, some species of which spend their lives in the sunlit tropic shallows, their fragile translucent bodies as evanescent as the shadow of a ripple, while others have their being in the icy darkness over two thousand fathoms down. *Euphausia alvae* Boone, from Flores Straits, and *E. consuelae* Boone, from off the New Hebrides, are each new deep-sea species, founded upon an extensive type series. *Stylocheiron longicorne* G. O. Sars

is here represented by adults from off the Canary Islands, also from off Marquesas Islands. *Brachyscelus stebbingi* Boone is a weird-looking deep-sea Amphipod with enormous eyes which are less than half so large as those of other members of the genus. It comes from off the Canary Islands. *Galathea balica* Boone, the only new anomuran in the collection, is a delicately sculptured inhabitant of the coral crevices of Bali.

The Echinodermata are discussed under Part II.

## ACKNOWLEDGMENTS

I am especially grateful to Mr. Vanderbilt for his unstinted generosity which has graciously enabled me to prosecute this investigation. I am also indebted to Dr. Herbert Putnam, Librarian of Congress, and his assistants, Mr. Martin Roberts and Mr. F. E. Brasch, for granting me special research privileges in this institution. The photographs of the Echinodermata were made by Mr. Ernest L. Crandall, of Washington, D. C. The line drawings for plates 1 to 6, inclusive, also for plates 8 to 13, inclusive, also plates 22, 24 and 38 were made under my direction by Mrs. Elizabeth M. Fulda, of New York City; the remaining plates were similarly drawn by two other assistants.

As in the preparation of Volume V of this Bulletin series, I am inexpressibly indebted to my colleagues in the Asiatic and European museums and universities, and to Dr. Austin H. Clark of the United States National Museum, for many helpful courtesies.

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## Family: GALATHEIDAE

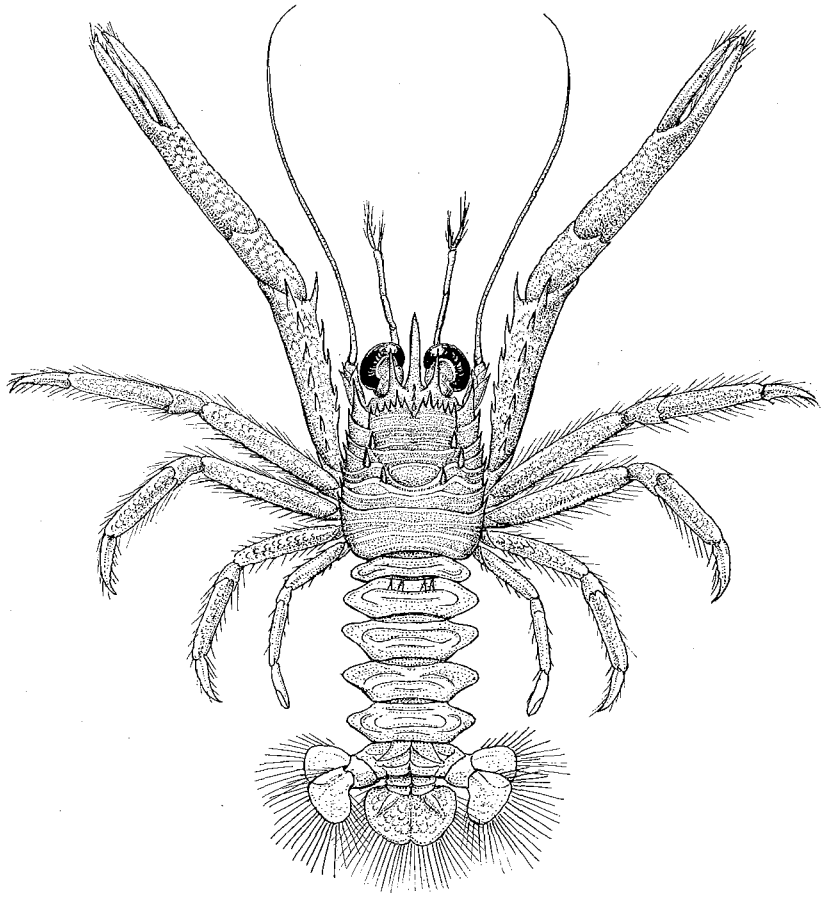
### Genus: MUNIDA Leach

### *Munida militaris* variety *andamanica* Alcock

### Plate 10

TYPE: The type material of *M. militaris* typical form came from the "Challenger," Station 173, off Matuku, Fiji Islands (depth, 315 fathoms), and Station 192, off Little Ki Island (depth, 140 fathoms), and Amboina (depth, 100 fathoms); these are deposited in the British Museum of Natural History.

The type of *M. militaris curvirostris* Henderson was also taken by the "Challenger" and came from Station 200, off Sibago, P. I. (depth, 250 fathoms), and Station 210, off Zebu, P. I. (depth, 375 fathoms), and is likewise deposited in the British Museum.



*Munida militaris* variety *andamanica* Alcock, × 3.

The type series of *M. militaris andamanica* Alcock came from the Andaman Sea, at ten stations of the "Investigator" at depths ranging from 173 to 405 fathoms, and from the Arabian Sea in the neighborhood of the Laccadive and Maldive archipelagoes at two stations, ranging from 210 to 360 fathoms, and is deposited in the Calcutta Museum.

DISTRIBUTION: Indo-Pacific, deep water.

MATERIAL EXAMINED: One young specimen taken from fish's mouth at Trong village, Admara Island, Solar Straits, Dutch East Indies, October, 1931, by the "Alva."

TECHNICAL DESCRIPTION: The front is produced into a strong, slender, acute, rostral spine, one-half or slightly more than one-half as long as the carapace, the distal third extending beyond the eyes, flanked by a pair of submedian, rostral spines, each about half or slightly more than half as long as the rostral spine. These spines are acute, laterally compressed, dorsally carinate. There is a strong acute spine about two-thirds as long as the submedian rostral spines, situated at the postorbital angle. The carapace is decidedly convex from side to side and broken by about fourteen transverse ridges, seven of which occur on the precervical portion of the carapace. The first of these ridges bears fifteen spinules in irregular series, one slightly larger, being on the anterolateral margin succeeded by six short ones, while the seventh spinule is also larger and is situated behind the submedian rostral spine; the eighth spinule is small and is on the median line. On the third transverse ridge there is a solitary spinule, a little in advance of the cervical sulcus, and in line with the third (from the outermost side) spinule of the first ridge. Posterior to the cervical groove there are two solitary spines on each side of the carapace; the anterior one of these is on the seventh ridge, at the inner edge of the ridge outside of the cervical groove and in line transversely with the third postcervical spinule, of the lateral margin. The other spinule is on the eighth transverse ridge, at its inner end, just behind the cervical groove. These transverse ridges are minutely granulose and fringed with short, silky, forward-directed setae. The second precervical ridge and first to fifth, inclusive, postcervical ridges each terminate in an acute, forward-directed spine on the lateral margin.

The abdominal segments are each marked by transverse ridges, but no spinules are present, except on the anterior margin of the

second segment, which bears about six, the inner two spines being widely submedian, the remaining four, two on each side near the outer lateral region. An encrusting growth on the carapace makes it impossible to say reliably whether or not there are more than six spinules here. On the anterior margin of the third abdominal segment there are no spinules. The first abdominal segment is short, partially concealed, with a median transverse ridge and with the lateral margins small, subacute, forward-directed. The second segment is longer, with two long transverse ridges across the entire segment, and a shorter, curved ridge anterior to these, forming the anterolateral border of the widely rounded lateral margin. The third abdominal segment has two transverse ridges, the anterior of which is the wider, and also a smaller ridge on the anterior margin of the narrow, acute lateral area. The fourth abdominal segment is also subacute laterally and has two transverse, ciliated ridges across the median area and a third, shorter ridge curving along the anterior lateral region near the margin. The fifth segment is usually ventral in position and is distinctly longer in the median line than the preceding segment and much narrowed on the anterior half, the postlateral angle being narrowly rounded; the sixth segment is narrower and a little shorter in the median line than the fifth and is marked by two transverse, curved ridges; the telson is little longer than the sixth segment, its posterior margin widely rounded, ciliated, weakly bilobed in the median line and cut by oblique lines on each half; the dorsal surface is marked by crescentic squamae outlined by short setae. The uropoda have the peduncle short, wide, strong; both blades are bluntly truncate, each a little shorter than the telson and with similarly ciliated margins; the outer blade is narrower than the inner blade, which is expanded on its rounded inner lateral margin.

The eyes are large, blackish, reniform.

The antennulae have the first article produced into a very long, acute spine at the outer lateral angle, this spine curved upward, extending for a considerable distance beyond the eye and reaching almost as far forward as the median rostral spine; the second article is narrow, cylindrical, reaching slightly beyond the eye and armed at the inner and outer distal angles, each with a spine; the remaining articles are broken off.

The antennae have the basal article widest and produced to a long acute spine at its inner distal angle; the second article is

slightly narrower and has a similar acute spine at each the inner and outer distal angles, that at the inner angle being slightly the longer, extending to midway the eye; the third article is small; the flagellum, represented by about sixty-three rings, appears to be broken off at this point; the portion present extends to midway the finger of the chelipeds.

The chelipeds are subequal, slender, about two and two-thirds times as long as the lateral margin of the carapace, covered with squamae on the upper surfaces, and with the anterior lateral margin of the merus, carpus and propodus armed with a series of acute spines; a single spine is situated on the lateral margin at the base of the upper finger; there is a longitudinal series of spines on the upper surface among the squamae. There is also a solitary spine on the upper distal margin of the merus and another at the outer distal angle. The fingers are subequal, slender, blade-like, each a little longer than the palm, the curved tips crossing and with two spinules subdistal to the tip on the outer margin of each finger.

The ambulatory legs successively decrease in length in the order 1, 2, 3, but are otherwise similar, slender, the posterior lateral margin of each the merus, carpus, propodus and proximal two-thirds of dactyl armed with a series of spinules; the tip of the dactyl is curved moderately, acute. The anterior lateral margins of these legs have a series of long fine setae.

The fifth pair of legs is typically small, slender, reflexed.

REMARKS: The present specimen conforms in major essentials with *M. andamanica* Alcock, from which it differs: (a) In possessing a small precervical spinule on either side on the third transverse beaded ridge. (b) In possessing two pairs of spinules, one of each pair being on each side, posterior to the cervical groove, where Dr. Alcock notes only one pair present. On the "Alva" specimen the second pair of spines are so fine that they could easily be mistaken for a hair, especially on a wet specimen. (c) The present specimen has definitely six spinules on the second abdominal segment, but also has an encrusting foreign calcareous growth which may and probably does conceal two more spinules beneath it.

The differences cited are too trivial to merit consideration, especially when it is remembered that the present specimen is very young. Hence, it is placed as variety *andamanica* Alcock.

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*Munida andamanica,* ALCOCK, A., Descrip. Cat. Indian Deep-Sea Crust. Decap. Macrura and Anomala. Revised Account "Investigator" Species. Calcutta, 1901, p. 242.

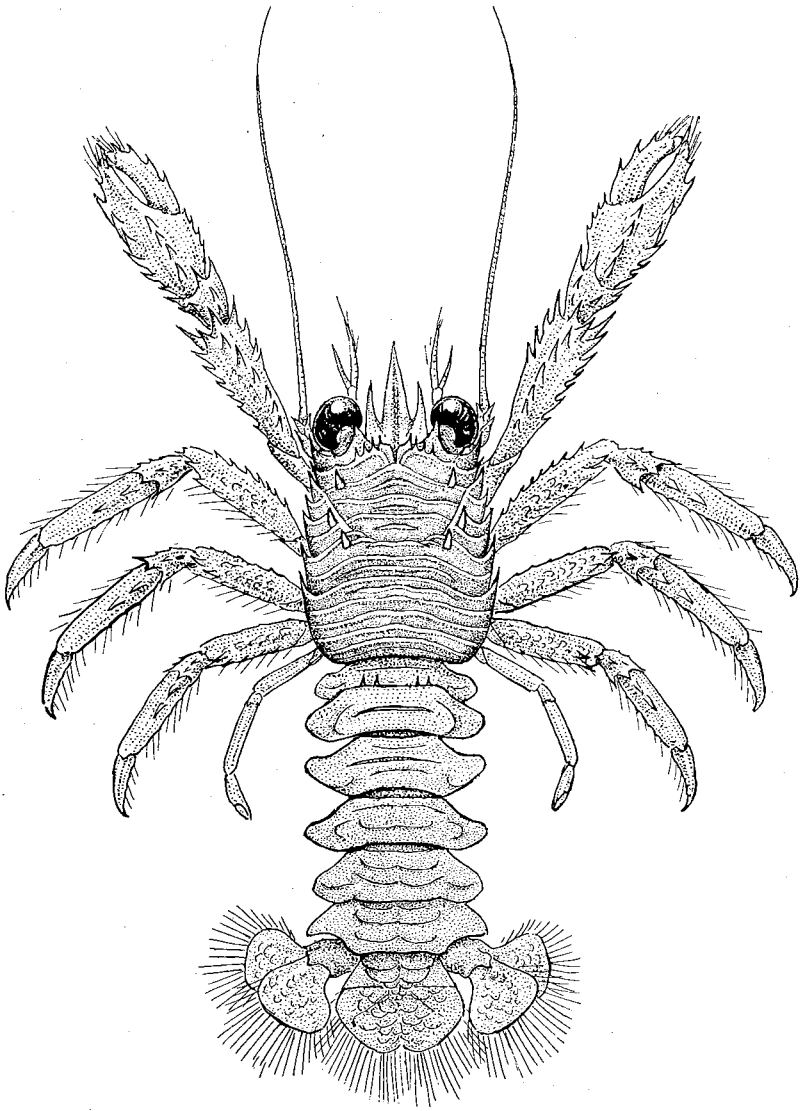
### Genus: GALATHEA Fabricius
### Galathea balica new species

Plate 11

TYPE: Two very young specimens collected in coral, Temukus Roads, Bali, Dutch East Indies, October 25, 1931, by the "Alva," form the type series, and are deposited in the Vanderbilt Marine Museum, Cat. No. 692.

DISTRIBUTION: So far restricted to the type series.

TECHNICAL DESCRIPTION: This exquisitely sculptured small *Galathea* reminds one of an ancient Cho-sun ivory. Front produced into a well developed rostrum, consisting of a strong, forward and upward directed median triangulate spine, dorsally keeled and extending beyond the orbit by about half the rostral length, and a pair of submedian rostral spines, each about three-fifths as long as the median spine; basally in line with it but well separated by a V-like excavation of dimensions equal to one of the spines and uptilted so that they are on a plane slightly above the median spine and directed outward and forward, the tip being slightly in advance of the distal border of the eye. Outside of this submedian pair of spines there is another pair of much smaller spines, one each side at the base of the larger spine, preorbital in position, slightly more elevated than the larger spine and very short, not extending as far forward as the base of the cornea. The carapace is decidedly convex from side to side with the lateral



*Galathea balica*, new species, × 4.

margins moderately convergent anteriorly and less so posteriorly, with a strong, acute spine at the preorbital angle and a small spinule at the base of this outside, and with five sharp, outward and forward directed spines along each lateral margin, three of which are precervical and two postcervical, one each at the antero-lateral terminus of one of the transverse ridges that ornament the dorsal surface. The cervical groove is deep and there are five entire transverse ridges anterior to it, the first of which is sinuate and bears twelve acute teeth, six of which occur at the base of the rostrum; the outermost pair of the twelve teeth occur, one on each side, midway behind the orbital margin; the other four ridges are devoid of dorsal spines; the hinder three ridges are cut by the cervical groove. On the postcervical region there are seven complete transverse ridges and anteriorly, the lateral portions of the three ridges cut by the cervical groove. There is a small, sharp spine at the inner lateral angle of the third of the short ridges, adjacent to the cervical groove; immediately behind this spine is a second similar spine on the first complete postcervical groove. The *linea anomurica* is very distinct. On the lateral walls of the carapace there are several, four to six, oblique ridges running forward.

The first abdominal segment has a small tooth-like epimera. The second abdominal segment has two small, submedian spinules on each side in the median lateral region of the most anterior transverse ridge, which is sinuate laterally; there is a deep, median, transverse groove on this segment and a fainter transverse groove posteriorly and a still fainter transverse groove anteriorly, which is nearly obsolete in the median area and recurvate on the broadly rounded epimera. The third segment is smooth, except for two smooth transverse grooves; the anterior groove recurves laterally and extends onto the epimera; the posterior one curves backward and terminates above the epimera. The epimera are much narrower than those of the preceding segment and rounded. The fourth segment is a little longer in the median line than the third and has the epimera rounded and not quite so narrow; the dorsal surface is transversed by three lines, which terminate unequally above the epimera. The fifth segment is still longer medially and has two transverse grooves on the median segment and an incomplete less distinct groove posteriorly which extends on the epimera. The sixth abdominal segment is the longest of the series with the posterior margin truncate above the telson and excavate

above the base of the uropoda, with the epimera narrow, rounded and folding under those of the preceding segment; there is a shallow groove near the anterior margin, obsolete in the median region but forming curves on the epimeral region; there is a deep sinuate transverse groove in the median region and a similar one in midway between this and the posterior margin, neither of which extends to the lateral region. The telson has the distal margin broadly, rather bluntly rounded, bilobed by the median longitudinal sulcus; the lateral incisions are oblique. The proximal portion of the telson is triangulate with a proximal, interrupted, transverse ridge, followed by a similar but entire ridge, and just below the apex a pair of suboval squamae, followed by the similar contoured apex. The telsonic margins are ciliated.

The eye is large, ovoidal; the cornea black, bulbous; a sparse fringe of setae along the dorsal line of union between the stalk and cornea.

The antennae have the first peduncular article armed with a spinule at each distal angle; the second article is smaller with similar distal spines, weaker; the third article is about half as long as the second, devoid of distal spines; the flagellum is very fine.

The antennulae have the peduncular articles curiously modified to protect the orbit; the basal article is large and can only be seen in a ventral view with its outer distal angle produced in a long spine curved upward, its outer lateral margin denticulate, each denticulation carrying a long solitary hair, directed outward and laterally, protecting the eye. The tip of this spine is very acute, produced almost as far as the long submedian rostral spine; the second article is small, somewhat encupped on the outer side by the first article and has its inner distal angle produced to an acute tooth and the outer distal angle a long acute tooth that extends almost as far as the third article; the third and fourth articles are cylindrical, subequal; the flagellum is rudimentary with a hairy brush of setae.

The chelipeds are equal, each one being about twice as long as the lateral border of carapace, slender; the merus is dilated distally, armed with spines on both lateral and upper surfaces, these spines along the upper distal border being much longer and sharper than elsewhere; low, scale-like squamae are interspersed among the spines; the carpus is two-thirds as long as the merus,

similarly dilated and spinose; the propodus with the palm about as long as the carpus and two-thirds as high as long, not very swollen, the outer and upper surfaces covered with squamae and upper surface of the palm has additionally about five intermediate, longitudinal series of smaller spines; the dactyli are about as long as the palm, slender, curved distally, with a wide oval gape, the tips only meeting; the tip of the lower finger is tridentate and rugose; the upper finger-tip interfits into the lower one. The lower finger has a single basal molar with serrulate surface and the upper finger has a smaller basal molar followed by well-spaced spines, these spines tending to form a double longitudinal row along the upper surface and a single row of very long spines along the lower margin, this latter row continuing along the inferior margin of the lower finger; one or two rows of spines are present on the outer surface; the fingers are about as long as the palm, meeting throughout their length along the evenly denticulated outer margin, but somewhat separated by a concavity along the proximal portion; the tips are rounded, hollowed, and slightly crenulated, with a sieve-like brush of setae set subdistally along the outer margin of each finger. Numerous long, solitary setae occur on the meral, carpal, propodal and dactylar joints of the chelipeds.

The second, third and fourth pairs of legs are similar, but successively decrease in length from the first to third pairs, respectively; each leg has the merus slightly expanded, squamose on the dorsal surface and inferior lateral margin, the superior lateral margin with a longitudinal series of sharp spines; the carpus is about half as long as the merus with three acute spines on the superior lateral margin, the third spine being distal; a row of spinules on the upper surface, a single spine at the inner distal angle; the propodus is quite slender, about as long as the merus with one or two spinules proximally on the outer surface, the inferior lateral margin with five or six spines; the dactyl is two-thirds as long as the propodus, tapered, the inferior margin with five or six spines, the tips acute, curved.

The fifth pair of legs is slender, retracted within the branchial cavity.

**Galathea latirostris** Dana

Plate 12

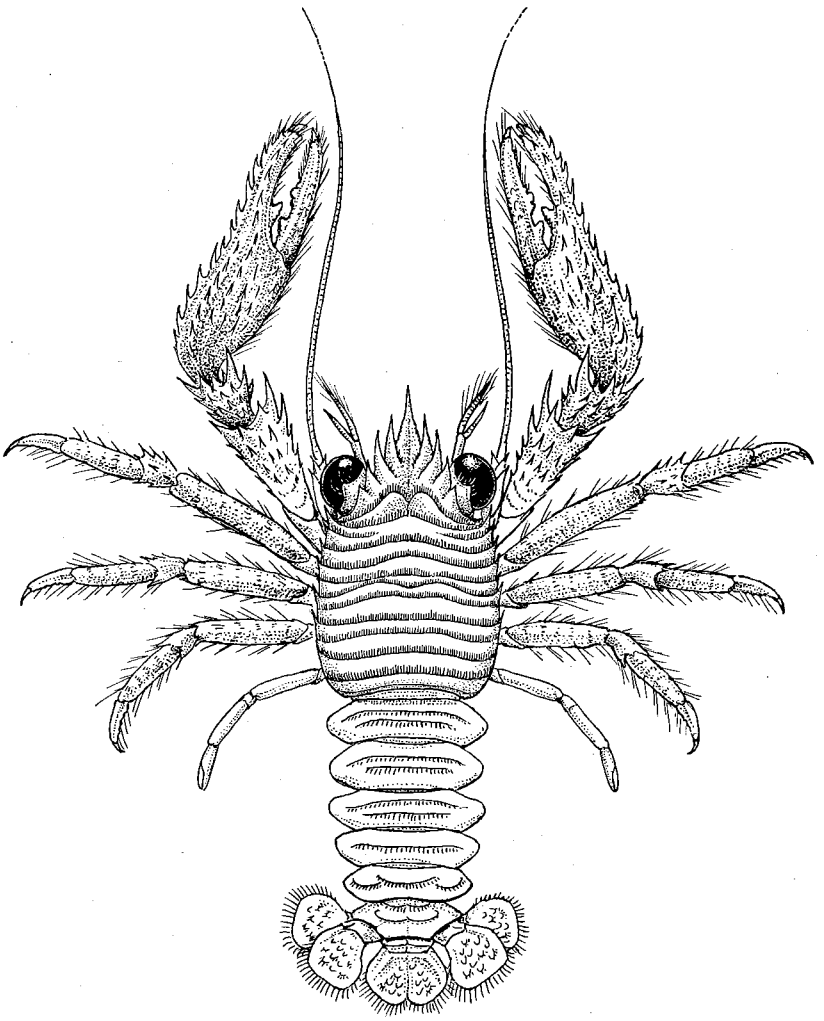
TYPE: Dana's type was collected in the Fiji Islands among corals and in cavities of coral rock.

DISTRIBUTION: The Fiji Islands, the type locality, is the only record cited for this species until its rediscovery by the "Alva" at the four widely separated localities cited below.

MATERIAL EXAMINED: One small specimen, taken in coral, Ingram Island, Queensland, Australia, August 12, 1931. One slightly larger specimen taken at Pago Pago, Samoa, U. S. A., September 2, 1931. Seven, some of which are very small, taken on Venus Point Reef, Tahiti, Society Islands, August 15, 1931. One taken in coral, Teviatoa Reef, Raiatea Island, Society Islands, August 21, 1931.

TECHNICAL DESCRIPTION: All ten specimens in the series are quite young.

The front is produced to a triangular rostrum, extending beyond the orbit and consisting of a median, apical triangular spine, forward-directed and slightly uptilted distally, and on each side of this a series of four serrate distal spines, the distal pair of which are the longest, extending slightly in advance of the eye and being triangulate and more uptilted than the median spine; the second pair of lateral rostral spines are two-thirds as long as the distal pair, triangulate, directed obliquely outward above the base of the eye; the third and fourth pairs of spines are successively smaller, situated above the eyestalk. The dorsal surface of the rostral area is smooth in these young specimens and slightly concave in the median area. There is no branchiostegal spine; the outer orbital angle is a small spine. The carapace is 3.5 mm. long, from posterior margin to base of rostrum, 3.1 mm. greatest width, which occurs slightly in advance of the posterior margin. The rostrum is 1.5 mm. long. The carapace is decidedly convex from side to side and has a suboval contour, the lateral margins converging toward each end, but more so anteriorly. There are eight acute, procurved spines along the lateral margin, four along the precervical portion and four on the postcervical portion. The cervical groove is deep; the precervical portion of the carapace is ornamented with four uninterrupted, transverse ridges ex-



*Galathea latirostris* Dana, × 4.

tending from margin to margin, where each bears one of the lateral spines; each ridge is microscopically granulated and fringed anteriorly with fine, short, amber setae; a fifth, short, incomplete ridge occurs across the rostral base. There are about six similar complete ridges on the postcervical region. The *linea anomurica* is distinct in the young specimen. The lower lateral wall of the carapace is ornamented with three oblique ridges that curve forward and also a row of four or five denticles below the eye.

The abdominal segments are devoid of spines in these young specimens; the second, third and fourth segments each have their anterior margins fringed with fine setae; and each has a transverse ridge, also setae-fringed anteriorly; the fifth and sixth segments have only very faint transverse lines and are quite glabrous; the telson has the posterior margin broadly rounded, evenly bilobate; there is a median longitudinal groove and the posterior suture lines are oblique; there are a pair of squamae-like arcs edged with fine setae, proximally, faintly delineated on the translucent telson. The uropoda are large, fan-like, the peduncle wide with an acute tooth at the upper inner posterior angle; the inner blade is the larger, with the distal margin unevenly truncate, slightly rounded; the outer blade is slightly smaller and more regularly rounded distally. On the dorsal surface of the large blade there are several arcs of minute setae emphasizing the posterior border of half-circle squamae-like formations which in older specimens probably become definite squamae. The telson and rhipidura both have the distal margins heavily fringed with long, web-like setae.

The eye is large, bulbous, with a short, thick stalk and hemispherical cornea, set obliquely terminal, so that its lower frontolateral surface is much greater than the dorsal.

The antennulae extend beyond the rostrum a short distance and have the peduncular joints enlarged, the distal peduncular article produced at the outer distal angle into a strong spine that protects the orbit; and has also a slenderer long, median distal spine and another spine subequal to it at the inner inferior distal angle; the flagellum is short, slender, tufted with setae distally, usually concealed on the inner side of the peduncle but when extended reaching a little beyond the rostrum.

The antennal peduncle has only the distal two articles visible dorsally; these are successively smaller, each about as wide as

long and with a small distal spine at both the inner and outer lateral angles; the flagellum is thread-like, composed of forty-five to fifty rings, each bearing a tactile setum at its outer margin, the whole exceeding the chelipeds in length by almost the length of the dactyli.

The chelipeds are subequal, about 10 millimeters long, or slightly longer than the body; the ischial joint is strong, terminating in an acute tooth at the lower distal angle; the merus is dilated distally with the lower surface granulose and the upper surface spinose; a particularly long spine occurs at the inner distal angle; the carpus is two-thirds as long as the merus, dorsally rounded and with four approximately longitudinal series of spines, the outermost of which are lateral; there is a long acute spine at the inner carpal angle; the propodus has the palm only a trifle longer than the carpus, dorso-ventrally flattened, slightly wider than the carpus, with both lateral margins spinose with coarse, sharp spines, the lateral series continuous along the outer margins of the dactyli, and especially strong on the lower dactyl. The lower dactyl has a single large tooth and the upper dactyl has large, bifid tooth. Abundant long, solitary setae occur on the inner dactylar margins, forming a crude sieve. The upper, and especially the lateral, surfaces of the carpus, propodus and dactyl are also set with numerous long, solitary setae. In the females the chelipeds have the gape less wide but constant.

The ambulatories are slender, the first pair not quite extending to the base of the dactyl of the cheliped, and the second and third pairs of legs successively decreasing in length by approximately the length of the dactyl of the preceding pair. Each leg has the merus elongate, compressed cylindrical, banded by transverse ridges and with the lower, and especially the upper, lateral margins spinose; the carpus is about one-half as long as the merus, dilated distally and similarly spinose along the lateral margins; the propodus is slenderer, more compressed, about twice as long as the carpus, with the upper margin spinose; the dactyl is little over half as long as the propodus, with a strong curved tip, augmented by a subdistal spinule on the inferior margin. The carpus, propodus and dactyl have numerous long, solitary setae on the upper surface.

The fifth pair of legs are slender, smooth, reflexed.

REMARKS: On the Samoan specimen, which is about one or two moults larger than the other nine specimens, the five transverse ridges of the precervical region of the carapace are replaced by a series of interrupted rugae, formed of small squamae-like arcs, with the convex margin anterior and fringed with fine setae.

REFERENCES: *Galathea latirostris*, DANA, J., U. S. Explor. Exped. Crust., vol. XIII, pt. 1, 1852, p. 480; Atlas, 1855, pl. 30, fig. 8.—BENEDICT, J. E., Proc. U. S. Nat. Mus., vol. XXVI, 1903, p. 302.

## Family: PORCELLANIDAE

### Genus: PETROLISTHES Stimpson

### Petrolisthes armatus (Gibbes)

DISCUSSION: For full description and figure of this species, consult Bulletin of the Vanderbilt Marine Museum, vol. III, 1930, p. 73, pl. 19.

MATERIAL EXAMINED: Forty-two specimens, taken on the reef at Apia, Samoa, September 5, 1931. One male specimen, Falcon Island, Palm Islands, Queensland, October 7, 1931.

DISTRIBUTION: This species is practically tropicopolitan in the tidal zone of the Indo-Pacific and of the west coast of America from Lower California to Peru, including the Galapagos Archipelago. It is also found throughout the West Indian region and eastward in the tropic Atlantic on the west coast of Africa.

The Samoan specimens show quite interesting degrees of variation among the forty-two specimens. The majority have the carpus of typical length and armed with three teeth on the anterior margin, but five specimens have the carpus of normal length armed with three teeth on one side, but with four equally developed teeth on the carpus of the opposite cheliped. One specimen has the carpus greatly foreshortened, less than half the normal length, but armed with three teeth. Five specimens have the anterior margin of one carpal joint armed with coarse serrations, slightly smaller than the three teeth, among which these serrations are interspersed. There is also considerable variation in the degree of corrugations or rugae on the carpus and legs. This varies from normal to a few excessively rough surfaces on a few individuals, to some that are almost entirely smooth. One such specimen also has the hepatic tooth missing on one side, but present on the opposite side.