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With the best regards of
T. Fujino

Studies on the genus *Onycocaris* with descriptions of five new species (Crustacea, Decapoda, Palaemonidae)

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Studies on the genus *Onycocaris* with descriptions of five new species (Crustacea, Decapoda, Palaemonidae)[1,2]

Takahiro FUJINO and Sadayoshi MIYAKE

In the genus *Onycocaris* Nobili have hitherto been recorded only three species, namely, *Onycocaris aualitica* (Nobili), *O. quadratophthalma* (Balss) and *O. stenolepis* Holthuis. These species are all distributed in the Indo-West-Pacific region in close association with sponges inhabiting shallow coastal waters. The authors (Miyake and Fujino, 1967) already published the paper on pontoniid shrimps commensal with sponges from Kyushu, Japan and referred in it a number of specimens, which were obtained from the Amakusa Islands, to *Onycocaris quadratophthalma*, though with some doubts. But after that publication the authors had the chance to examine the type of *O. quadratophthalma*[3] deposited in the Naturhistoriska Riksmuseum, Stockholm as well as other species here noted. These studies made the authors to judge that the specimens treated in the previous paper in fact may be referable not to *O. quadratophthalma* but to two new, separated species, *Onycocaris amakusensis* and *O. callyspongiae*. The former species is distinguished from the latter by lacking a row of small teeth inside the cutting edges of the fingers of the second pereiopods. On the other hand, the authors had borrowed Edmondson's Hawaiian specimens preserved in the U. S. National Museum, which were labelled *O. quadratophthalma* (Balss). The examination of them proved that these specimens may probably be Balss's species by the reason of having the excessively slender first pereiopod and by lacking an angle or a spine-like projection from each of the posterodistal corners of the merus and the ischium of the second pereiopods, though the size of the dorsal spines of the telson seems to be somewhat different from that of the type. And it was also made clear in these specimens that there are considerable variations in reference to the

1) Contributions from the Zoological Laboratory, Faculty of Agriculture, Kyushu Universty, No. 420.
2) Contributions from the Amakusa Marine Biological Laboratory (Kyushu University), No. 210.
3) Labelled under the genus of *Pontonia*.

first pereiopod, the rostrum and the lateral tooth of the antennal scale. In many ways *Onycocaris amakusensis* sp. nov. resembles *O. oligodentata* sp. nov., which is here described and was secured from a sponge fished up entangling with gill net for spiny lobsters also in the Amakusa Islands. They are distinguished each other in the character of the pereiopods as well as of the certain part of the oral appendages.

Recently another three species were found at bases of branching corals on the coastal reefs of the Ryukyu Islands. One of them is determined to be Balss's *O. quadratophthalma*. And the other two species may be referable to none of the described species, and thereupon new to science. One, *Onycocaris spinosa*, is distinctively characterized by possessing several strong spines on the posterior border of the merus and vestigial ones on both the anterior and the posterior borders of the ischium of the second pereiopods. Another, *Onycocaris monodoa*, constitutes a characteristic feature of the much longer rostrum than usual, with one tooth on the upper border. Moreover, this species has the well-developed epipod of the second maxilliped, which is in the other species usually absent or strongly reduced into a small convexity.

The description of the new species as well as of *Onycocaris quadratophthalma* are here tried. And also the diagnostic key of the species belonging to this genus is given for the convenience of the identification. In the last of this communication are discussed the morphological interrelation of the mouthparts among the species of *Onycocaris* and also the morphological comparison of this genus with the allied genera having a similar habit of association with sponges as the mode of life. The material on which this communication is based has been deposited in the collection of the Zoological Laboratory of Kyushu University, except for the type of *Onycocaris quadratophthalma* and the Hawaiian specimens, which each is deposited in the original museum.

Key to species of the genus *Onycocaris*[1]

1 Rostrum long and compressed with tooth on upper border; epipod of second maxilliped well developed ..... *O. monodoa* sp. nov.
Rostum very short and triangular without tooth; epipod of second maxilliped absent or strongly reduced 2
2 Merus and ischium at posterodistal corner produced into angle or spine-like projection 3
Merus and ischium at posterodistal corner round without angle or spine-like projection 5
3 Cutting edges of fingers of second pereiopods with inside a row of

1) As some characteristics of *Onycocaris aualitica* (Nobili) still now remain questionable it is herefrom excluded.

several distinct teeth ..... *O. callyspongiae* sp. nov.
- Cutting edges of fingers of second pereiopods without inside a row of teeth 4
4 Distal half of movable finger of second pereiopods entire or finely serrated; distal claws of dactyli of last three pereiopods with posteriorly several well-developed teeth throughout length; incisor process of mandible dentated for 22 or 23 ..... *O. amkusensis* sp. nov.
- Distal half of movable finger of second pereiopods dentated; distal claws of dactyli of last three pereiopods with posteriorly a few vestigial teeth, restricted near base; incisor process of mandible dentated for 12 or 13 ..... *O. oligodentata* sp. nov.
5 Anterior border of merus and both anterior and posterior borders of ischium of second pereiopods with several strong or vestigial spines ..... *O. spinosa* sp. nov.
- Anterior and posterior margins of merus and ischium of second pereiopods entire without spines 6
6 Antennal scale slender; first pereiopod stout; posterior margin of dactyli of last three pereiopods with a small accessory tooth .... *O. stenolepis* Holthuis[1]
- Antennal scale broad; first pereiopod very slender; posterior margin of dactyli of last three pereiopods with a broad process and small spines ..... *O. quadratophthalma* (Balss)

Description of the species

Onycocaris monodoa sp. nov.

(Figs. 1-5)

Meterial examined. Kasari-zaki, Amami-oshima I., Ryukyu Is., Japan, coral reef, 1 m deep, July 25, 1968, T. Fujino leg. 1 ♂ (holotype, ZLKU No. 12039), 1 ovig. ♀ (paratype, ZLKU No. 12040).

Description of holotype (male). A small sized pontoniid with compressed, somewhat elongated body form (Fig. 1).

The rostrum (Fig. 2, *a*) is rather short, almost straight and compressed throughout its length, scarcely reaching the distal border between the cornea and the eyepeduncle. The rostrum fails to reach the end of the basal segment of the antennular peduncle. In lateral view the rostrum becomes narrow distally with the tip bluntly pointed and slightly upcurved. On the upper border a distinct tooth is present at about distal third, which is not sharply pointed but rather obtusely and

1) After Holthuis, 1952. No specimen available.

somewhat erected. The lower border is entire and slightly convex.

The carapace (Fig. 1) is entirely smooth, a trifle less than as long as broad. The inferior orbital margin terminates forwards in a sharply pointed, so-called antennal spine. The anteroventral angle is subrectangular.

The abdominal somites are all entire. The first four somites are with the broadly rounded pleura. The pleuron of the fifth somite is somewhat depressed, with nearly the same length as that of the fourth. The posterolateral margin of the sixth somite projects backwards triangularly.

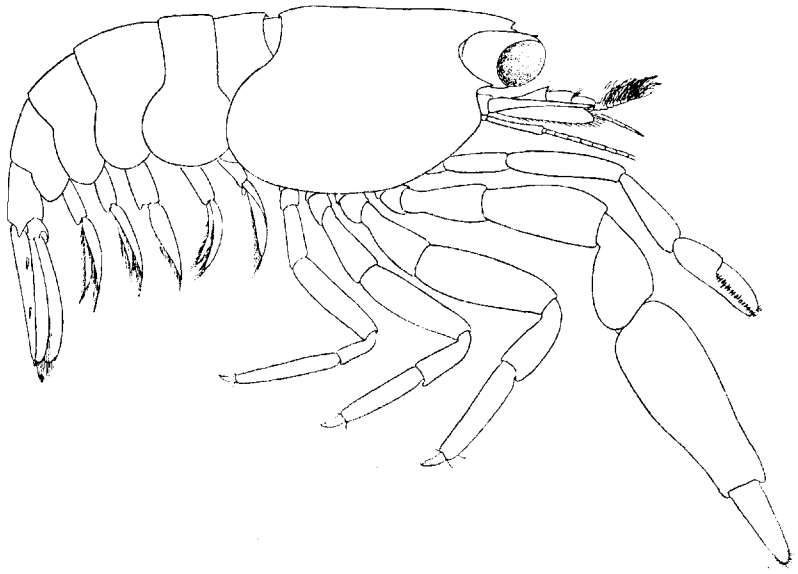

Fig. 1. *Onycocaris monodoa* sp. nov., holotype male, ×19.

The telson (Fig. 2, *c*) is flattened and more than twice as long as its maximum breadth, about twice the length of the sixth abdominal somite. The lateral borders are slightly convex. Two pairs of spines of equal length are situated on the dorsal surface; the anterior pair is a bit before the anterior third, while the posterior pair is halfway between the anterior pair and the posterior end of the telson; they are placed somewhat inside the lateral margins. On the posterior margin there are three pairs of stout spines; the outer pair is small, the intermediate the longest and stoutest, and the inner shorter and more slender than the median.

The eye (Fig. 2, *b*) is well developed, not extending to the end of the basal segment of the antennular peduncle. The cornea is hemispherical,

well pigmented and obliquely situated. The peduncle is very stout, much longer than the cornea.

The basal segment of the antennular peduncle (Fig. 2, *d*) is broad but more or less elongated, the outer lateral margin being nearly straight and tipped with a strong process which exceeds the middle of the second segment of the peduncle but fails to reach its end. The stylocerite is somewhat slender and short with the tip pointed, falling short of the

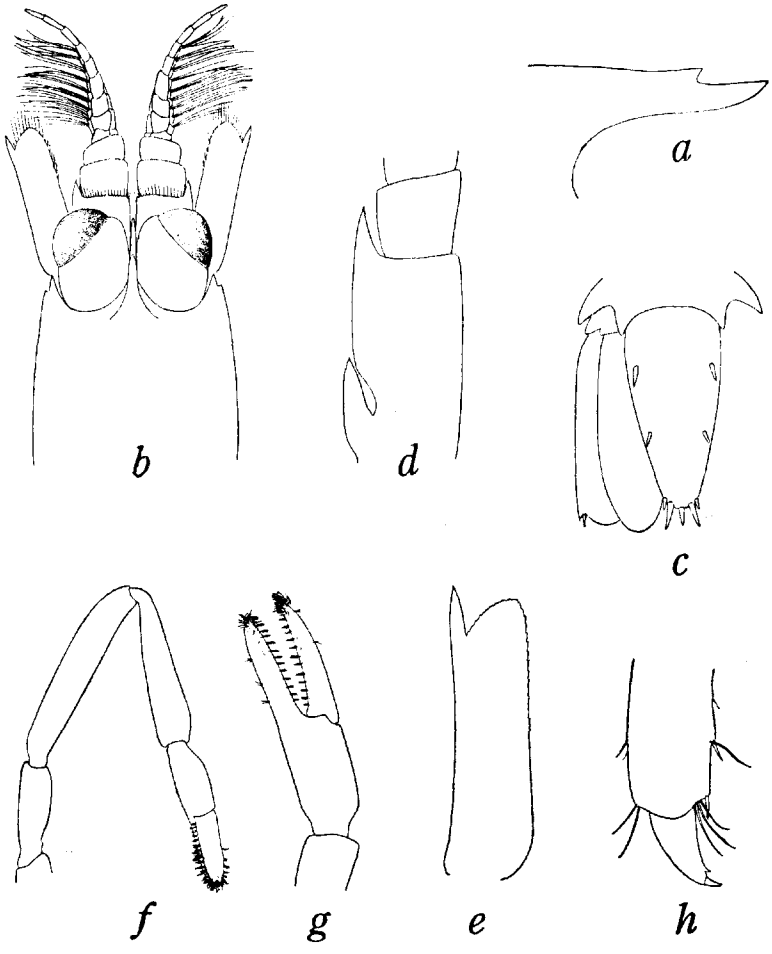

Fig. 2. *Onycocaris monodoa* sp. nov., *a*, *c*, *f*, *g*, *h*, paratype female; *b*, *d*, *e*, holotype male. *a*, rostrum, ×39; *b*, anterior part of body in dorsal view, × 23; *c*, telson and uropod, × 13; *d*, antennular peduncle, × 39; *e*, antennal scale, × 39; *f*, first pereiopod, × 17; *g*, chela of first pereiopod, ×26; *h*, distal part of third pereiopod, ×72.

mid-point of the basal segment. The second segment is broader and longer than the third. The upper flagellum is short and fused for three segments. The lower flagellum, which consists of six segments, is also short and as long as the upper.

The basicerite of the antennal peduncle is short without the lateral spine. The carpocerite is slender, long and cylindrical, reaching the end of the second segment of the antennular peduncle. The antennal scale (Fig. 2, *e*) is elongated, extending to the level of the end of the antennular peduncle; the outer margin is slightly concave, ending in a very strong lateral tooth which slightly overreaches the end of the lamella; the anterior part of the lamella is strongly expanded forwards to form a somewhat narrow angle; the inner margin is nearly straight; the broadest portion lies near the proximal part.

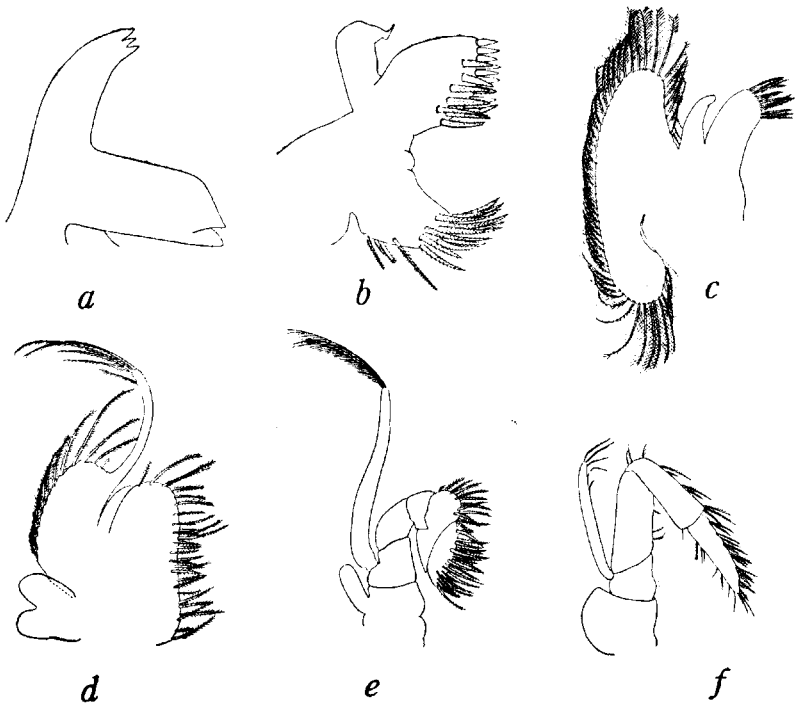

Fig. 3. *Onycocaris monodoa* sp. nov., paratype female, mouthparts. *a*, mandible; *b*, maxillule; *c*, maxilla; *d*, first maxilliped; *e*, second maxilliped; *f*, third maxilliped.

The mandible (Fig. 3, *a*) is made up of the strong and broad molar process, the surface of which is somewhat concave distally, with the two pointed similar knobs, and the laminar incisor process possessing

three distinct teeth distally. The palp of the maxillula (Fig. 3, *b*) is narrow, the tip being curved and tapering to a pointed projection; the upper lacinia is relatively broad and provided with several short stout spines and slender, long and setose spinules; the lower lacinia is as broad as the upper and armed distally with many coarse setae and spines bearing short setules. The maxilla (Fig. 3, *c*) is normal in shape; the distal endite is broad and uncleft with many coarse setae; the palp is narrow and slightly curved distally; the scaphognathite is well developed and somewhat narrow. The epipod of the first maxilliped (Fig. 3, *d*) is rather broad and bilobed for the distal third; the exopod has a moderately developed flagellum, the caridean lobe being broad and elongated; the palp is narrow; the endite forms a broad unilobe with marginally strong setae. The second maxilliped (Fig. 3, *e*) is typical with the well developed exopod; the epipod is well developed and forms a narrow lobe. The ultimate segment of third maxilliped (Fig. 3, *f*) is long, subequal to the penultimate in length but more slender than the latter; the antepenultimate segment is broad and short, somewhat longer than the distal segments; the exopod is rather small and feebly setose, reaching a little beyond the end of the antepenultimate segment; a broad and round epipod is present; the arthrobranch is absent.

The first pereiopod (Fig. 2, *f*) is short and slender. It reaches with the chela and the carpus together beyond the antennal scale. The fingers (Fig. 2, *g*) are distinctly longer than the palmar portion of the chela; the cutting edges are entire without teeth or excavation, but with many tufts made up of some slender spinules, which cross alternately when the fingers are closed. The palmar portion is less than twice as long as broad. The carpus is subcylindrical and almost as long as the chela, becoming much heavier distally. The merus is distinctly longer than the carpus. The ischium is shorter than the carpus.

The second pereiopods (Fig. 4, *b*) are equal in shape but slightly unequal in size. The smaller right pereiopod exceeds the antennal scale by the length of the chela and the carpus together. The movable finger is curved, gradually decreasing in breadth distally; the tip is somewhat crooked and pointed; near the middle on the cutting edge there is one low triangular tooth, behind which a rather broader tooth is present; some tufts of setae are present distally. The immovable finger is damaged in the distal third; a broad obtuse tooth is visible near the base, which fits in the concavity between both of the teeth on the cutting edge of the movable finger when the fingers are closed. The palm is depressed, high and smooth, about twice as long as the maximum height and much longer than the fingers. The carpus is short and conical without teeth or concavities distally. The merus is stout and broadest in the middle portion. The ischium is much shorter than the

merus, the anteroventral corner forming a blunt projection. The larger left pereiopod, which is detached, is similar to the right in shape but somewhat larger. On the cutting edge of the movable finger one stout triangular tooth is present at about the proximal third. The immovable finger is armed on the edge with two teeth as seen in the right side. The palm is high, about twice as long as the maximum height. The merus is provided with several small tubercles on the posterior border. The ischium is also provided anteroventrally with an obtuse projection.

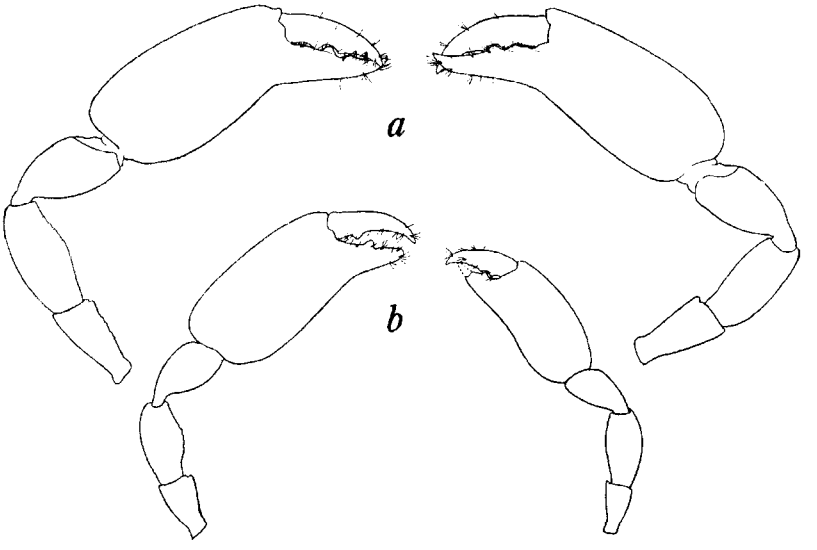

Fig. 4. *Onycocaris monodoa* sp. nov., second pereiopods. *a*, paratype, ×14; *b*, holotype, ×14.

The last three pereiopods resemble one another, but become much shorter and more slender from the third posteriorly. The dactylus (Fig. 2, *h*) is slender, short and slightly curved, narrowing distally with a stout and pointed claw; a small accessory tooth is visible near the base of the claw on the posterior border. The propodus is less than five times as long as the dactylus; on the posterior border there are a few short spinules and fine hairs. The carpus is subcylindrical and two-thirds the length of the propodus. The ischium is as long as the propodus.

The endopod (Fig. 5, *b*) of the first pleopod is slender and narrows distally with several marginal setae. The appendix masculina (Fig. 5, *c*) is very short and provided at the tip with one strong seta. The appendix interna is slender and long.

The uropod (Fig. 2, *c*) is as long as the telson. The outer margin of the exopod is slightly concave and terminates in two spines, the inner of which is movable.

Description of paratype (ovigerous female). With the exception of the following differences one ovigerous female is closely similar to the male.

The body is much larger and more strongly swollen than in the male.

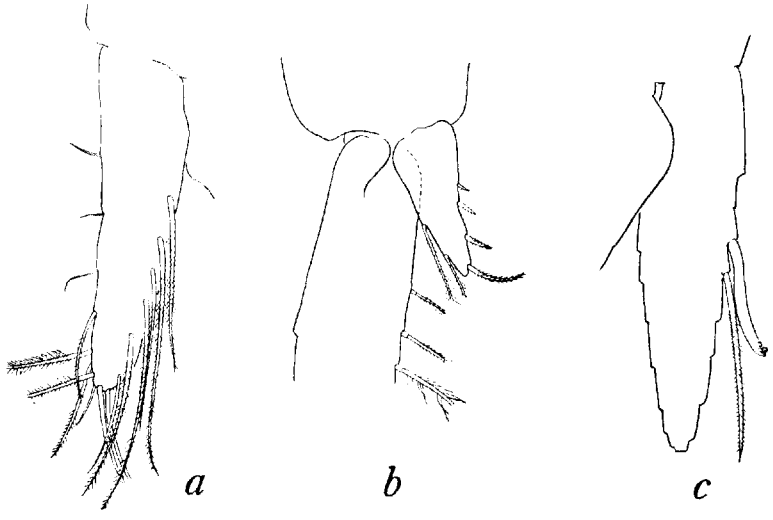

Fig. 5. *Onycocaris monodoa* sp. nov., *a*, paratype female; *b*, *c*, holotype male. *a*, endopod of first pleopod; *b*, endopod of first pleopod; *c*, endopod of second pleopod.

There are one median spine and two pairs of spines on the posterior margin of the telson; the outer pair is small, and the inner pair is stout and a little longer than the median spine.

The upper antennular flagellum is fused for three segments as in the male. The lower flagellum is slightly longer than the upper, consisting of eight segments.

The second pereiopods (Fig. 4, *a*) are almost equal in both shape and size. The movable finger is slender and curved with the tip bluntly pointed. The middle portion of the cutting edge forms concavity into which the truncated tooth on the cutting edge of the immovable finger is received when the fingers are closed. The concavity on the movable finger is just followed by a triangular tooth which also fits in the concavity present behind the truncated tooth on the immovable finger. The palm is high, about twice as long as the maximum height. The posterior margin of the merus is provided with several obscure tubercles as in the larger pereiopod of the male. The

posterodistal corner of the ischium is somewhat produced to form an acute angle.

The endopod (Fig. 5, *a*) of the first pleopod is elongated with marginally many long setae.

The ova are rather small in number, less than 30, and 0.5×0.5 mm in diameter.

Measurements (mm).

	Male (holotype)	Female
Body length	5.9	7.5
Carapace length	1.4	1.9
Rostrum length	0.4	0.6
Telson length	1.6	1.4
Chela of larger second pereiopod length	2.8	3.5
Chela of smaller second pereiopod length	2.2	3.4

Colour. The body is entirely yellow, with eggs green.

Host. The two specimens were obtained by breaking the base of madrepore corals. It is uncertain whether these specimens were living commensally with sponges or other animals.

Remarks. This species, as described above, has very interesting morphological characters with regards to the rostrum and the second maxilliped. First, the compressed rostrum of this species is much produced forward and reaches as far forward as the level of the distal border of the cornea being armed with a stout tooth situated in about the middle on the upper border. The rostrum in the other species is very short and only forms a small triangular projection which falls short of the end of the eyepeduncle without teeth. Secondly, the epipod of the second maxilliped is of a rather slender but well-developed lobe. Whereas in the others it is entirely absent or very strongly degenerated into a round convexity. These features may show that this species has the much closer relation to the genus ***Periclimenaeus*** Borradaile than to the others. ***Periclimenaeus*** possesses the rostrum which in usual is moderately developed and with teeth, and also the epipod of the second maxilliped is well developed.

This species bears superficial resemblance to ***Onycocaris stenolepis*** Holthuis in the slender antennal scale, in the fingers of the first pereiopod, which have the cutting edges with along the margins many tufts of spinules, in a few teeth on the incisor process of the mandible, and in the dactyli of the last three pereiopods, with posteriorly a small accessory tooth. And also the telson of both the species is more

elongated than in the others, and the lateral spines are rather distinct and placed more or less inside the lateral margins, while thay are just on the margins in the others. The orbital angle of both the species is much more protruded forward than in the others. In this species like *O. stenolepis* and *O. quadratophthalma*, the posterodistal corner of the merus of the second pereiopods is rounded without an acute angle or strong spine-like projection, while somewhat protruded in the ischium.

Onycocaris amakusensis sp. nov.

(Figs. 6, 8 *a-c*, 9 *a-c*)

Onycocaris quadratophthalma: Miyake et Fujino, 1967, p. 283, figs. 4, 5 (in part)- Amakusa Is., Kyushu.

Material examined. Takamatsu, Amakusa Is., Aug. 16, 1932, H. Ohshima leg. - 1 ♂, 1 ovig. ♀ (paratypes, ZLKU No. 3438; 3439).

Tsuji-shima Islet, Amakusa Is., in sponge collected at low tide level, Apr. 24, 1967, A. Taki leg. - 1 ♂ (ZLKU No. 14223), 1 ♀ (holotype, ZLKU No. 14224).

Tsuji-shima Islet, Amakusa Is., in sponge collected at low tide level, Apr. 26, 1967, A. Taki leg. - 1 ♂, 1 ♀ (ZLKU No. 14219).

Description of mouthparts. The incisor process of the mandible (Fig. 6, *a*) is thin rather broad and twisted, the distal edge being finely crenulated; under considerable magnification it proves to be of twenty-three or-four minute teeth except for a terminal, much larger tooth; the molar process is relatively slender, making a right angle with the incisor process, the tip being surrounded by many spinules. The maxillula (Fig. 6, *b*) is typical; the rectangular palp is almost straight distally with a small terminal spine; the upper lacinia is broad with on the distal margin several stout spines and many coarse setae; the lower lacinia is narrower than the upper and considerably curved. The maxilla is made up of the well-developed palp, the broad, slightly emarginated endite (Fig. 6, *c*), and the somewhat elongated scaphognathite. The epipod of the first maxilliped (Fig. 6, *d*) is a heart-shaped lobe, the distal magin being a little concave; the palp is well-developed; the caridean lobe is rather broad; the endite is broad and unilobed. The second maxilliped (Fig. 6, *e*) is typical; the epipod remains as only a round convexity. The third maxilliped (Fig. 6, *f*) is rather stout; the ultimate segment is slightly longer than the penultimate; the antepenultimate segment is broader than the distal two segments, measuring somewhat less than twice as long as the ultimate segment; the exopod exceeds the end of the antepenultimate segment.

Size. Three males measure 7.0 to 7.8 mm, one ovigerous female 14.0 mm and two females 7.1 and 12.0 mm in body length.

Colour. The body is entirely transparent or light pink, with small milkish white chromatophores thickly settled.

Host. The specimens were collected from the cavities of the sponge, *Callyspongia elegans* (Thiele) and other tubular sponges, the former is sublittoral and range from Japan sonthwards to the tropical waters.

Distribution. This species may distribute from Zanzibar, Hong Kong, Australia, Japan and Hawaii (by the personal communication with Dr. A. J. Bruce).

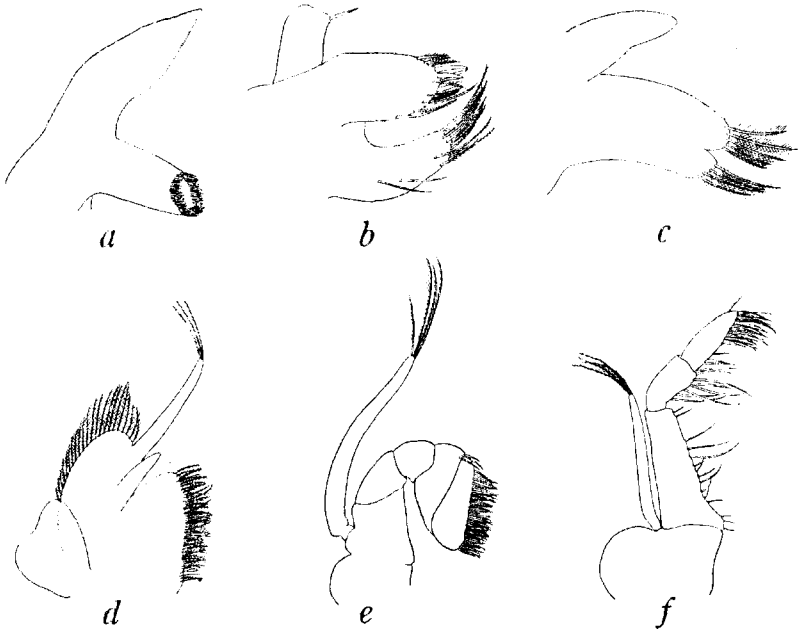

Fig. 6. *Onycocaris amakusensis* sp. nov., paratype female, mouthparts. *a*, mandible; *b*, maxillula; *c*, endite and palp of maxilla; *e*, first maxilliped; *f*, second maxilliped; *g*, third maxilliped.

Remarks. The authors in the previous paper (Miyake and Fujino, 1967) described this species under the name of *Onycocaris quadratophthalma* (Balss), and pointed out some differences found between Balss's (1921) original description and the two specimens (ZLKU No. 3438) there treated, collected from the Amakusa Islands. These differences are: the

length of the rostrum, which in Balss's description is much shorter than in the specimens from the Amakusa Islands and distinctly fails to reach the anterolateral process of the carapace; the first pereiopod, which in Balss's description and figure is more slender and longer; the posterodistal corners of the merus and the ischium, which in Balss's description are round at variance with the authors' specimens forming there acute angles or distinct spine-like projections. At that time the authors considered that such differences may fall into the possible variation would occur within the specific category. However, after that publicatoion, through examinations of more specimens of this species and the other allied species including the type specimen of *O. quadratophthalma* as well as Edmondson's Hawaiian specimens the authors have come into the conclusion that the material dealt with in the previous paper is in fact referable not to *O. quadratophthalma* but to another two new species, *O. amakusensis* and *O. callyspongiae*. The principal reasons, from which such a conclusion is deduced, though they duplicate the above-mentioned differences from Balss's description, are : both the species, *O. amakusensis* and *O. callyspongiae*, have the strong projections or angles on the posterodistal corners of the merus and the ischium of the second pereiopods. This character seems distinct and may probably be constant. On the other hand, the corners of these segments in *O. quadratophthalma*, though the comparison and reference are obliged to restrict only to the original description and figure because of all the pereiopods of the type specimens borrowed missing, are not produced into the acute angles nor strong projections but form the round margin. And also the much stouter and shorter first pereiopod of this species, especially in the chela, is also differenciated from that of *O. quadratophthalma*. The differences between this species and *O. callyspongiae* are, as will be mentioned in the following article of *O. callyspongiae*, found in the character of the second pereiopods.

Onycocaris oligodentata sp. nov.

(Figs. 7, 8 *d-f*, 9 *d-f*)

Metarial examined. Tomioka, Amakusa Is., in sponge fished up entangling with gill net, 35 m deep, Sept. 27, 1966, A. Taki leg. -1♂ (paratype, ZLKU No. 14221), 1 ovig. ♀ (holotype, ZLKU No. 14222).

Description of holotype (ovigerous female). The short, triangular rostrum (Fig. 7, *a*) is directed obliquely downwards, the slightly upcurved tip almost reaching as far forward as the level of the midlde of the eye-peduncle. The rather marked dorsal carina extends backwards from the tip to behind the orbit.

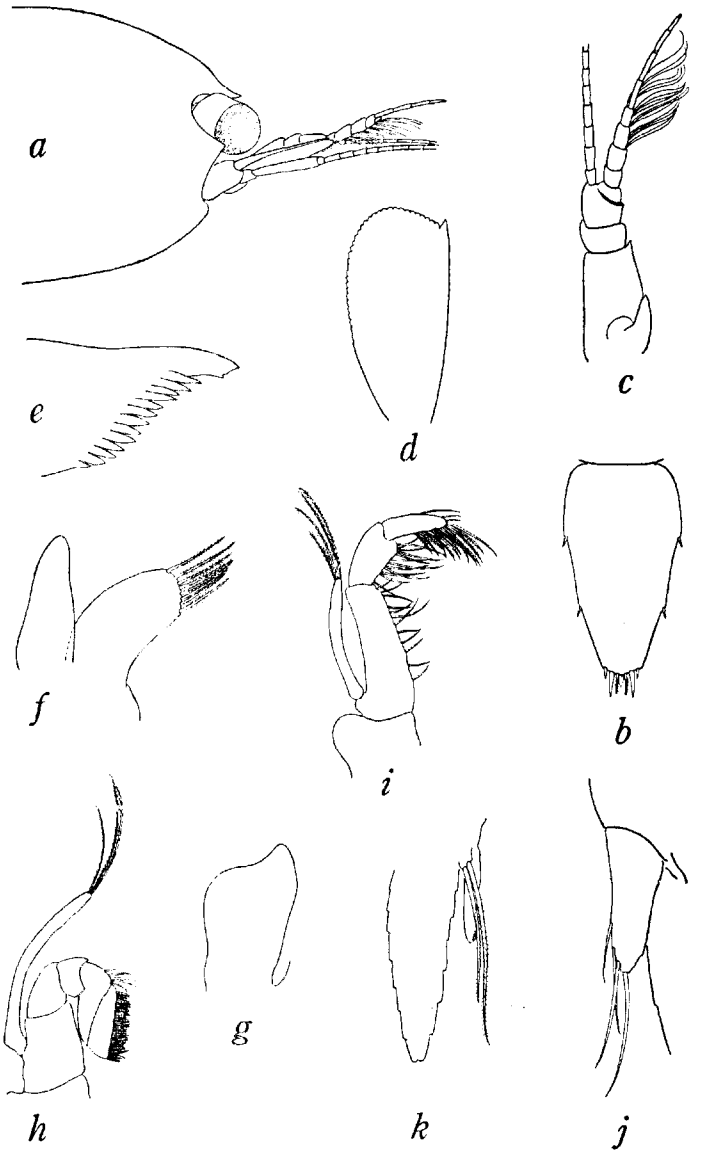

Fig. 7. *Onycocaris oligodentata* sp. nov., paratype male. *a*, anterior part of body in lateral view, × 17 ; *b*, telson, × 23 ; *c*, antennule, × 23 ; *d*, antennal scale, × 34, *e*, distal part of incisor process ; *f*, endite and palp of maxilla ; *g*, epipod of first maxilliped ; *h*, second maxilliped ; *i*, third maxilliped ; *j*, endopod of first pleopod ; *k*, endopod of second pleopod.

The carapace is smooth and swollen. The orbital angle is produced forward to make a broad triangular protrusion, scarcely reaching the level of the tip of the rostrum. The anterior margin below the orbital angle is concave and succeeded downwards to a low round convexity at the anteroventral corner.

The abdomen is expanded for holding ova which measure about 0.6 to 0.65 mm in diameter. The surface of the somites is entire. The pleura of the first four somites are very broad, that of the fifth becoming narrower. The sixth somite is subequal to the fifth in length.

The telson (Fig. 7, *b*) is flat and broad, measuring about twice as long as broad, and more than one and a half the length of the fifth abdominal somite. The lateral margins are slightly convex, with two pairs of small spines; both of the pairs stand at the place dividing the length of the telson equidistantly. On the broad posterior margin there are three pairs of spines; the outer pair is small and as long as the lateral spines; the intermediate pair is the longest; the median pair is plumose and somewhat shorter and more slender than the intermediate.

The eye (Fig. 7, *a*) is quadrate in form. The eyepeduncle is short and heavy, the anterior border being almost transverse to the body axis. The cornea obliquely lies on the peduncle.

The basal segment of the antennular peduncle (Fig. 7, *c*) is broad; the outer lateral margin is a trifle convex, ending anteriorly in a small spine which fails to reach the half point of the second segment. The stylocerite is a rather narrow lobe, the obtusely pointed end extending almost to the middle of the basal segment. The second segment is broader and much shorter than the third; the length of the distal two segments together is distinctly shorter than the basal segment alone. The upper flagellum is of the four basal fused segments, the longer free ramus consisting of four long equal joints and the shorter free ramus of only one joint. The lower flagellum is longer than the outer flagellum.

The basicerite of the antennal peduncle is stout, without the lateral spine. The carpocerite is slender and cylindrical, falling short of the end of the antennal scale. The antennal scale (Fig. 7, *d*) is comparatively small and reaches beyond the end of the antennular peduncle, a little less than twice as long as the maximum breadth which lies anterior to the middle; the outer lateral margin is slightly concave, tipping anteriorly with a small tooth. The anterior margin is round and overreaches the lateral tooth.

The mandible consists of the laminar and twisted incisor process and the basaly compressed molar process, both the processes making an almost right angle; the distal edge (Fig. 7, *e*) of the incisor process

is cut diagonally and dentated for twelve, except for the terminal tooth which is much larger than the others; round the chitinized top of the molar process there are thickly grown spinules. The palp of the maxillula is slightly curved, with the shallow concavity in the middle of the tip where a small spine is present. The maxilla is typical; the palp (Fig. 7, *f*) is well developed and rather broad; the broad, unilobed endite is marginally with several plumose setae; the scaphognathite is broad. The epipod (Fig. 7, *g*) of the first maxilliped is of a broad quadrate lobe, the distal margin of which is more or less sunken; the palp is slender, with the obtusely pointed tip; the well-developed exopod possesses basally a broad caridean lobe. The second maxilliped (Fig. 7, *h*) is normal; the epipod is entirely absent. The third maxilliped (Fig. 7, *i*) is stout; the distal two segments are subequal in length, bearing long, coarse setae; the antepenultimate segment is broader than the distal segments, measuring about two and a half the length of the ultimate segment; the exopod a trifle overreaches the end of the antepenultimate segment; the epipod forms a broad round projection.

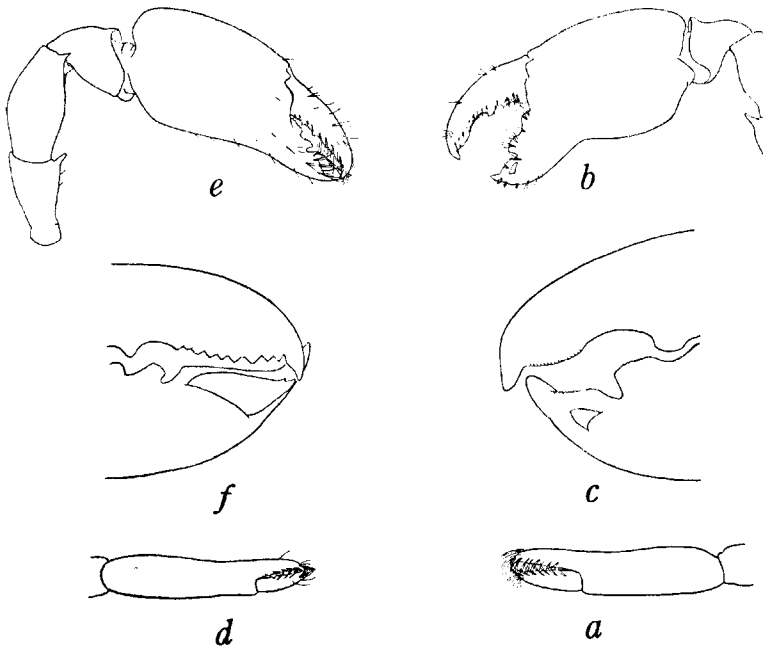

Fig. 8. *Onycocaris amakusensis* sp. nov., *a-c*, paratype female. *a*, chela of first pereiopod, ×33; *b*, second pereiopod, ×8; *c*, distal part of fingers of second pereiopod, hairs removed, ×22.

Onycocaris oligodentata sp. nov., *d*, paratype male; *e*, *f*, holotype female. d, chela of first pereiopod, ×33; *e*, second pereiopod, ×11; *f*, distal part of fingers of second pereiopod, hairs removed, ×33.

The first pereiopod (Fig. 8, *d*) is slender, exceeding the end of the antennal scale by the length of the chela and the carpus combined. The fingers are short and narrow, and the crooked and pointed tips are provided near the distal parts with thick hairs. The palmar portion is subcylindrical and more or less constricted in the anterior third, about three times as long as the fingers. The carpus is slender and cylindrical and becomes heavier distally, measuring about one and a half the length of the chela. The merus is subequal to the carpus in length. The ischium is stout and somewhat longer than the chela.

The second pereiopods (Fig. 8, *e*) are symmetrical. The movable finger (Fig. 8, *f*) is rather shallow and somewhat curved; the tip forms a strong, triangularly poined tooth which is followed by a series of several small but distinct teeth on the cutting edge; in about behind the middle on the edge are present two rather small and truncated teeth, the anterior of which is larger than the posterior. The immovable finger is higher than the movable. The distal half of the cutting edge is minutely serrated entirely. In about the middle a distinct truncated tooth is placed, which is flanked on both the sides with small concavities. Behind the middle tooth a broad truncated tooth is visible on the edge. A broad flap is produced outwards outside the distal of the finger. Into the gap between the finger and the flap the distal part of the movable finger fits when the fingers are closed. The inner side of the fingers are considerabley hollowed with many setae. Many tufts of long setae are present somewhat above the cutting edges. The palm is high, about one and a half as long as its maximum height and distinctly longer than the movable finger; fine hairs are dispersed on the rather smooth surface; both the anterior and the posterior borders are gently curved and the anteroproximal corner is somewhat produced backwards. The carpus is short and cup-shaped, the distal margin being entire without any spine or tooth. The merus is stout and both the anterior and the posterior margins are convex; the posterodistal corner forms an acute angle. The ischium is as long as the carpus; the posterodistal angle is also projected into a stout spine.

The last three pereiopods are stout and resemble one another. The dactylus (Fig. 9. *d*) is to a great degree recurved, about twice as long as the breadth at the base; the anterior margin is strongly curved and smooth with distally a stout claw, the posterior border (Fig. 9, *e*, *f*) of which bears a few obscure teeth restricted near the base; on the posterior border is subterminally situated a broad rectangular projection, the terminal margin of which is truncated and with several irregularly arranged teeth; the proximal margin succeeded from the projection is convex and armed with several triangular, stout teeth. The propodus is stout, about four times as long as the dactylus; there are four single

and a pair of longer spines on the posterior border and at the postero-distal corner, respectively. The merus is stout, longer than the propodus.

The uropods are longer than the telson. The outer margin of the exopod is convex with terminally two minute spines, the inner of which is movable.

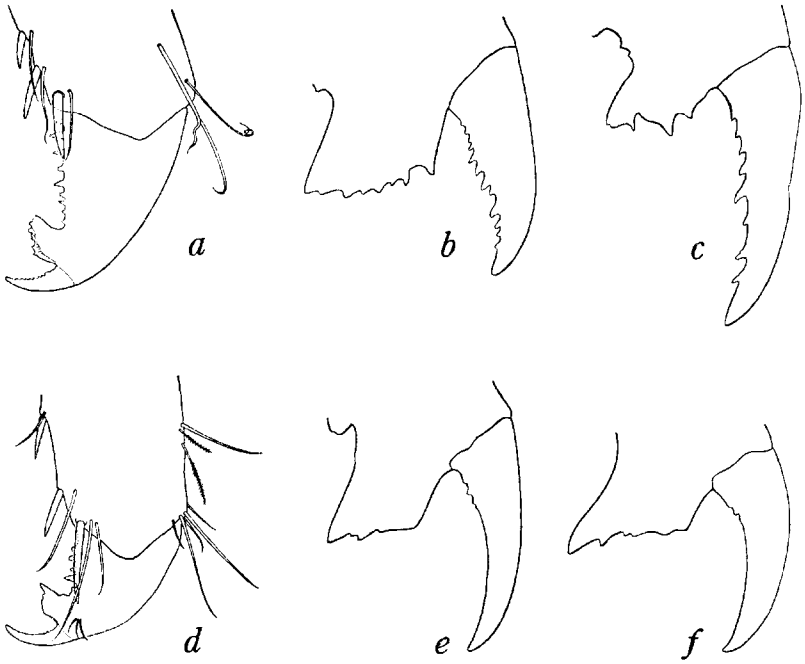

Fig. 9. *Onycocaris amakusensis* sp. nov., *a-c*, paratype female. *a*, dactylus of third pereiopod, ×85; *b*, distal part of dactylus of third pereiopod, ×285; *c*, distal part of dactylus of fifth pereiopod, ×285.
Onycocaris oligodentata sp. nov., *d-f*, paratype male. *d*, dactylus of third pereiopod, ×85; *e*, distal part of dactylus of third pereiopod, ×285; *f*, distal part of dactylus of fifth pereiopod, ×285.

Description of paratype (male). The body of the male is much smaller and thinner than in the ovigerous female. The abdomen is slender and subcylindrical, the pleura of the somites being broad and round.

The telson resembles that of the ovigerous female but the lateral spines are more distinct than in the ovigerous female.

The upper antennular flagellum is as in the ovigerous female fused for four basal segments, and the longer free ramus consists of four joints.

The outer lateral margin of the antennal scale is slightly convex

and terminates in a small tooth which fails to reach the anterior margin of the lamella.

The mouthparts are closely similar to those of the ovigerous female but the incisor process of the mandible is dentated terminally for thirteen except for the terminal tooth.

The second pereiopods are more or less asymmetrical in size but almost equal in shape; the palm is somewhat higher than in the ovigerous female, measuring less than one and a half as long as its maximum height; the distal half of the cutting edge of the movable finger is also distinctly dentated; the teeth on the cutting edges of both the fingers are as observed in the ovigerous female; each posterodistal corner of the merus and the ischium is produced into a strong spine-like projection.

Each dactylus of the last three pereiopods possesses the distal claw, the posterior margin of which bears a few vestigial teeth near the base; the posterior, subterminal and truncated projection is irregularly serrated at the distal margin. The posterior margin behind that projection bears several distinct spines.

The endopod (Fig. 7, *j*) of the first pleopod is small and rather elongated with some marginal setae. The appendix masculina (Fig. 7, *k*) is very short and provided with two strong long setae at the top.

Measurements (mm).

	Male	Female (holotype)
Body length	8.0	13.3
Carapace length	2.0	2.9
Telson length	1.3	1.8
Chela of larger second pereiopod length	2.9	3.1
Chela of smaller second pereiopod length	2.5	3.1

Colour. According to the donator, the body of the male is transparent, with red chromatophores roughly dispersed on the ventral side of the abdomen. The ovigerous female is tinged with light reddish purple, thickly dotted with white chromatophores, and the ventral side of the abdomen is coloured with somewhat thickly settled red chromatophores. The pereiopods are transparent.

Host. The specimens in pair were found in the purplish sponge, fished up entangling with gill nets for spiny lobsters.

Remarks. In many ways this species is closely related to the previous

species, *Onycocaris amakusensis* sp. nov., but may be distinguishable from it by the following regards:

1) The chela of the first pereiopod of this species is comparatively more slender and longer. The dactylus is a little less than three times as long as the palmar portion, while that (Fig. 8, *a*) of *O. amakusensis* is about twice as long as the palmar portion.

2) Both of the second pereiopods of this species are symmetrical. These pereiopods are rather smaller and relatively more slender than in *O. amakusensis* (Fig. 8, *b*), and both of the fingers are less curved. The cutting edge of the movable finger in the distal half has a row of small but distinct teeth. These teeth are absent from the edge of the movable finger of *O. amakusensis* (Fig. 8, *c*), in which the distal part is somewhat waved and finely or obscurely serrated.

3) The distal claws of the dactyli of the last three pereiopods have posteriorly two or three obsolete teeth which are restricted to the basal part, instead of *O. amakusensis* (Fig. 9, *b* and *c*) having a number of rather well-developed teeth throughout its length.

4) The incisor process of the mandible of this species is dentated for twelve or thirteen distally, while in *O. amakusensis* the teeth are much smaller and twenty-two or-three in number.

5) The endite of the maxilla of this species is unilobed but in *O. amakusensis* it is shallowly emarginated.

6) The epipod of the second maxilliped of this species is entirely absent, though the epipod remains as a round convexity in *O. amakusensis*.

Onycocaris callyspongiae sp. nov.

(Figs. 10-12)

Onycocaris quadratophthalma: Miyake et Fujino, 1967, p. 283 (in part) - Amakusa Is.

Material examined. Tomioka, Amakusa Is., in sponges, Sept. 6, 1966, A. Taki leg. - 2 ♂♂ (paratypes ZLKU No. 3440; 3441), 1 ovig ♀ (holotype ZLKU No. 3442), 3 ovig. ♀♀ (paratypes, ZIKU No. 3443 - 3445); Shiro-iwa-zaki, Tomioka, Amakusa Is., in sponges, Apr. 3, 1930, H. Ohshima leg. - 78 ♂♂, 88 ♀♀ (ZLKU No. 3508); Sagami Bay, in sponge, Feb. 6, 1969, N. Yurano leg.- 1 ♂, 1 ovig. ♀ (ZLKU No. 14217).

Description of holotype (ovigerous female). The body is rather plump. The rostrum (Fig. 10, *a*) is of a short protrusion, extending to the level of the mid-point of the eyepeduncle. The tip is slightly upcurved, the dorsal carina running a little backwards from near the tip.

The carapace is entirely smooth and swollen. In lateral view the dorsal part is somewhat inflated. The orbital angle (Fig. 10, *b*) is produced forward into a broad round convexity. The anteroventral corner forms a gently curved margin.

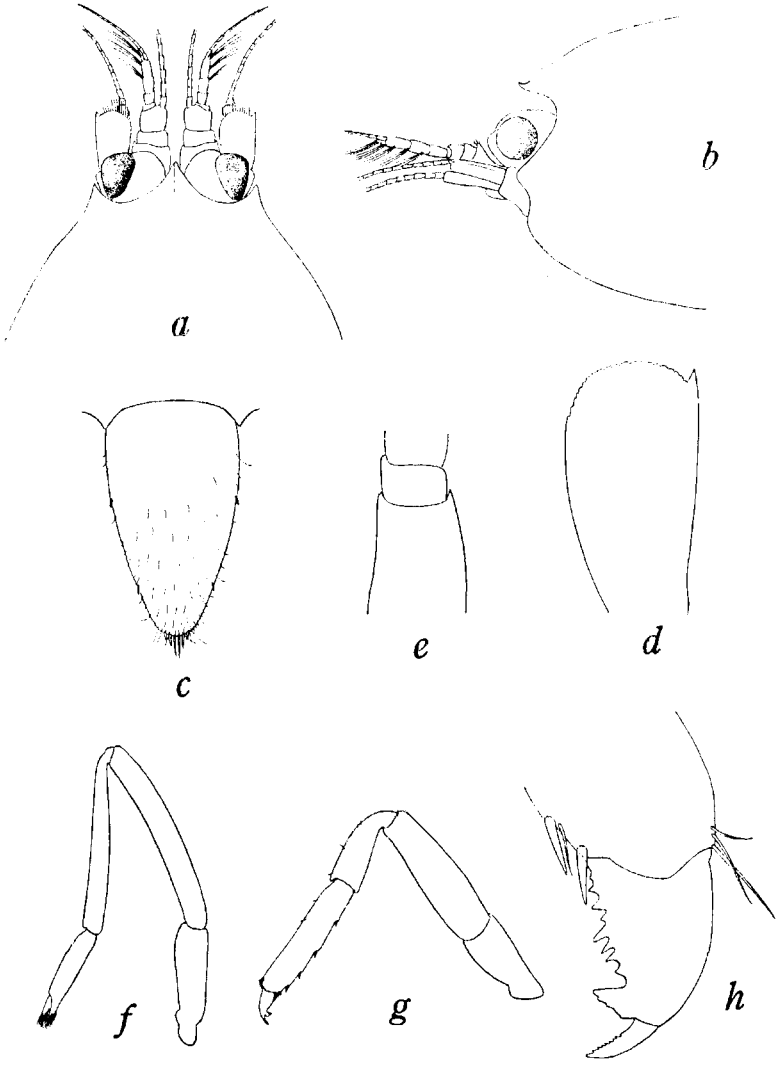

Fig. 10. *Onycocaris callyspongiae* sp. nov., paratype female. *a*, anterior part of body in dorsal view, ×16; *b*, anterior part of body in lateral view, ×16; *c*, telson, ×17; *d*, antennal scale, ×39; *e*, antennule, ×36; *f*, first pereiopod, ×16; *g*, third pereiopod, ×16; *h*, dactylus of third pereiopod, ×240.

The abdomen is entire and rather swollen. The pleura of the first four somites are broad and round, that of the fifth somite becoming somewhat narrow. The sixth somite is more or less shorter than the fifth.

The telson (Fig. 10, *c*) is broad and flat, more than one and a half as long as the breadth at the base, and slightly longer than twice the length of the sixth abdominal somite. The lateral margins are slightly convex, where two pairs of minute spinules are situated; the anterior pair is placed at the anterior two-fifths point of the telson, while the posterior pair is at the posterior fifth. The posterior portion of the telson is rather broad and the margin is convex with three pairs of spines; the outer pair is short and as long as the lateral spines of the telson and the intermediate pair is stouter but shorter than the median. There are many short hairs on the surface, especially thick along the posterior margin.

The eye (Fig. 10, *a*) is short, broad and quadrate, not reaching the end of the basal segment of the antennular peduncle. The cornea is obliquely situated on the eyepeduncle; both of the anterior and the inner margins are nearly straight. The small ocellus is obscurely visible near the corneal border.

The basal segment of the antennular peduncle (Fig. 10, *e*) is broad, the outer lateral margin being slightly convex and tipped with a small terminal spine which fails to reach the level of the middle of the second segment. The stylocerite is relatively small and leaf-like with the obtusely pointed end, not reaching the middle of the basal segment. The second segment is a trifle broader and shorter than the third, both together being shorter than the basal segment. The fused portion of the upper flagellum consists of four segments. The shorter free ramus is very short. The lower flagellum is slender and rather short.

The basicerite of the antennal peduncle is devoid of the lateral spine. The carpocerite is long, slender and cylindrical, extending to the end of the antennal scale. The antennal scale (Fig. 10, *d*) is rather small and reaches the end of the antennular peduncle, about twice as long as the broadest portion which lies in front of the middle; the outer lateral margin is slightly convex and ends in a small tooth which nearly reaches or a trifle falls short of the end of the lamella; the anterior margin of the lamella is broadly rounded.

The incisor process of the mandible (Fig. 11, *a*) is laminar and finely crenulated distally with an enlarged, terminal tooth; the molar process is rather slender and beset thickly wih stout spinules around its distal margin. The palp of the maxillula (Fig. 11, *b*) is nearly oblong with a seta terminally; the upper lacinia is somewhat broad, having mar-

ginally a number of setae and spines; the lower lacinia is curved and narrows distally, being more slender than the upper lacinia without spines or setae. The palp of the maxilla is developed and thumb-like; the endite is broad and unilobed; the scaphognathite is somewhat elongated. The first maxilliped (Fig. 11, *c*) is provided with the broad

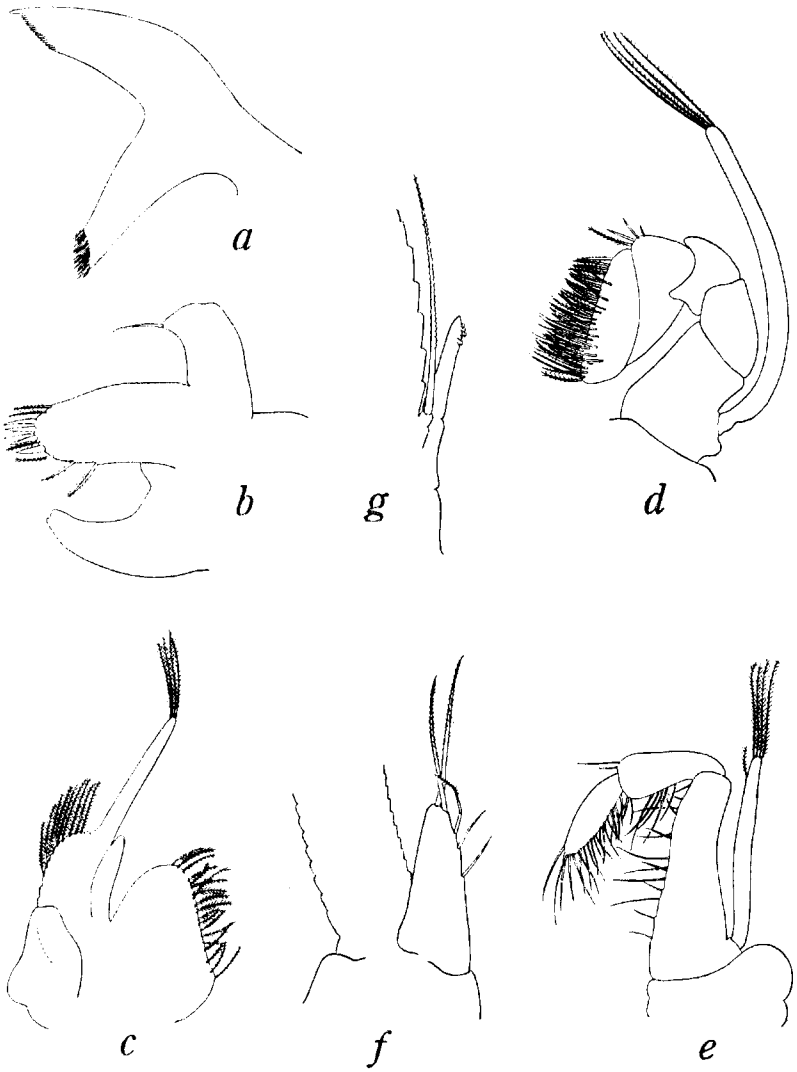

Fig. 11. *Onycocaris callyspongiae* sp. nov., *a*–*e*, paratype female; *f*, *g*, holotype male. *a*, mandible; *b*, maxillula; *c*, first maxilliped; *d*, second maxilliped; *e*, third maxilliped; *f*, endopod of first pleopod; *g*, appendix masculina and appendix interna.

unilobed epipod; the well-developed exopod has the elongated caridean lobe; the palp is non-setose and narrow; the broad endite is unilobed. The epipod of the second maxilliped (Fig. 11, *d*) is reduced into a small round convexity. The distal two segments of the third maxilliped (Fig. 11, *e*) are subequal in length. The antepenultimate segment is much broader and longer than the distal two segments and narrows distally, about twice as long as the ultimate segment. The exopod reaches slightly beyond the end of the antepenultimate segment. The epipod is broad and round.

The first pereiopod (Fig. 10, *f*) is slender, overreaching the end of the fused portion of the upper antennular flagellum by the length of the chela and the carpus together when expanded. The fingers are rather short and narrow with the crooked terminal claws. The cutting edges are nearly straight and entire; thick setae are grown along their length somewhat above the edges. The palmar portion is slender and subcylindrical, a litile more than twice as long as the fingers. The carpus is cylindrical and becomes more or less thicker distally, one and a half the length of the chela. The merus is nearly equal in length to the carpus and one and a half as long as the ischium.

The second pereiopods (Fig. 12, *a*) are almost similar in shape but somewhat different in size. The movable finger is slightly curved, becoming more or less narrower toward the tip which is crooked and obtusely pointed; the cutting edge is broad and distinctly hollowed throughout whole length; in the outer side (Fig. 12, *b*) the cutting edge becomes thinly expanded and obscurely crenulated in the distal half; in the proximal half there are two small teeth with the blunt tips; many tufts of long setae are present along the edge; in the inner side (Fig. 12, *c*) six strong triangular teeth are visible which are of subequal size; several tufts of long setae are also grown along the inner edge semewhat above the teeth. The immovable finger is higher than the movable, especially near the base. It is slightly curved but not so strongly as in the movable. The tip forms a strong, bluntly pointed claw. The outer side of the edge in the distal half becomes expanded into a thin broad projection which is shallowly crenulated distally. On the proximal half of the edge there are present several small and irregular-shaped teeth. From near the outer distal portion of the finger a square flap is produced outwards. Into the gap between the distal part of the immovable finger and this flap the tip of the immovable finger fits when closed. In the inner view several teeth are situated along the edge as in the movable finger. Long setae are placed near the edges. The palm is high and the surface is entirely smooth, about one and a half as long as its height, and twice as long as the movable finger; both the anterior and the posterior borders are a little convex.

The carpus is short and conical, the distal margin being entire and undulated. The merus is stout with a strong projection at the posterodistal corner, about twice as long as the breadth; the broadest portion lies at about the middle. The ischium is subequal to the merus in length; a strong spine-like projection is produced from the posterodistal portion, too.

The last three pereiopods (Fig. 10, *g*) are stout and rather similar one another. The dactylus (Fig. 10, *h*) is broad and somewhat recurved, one and a half as long as its basal breadth; both the anterior and the posterior borders are slightly convex; a stout claw, posterior border of which is minutely serrated throughout the length, is fused with the terminal portion, a broad, square and flat projection is protruded backwards from the posterior subterminal portion, the tip of which is truncated with vestigial small teeth. Several irregular and triangular teeth are present along the posterior border, which follow the square projection. The propodus is stout, more than four and a half as long as broad and about four times the length of the dactylus; along the posterior border four single spinules are visible. The carpus is subcylindrical, two-thirds the length of the propodus. The merus becomes stouter proximally, a trifle shorter than the propodus. The ischium is the stoutest of all the segments and a little longer than the carpus.

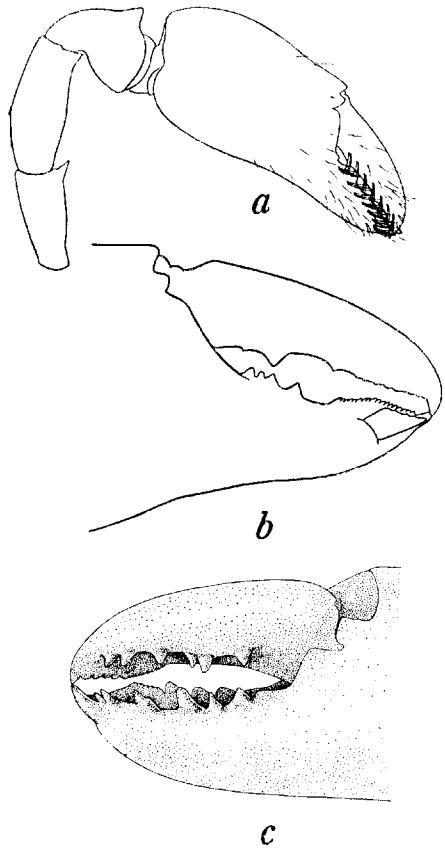

Fig. 12. *Onycocaris callyspongiae* sp. nov., paratype female. *a*, second pereiopod, ×16; *b*, fingers of second pereiopod, outer lateral aspect, hairs removed, ×35; *c*, fingers of second pereiopod, inner lateral aspect, hairs removed, ×35.

The uropods are broad and somewhat longer than the telson. The outer margin of the exopod is entire with a slight convexity, ending

in a minute movable spine.

Description of paratypes. Male is much smaller and thinner than ovigerous female. The rostrum of male is relatively longer and more slender than in female, reaching a little beyond the middle of the eyepeduncle. The dorsal carina is more distinct than in female. The inferior orbital margin of the carapace of male is a trifle produced forwards, forming an obtuse angle.

The telson of male is more slender than in female. The intermediate one of three pairs of the terminal spines is somewhat stronger and longer than in female. Such hairs as observed on the telson of female are much reduced in number in male. One female has two pairs of lateral spines of the telson, the anterior of which is some distance behind the middle and the posterior is close to the posterior margin of the telson.

The number of the fused segments of the upper antennular flagellum varies three or four in female, while three in male.

In the antennal scale of male the outer lateral margin is slightly convex and ends in a small spine which barely reaches the end of the anterior margin of the lamella.

As to all the pereiopods conspicuous differences between male and female are hardly found.

The endopod (Fig. 11, *f*) of the first pleopod of male is rather small and narrows distally, failing to reach the proximal third of the exopod; the tip is round with several marginal setae. The appendix masculina (Fig. 11, *g*) is very short with terminally a long seta.

Size. Two males measure 7.5 and 7.3 mm and two ovigerous females 14.8 and 13.5 mm in body length.

Colour. The body is semitransparent with white, and the carapace is dorsally tinged with yellow. The eye is dark brown, and the eggs transparent.

Host. All the specimens were found in the stomach cavities of sponges, *Callyspongia elegans* (Thiele) and *C. confoederata* (Ridley).

Distribution. This species was previously recorded by the present authors from the Amakusa Islands, southern Kyushu, Japan.

Remarks. This species is closely allied to ***Onycocaris amakusensis*** sp. nov., both being obtained from the Amakusa Islands. The authors (Miyake and Fujino, 1967) did deal with them as one, judging from the similarity of the external features of the body and from the occurrences

from the same locality of both the species. Both of the species resemble each other, above all in the shape of the dactyli of the last three pereiopods and of the antennal scale, in the rather stouter first pereiopod than in *Onycocaris quadratophthalma*, and in an acute angle and a strong spine-like projection on the posterodistal corners of the merus and the ischium of the second pereiopods, respectively. These characters are all considered as the important accounts in assigning the species of this genus. However, the second pereiopods appear to be the effective and distinctive point between *O. amakusensis* and *O. callyspongiae*, and this character may probably be constant. To this respect the authors in the previous paper paid little attention and failed to note the differences found between them; the chela of *O. callyspongiae* is on both the sides proportionately smaller and less higher than in *O. amakusensis;* the merus and the ischium of *O. callyspongiae* are narrower than in *O. amakusensis;* the cutting edges of the fingers of *O. amakusensis* are thin and bear only two or three truncated or triangular teeth on the cutting edges, while in *O. callyspongiae* the cutting edges of the fingers are thinly expanded outwards to form serration distally and some truncated teeth proximally, and inside are armed with a row of several strong teeth the portion between both the produced edges being concave throughout the length.

Onycocaris spinosa sp. nov.

(Figs. 13-15)

Material examined. Terasaki, Yoron-jima I., Ryukyu Is., coral reef, in sponge, 1 m deep, July 14, 1968, T. Fujino leg. - 1 ♂ (holotype, ZLKU No. 12056), 1 ovig. ♀ (paratype, ZLKU No. 12057).

Description of holotype (male). The body is rather small, somewhat compressed and smooth. The rostrum (Fig. 13, *a*) is of a short projection with the tip slightly upcurved and triangular in dorsal view, reaching the level of the middle of the eyepeduncle. A dorsal carina, which runs slightly backwards, is obscurely visible.

The carapace (Fig. 13, *b*) is entirely smooth and rather swollen. The anterior margin curving downwards from the orbit is broadly produced forwards, not making an angle nor spine, and then somewhat concave behind the antennal peduncle and downwards to form the anteroventral corner broadly convex. The posterolateral margin is expanded round.

The pleura of the first four abdominal somites are broadly round, while that of the fifth becomes narrow ventrally. The sixth somite is a little shorter than the fifth.

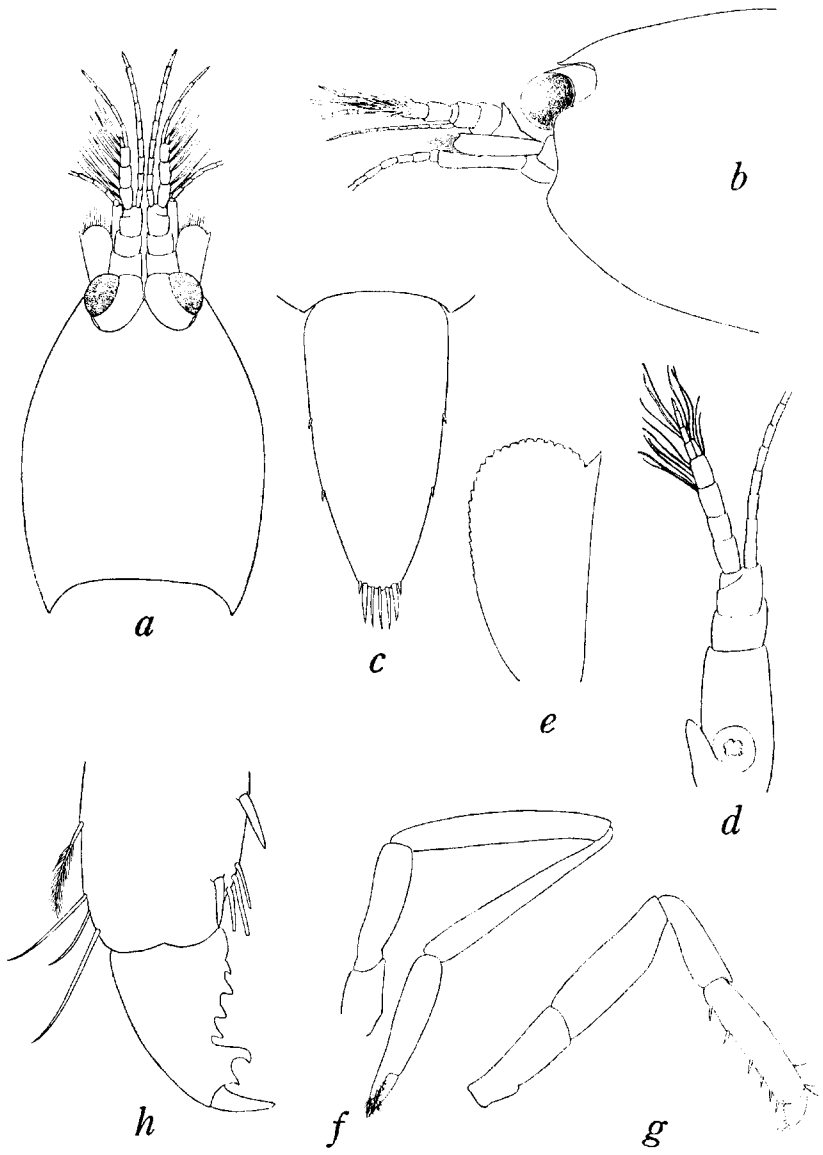

Fig. 13. *Onycocaris spinosa* sp. nov., *a–c*, *e–h*, holotype male ; *d*, paratype female. *a*, anterior part of body in dorsal view, ×19 ; *b*, anterior part of body in lateral view, ×25 ; *c*, telson, ×37 ; *d*, antennule, ×37; *e*, antennal scale, ×74; *f*, first pereiopod, ×25; *g*, third pereiopod, ×25 ; *h*, dactylus of third pereiopod, ×123.

The telson (Fig. 13, *c*) is broad and flat, about twice as long as broad, the lateral margins being a little convex. The posterior end breadth is less than a third of the anterior end breadth. On the lateral margins are placed two pairs of very small spines; the anterior pair is before the middle of the telson, while the posterior a trifle in front of the half point between the anterior pair and the posterior end of the telson. At the posterior terminal margin seven spines are situated; the median three spines are slender and almost equal in length and breadth one another; the intermediate pair is a trifle shorter and stouter than the median; the outermost pair is small and as long as the lateral spines.

The eye (Fig. 13, *a*) is short and quadrate in form, reaching beyond the end of the rostrum but falling short of the end of the basal segment of the antennular peduncle. The anterior margin of the peduncle is straight and transverse to the body. Both the inner sides of the peduncles are closely contiguous each other.

The basal segment of the antennular peduncle (Fig. 13, *d*) is broad; the outer margin is slightly convex, terminating in a minute outer lateral spine. The stylocerite is of a short, broad and leaf-like lobe, the obtusely pointed tip not exceeding the middle of the basal segment. The second segment is broader and shorter than the third. The length of the distal two segments together is distinctly shorter than the basal alone. The fused portion of the upper antennular flagellum consists of three segments. The longer free portion consists of four segments, a little longer than the fused portion, while the shorter is of only one segment.

The basicerite of the antennal peduncle is short without the lateral spine. The carpocerite is long and rather stout, its tip reaching the end of the third segment of the antennular peduncle. The antennal scale (Fig. 13, *e*) is rather short and broad; the outer lateral margin is nearly straight with distally a distinct lateral tooth which scarcely touching the level of the anterior margin of the lamella; the anterior margin is round, and the inner lateral margin somewhat convex. The breadth of the lamella gradually decreases posteriorly.

The molar process (Fig. 14, *a*) of the mandible is fringed along the terminal margin with thickly set strong spinules. The incisor process at the distal end is finely crenulated. The maxillula possesses the palp (Fig. 14, *b*) slightly emarginated. The palp of the first maxilliped (Fig. 14, *c*) is well developed and broad; the epipod is broad and somewhat bilobed. The second maxilliped has the strongly reduced epipod which forms merely a round convexity of the coxa. The ultimate segment of the third maxilliped (Fig. 14, *d*) is as long as and narrower than the penultimate. The antepenultimate segment is much broader than

both the distal segments, more than twice the length of the penultimate. The exopod overreaches the end of the antepenultimate segmnt. A broad and round epipod is present.

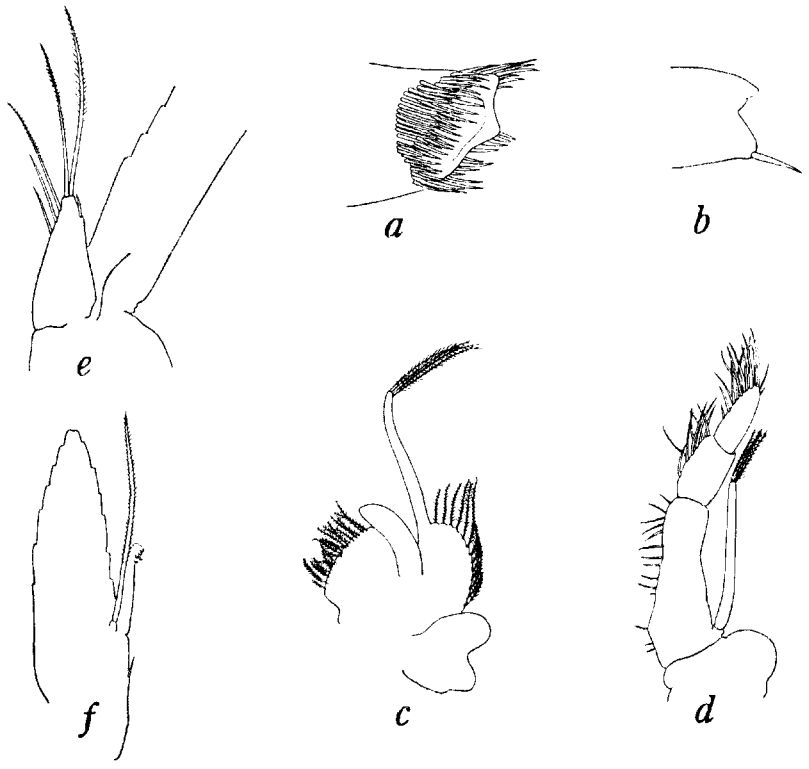

Fig. 14. *Onycocaris spinosa* sp. nov., *a-d*, paratype female; *e*, *f*, holotype male. *a*, distal part of molar process of mandible; *b*, palp of maxillula; *c*, first maxilliped; *d*, third maxilliped; *e*, endopod of first pleopod; *f*, endopod of second pleopod.

The first pereiopod (Fig. 13, *f*) is slender and long, exceeding the end of the antennal scale by the length of the chela, carpus and half of the merus combined. The fingers are slender and straight, decreasing the breadth toward the tips. Short hairs are present near the tips. The palmar portion is subcylindrical and narrows distally, measuring about three times as long as the fingers. The carpus is almost cylindrical and becomes more or less heavier distally, one and a half the length of the chela. The merus is somewhat shorter than the carpus, one and a half as long as the ischium.

The second pereiopods are asymmetrical, both being large and heavy. In the larger pereiopod (Fig. 15, *a*) the movable finger is in

some degree curved; a strong triangular tooth is situated in about the middle on the cutting edge; the distal portion of the cutting edge (Fig. 15, *b*) is finely serrated with terminally a crooked and stout tip. The immovable finger is much higher than the movable, especially near the basal portion; on the cutting edge is placed a broad strong tooth with the rounded tip, which is flanked on both the sides with rather deep and broad concavities, into the proximal one of which the tooth on the movable finger, just above mentioned fits when closed; the distal part of the cutting edge is also minutely serrated with outside laterally a triangular flap, the upper edge of which is crenulated, into the gap between the distal portion and this flap the tip the movable finger fitting. Many tufts of long setae are grown on the surface of both the fingers. The palm is high with the surface somewhat rugged in meshes, as long as one and a half the maximum height; the proximal middle portion is considerably sunken so as to be articulated with the carpus. The carpus is short and cup-shaped, the distal margin being entire but sinuous. The merus is stout and broad and longer than the carpus, the outer posterior border being armed with four strong spines, while the inner posterior border with two smaller ones; the posterodistal corner is bluntly angled in square; the anterior border is smooth and somewhat curved. The ischium is slightly shorter than the merus and a bit narrower, and bears like the merus some vestigial spine-like projection on both the anterior and the posterior borders. The smaller pereiopod (Fig. 15, *c*) rather resembles the larger. The movable finger is not so strongly curved as in the larger, the cutting edge being almost even; on the cutting edge (Fig. 15, *d*) there is a low triangular tooth in front of a short shallow concavity in the middle; the part before the concavity is serrated. The immovable finger is armed on the cutting edge with a much shorter and smaller tooth in the middle than in the larger pereiopod. Some tufts of setae are also placed on the chela. The palm is shallower than that of the larger pereiopod in the proportional height. The carpus closely resembles that of the larger. The outer posterior border of the merus also bears three stout, bluntly pointed spines, while the inner border with two ones. The ischium is provided with some obsolete spines on both the borders as in the larger.

The third pereiopod (Fig. 13, *g*) is relatively stout and short. The dactylus (Fig. 13, *h*) is broad, strongly recurved and becomes slender toward the terminal portion, its length being measured a trifle less than twice the breadth at the base; a strong naked claw is attached to the distal end; the posterodistal border is protruded into a short broad projection, the end of which is concave round so as to form a longer and a shorter teeth, the former is hooked; on the following posterior border from the projection there are four strong spines with

the obtuse apexes. The propodus is about five times as long as its breadth and four times the length of the dactylus; on the posterior border six spinules are present; many fine hairs are dispersed on the surface. The carpus is rather slender, about two-thirds the length of the propodus. The merus is broad and subequal to the propodus in length. The ischium is somewhat shorter than the merus. The last two pereiopods are similar to the third but shorter and narrower than it.

The endopod (Fig. 14, *e*) of the first pleopod is of a small and narrow lobe with setae along the margin. The very small appendix masculina (Fig. 14, *f*) is visible, to the tip of which a stout and long seta is attached.

The uropods are broad and all but as long as the telson. The outer margin of the exopod is a trifle convex with terminally outside a minute spine and inside a movable one.

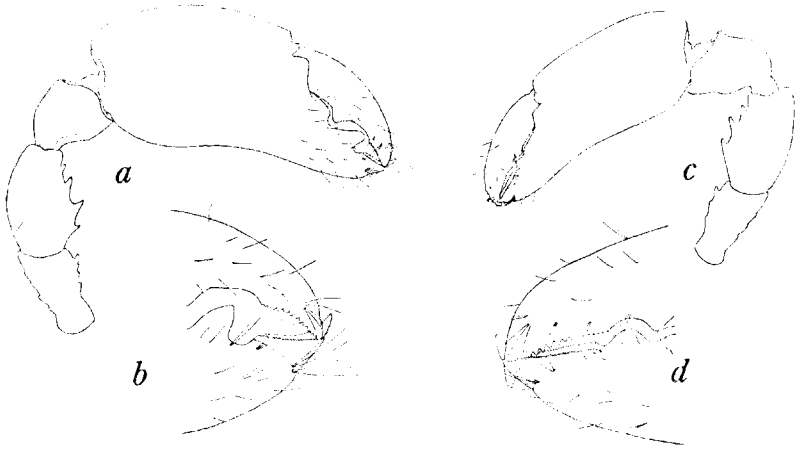

Fig. 15. *Onycocaris spinosa* sp. nov., holotype male. *a*, larger second pereiopod, ×14; *b*, distal part of fingers of larger second pereiopod, ×32; *c*, smaller second pereiopod, ×14; *d*, distal part of fingers of smaller second pereiopod, ×42.

Description of paratype (ovigerous female). An ovigerous female is somewhat damaged but noticeable morphological differences from the male are not observed. The body is considerably larger than in the male. The tip of the rostrum barely reaches the level of the middle of the eyepeduncle. The dorsal carina, as in the male, is obscurely visible. The carapace, although the frontal margin closely resembles that in the male, is much swollen than in the male.

The abdominal segments are broadly expanded for holding ova which

are proportionately small in number and measure about 0.6 × 0.6 mm in diameter.

The posterior terminal spines of the telson are paired for three. The intermediate pair and the median pair are nearly equal in length, but the former is stouter than the latter.

The upper antennular flagellum is fused for five basal segments.

The first pereiopod is slender, and the palmar portion is about three times as long as the fingers. The carpus is a little longer than the merus. Both the second pereiopods are detached and missing. The last three pereiopods are closely similar to those of the male.

Measurements (mm).

	Male (holotype)	Female
Body length	6.0	7.7
Carapace length	1.8	1.9
Telson length	1.0	1.0
Chela of larger second pereiopod length	3.0	—
Chela of smaller second pereiopod length	2.4	—

Colour. The body is entirely transparent, with eggs dark green.

Host. The specimens were obtained in pair from a small sponge living at the base of branching corals.

Remarks. This species is distinctively characterized from any other species of this genus by having some strong spines and several obsolete spines on the posterior border of the merus and both of the anterior and the posterior borders of the ischium of the second pereiopods, respectively. The distal claws of the dactyli of the last three pereiopods are entire without any small accessory teeth, which character is opposed to those of ***Onycocaris amakusensis*** sp. nov., ***O. callyspongiae*** sp. nov., ***O. quadratophthalma*** and also ***O. oligodentata*** sp. nov., in which a series of several or some small teeth are visible there. And also this species constitutes a characteristic feature in the form of the subterminal process of dactyli of the last three pereiopods.

Onycocaris quadratophthalma (Balss, 1921)

(Figs. 16-18)

Pontonia quadratophthalma Balss, 1921, p. 15, fig. 7 - Cape Jaubert, N. W. Australia; Edmondson, 1925, p. 7-Pearl and Hermes Reef, and Wake Island; Edmondson,

1946, p. 250, fig. 150c - Oahu, Hawaii.
Onycocaris quadratophthalma : Holthuis, 1952, p. 150 - No new locality.

Material examined. Terasaki, Yoron-jima I., Ryukyu Is., lagoon, at base of corals, July 13, 1968, T. Fujino leg. - 1 ♂ (ZLKU No. 13708), 1 ovig. ♀ (ZLKU No. 12055).

Cape Jaubert, N. W. Australia - 1 ♀ (Typsaml. 832, Naturhistoriska Riksmuseum, Stockholm).

Kahala, Oahu, Hawaii, May 1931, C. H. Edmondson leg.-2 ♂♂, 3 ovig. ♀♀, 3 sp. (U.S.N.M. reg. no. 67558)[1]

Description of male. The rostrum (Fig. 16, *b*) is of a short and triangular process, not extending to the middle of the eyepeduncle. The tip is directed slightly upwards, the dorsal carina being observed only near the tip.

The anterior margin of the carapace just behind the basicerite of the antennal peduncle, is somewhat expanded forwards to form a low convexity. The anterolateral corner is also broadly convex.

The telson (Fig. 18, *b*) is broad and flat, about twice as long as the maximum breadth. The lateral margins are gently curved and bear two pairs of short but distinct spines; the anterior pair is equal to the posterior in length and situated slightly in front of the middle of the telson; the posterior pair is a little before the half point between the anterior pair and the posterior end. There is a fine spinule with plumose hairs at the median point of the posterior end of the telson, which is flanked on both the sides with two pairs of stouter spines; the inner pair is much longer and stouter than the median spines, the outer pair is short and subequal to the lateral spines in length. Some setae are visible near the posterior margin.

The eye (Fig. 16, *b*) is short and rather quadrate, not reaching the end of the basal segment of the antennular peduncle. The anterior margin of the peduncle is truncated, the cornea being situated obliquely. The inner margin of the peduncle is nearly straight. The ocellus is visible.

The basal segment of the antennular peduncle (Fig. 18, *d*) is broad with the outer lateral margin almost straight, which ends in a strong spine slightly overreaching the middle of the second segment. The stylocerite is broad and forms a leaf-like lobe, the end of which is bluntly pointed, reaching as far forwards as the middle of the basal segment. The second segment is shorter and broader than the third, both these segments together being shorter than the basal. The fused

1) These specimens were previously examined by Holthuis (1952).

portion of the upper flagellum is made up of five segments, the shorter free ramus being very short.

The antennal scale (Fig. 18, *f*) fails to reach the level of the end of the antennular peduncle. The lamella is broad and about twice as long

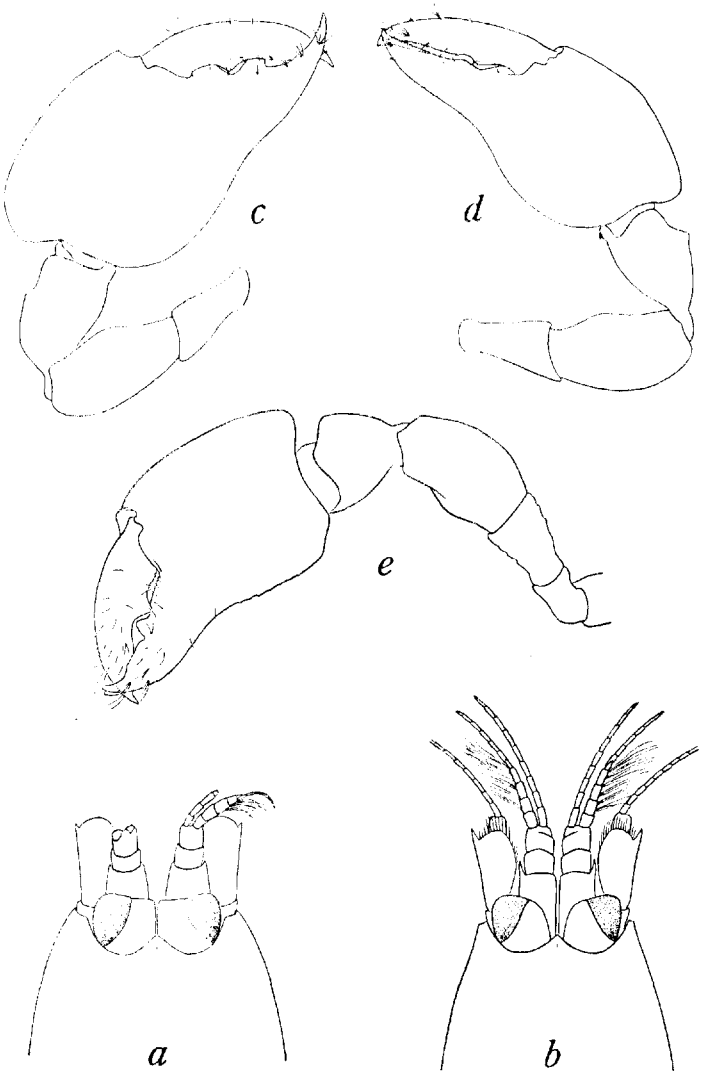

Fig. 16. *Onycocaris quadratophthalma* (Balss), *a*, type female; *b*–*d*, male; *e*, Hawaiian specimen female. *a*, anterior part of body in dorsal view, ×18; *b*, anterior part of body in dorsal view, × 18; *c*, larger second pereiopod, ×14; *d*, smaller second pereiopod, × 16; *e*, larger second pereiopod, ×11.

as its maximum breadth; the anterior margin is curved round and exceeded by the lateral tooth; the outer lateral margin is nearly straight.

The incisor process of the mandible (Fig. 17, *a*) makes a right angle with the molar process; the distal edge of the incisor process (Fig. 17, *b*) is finely crenulated, with terminally a large obtuse tooth; the molar process (Fig. 17, *c*) is rather elongated, the tip of which is fringed along the margin with stout, irregular and acute spines in considerable number. The maxillula (Fig. 17, *d*) has the palp curved, uncleft and truncated distally with a terminal spine; the upper lacinia is broad and provided with several stout spines and plumose setae; the lower lacinia is slender and curved with long setae. The endite of the maxilla (Fig. 17, *e*) is uncleft; the palp is well developed. The endite of the first maxilliped (Fig. 17, *f*) is broad and unilobed; the palp is elongated; the well-developed exopod has a broad and somewhat elongated caridean lobe; the epipod is broad, round and bilobed. The epipod of the second maxilliped (Fig. 17, *g*) is strongly degenerated into a small round projection. The ultimate and penultimate segments of the third maxilliped (Fig. 17, *h*) are subequal in length but the former is much narrower than the latter; the antepenultimate segment slightly narrows distally, more than twice as long as the ultimate; the exopod nearly extends to the end of the antepenultimate segment; there is a broad and round epipod.

The first pereiopod (Fig. 18, *g*) is very slender, exceeding the end of the antennular peduncle by the length of the chela, carpus and merus together. The chela (Fig 18, *h*) is extremely narrow and subcylindrical, the proximal portion being a trifle heavier than the distal. The movable finger is very short and narrow, measuring one-sixth the length of the palm. Hairs are grown near the tips of the fingers. The carpus is slender and cylindrical, a little less than twice the length of the chela. The merus is more or less shorter and stouter than the carpus. The ischium is the stoutest of all the segments, three-quarters the length of the merus.

The second pereiopods are heavy, strong and asymmetrical. The movable finger of the larger pereiopod (Fig. 16, *c*) is somewhat curved and its tip is obtusely pointed; a broad and triangular tooth lies at about the middle on the cutting edge, adjoining on both the sides the shallow and broad concavities. The immovable finger is a little curved and becomes abruptly shallow towards the bluntly pointed tip; there is a broad tooth with the truncated edge in front of the middle of the finger; this tooth is followed by a concavity into which the tooth on the movable finger fits. The height at the base of the immovable finger is more than that in the movable finger. Some tufts of setae are dispersed on the surface of both the fingers. The tips of

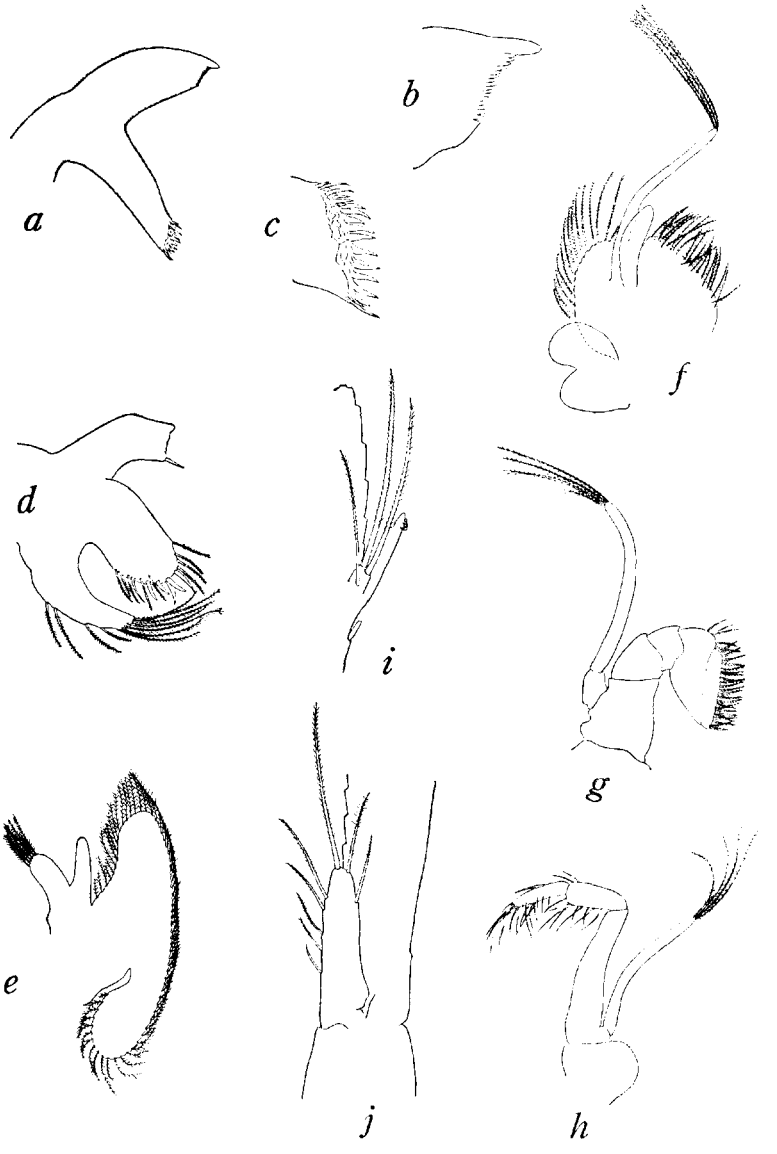

Fig. 17. *Onycocaris quadratophthalma* (Balss), *a-h*, female ; *i*, *j*, male. *a*, mandible ; *b*, distal part of incisor process ; *c*, distal part of molar process ; *d*, maxillula ; *e*, maxilla ; *f*, first maxilliped ; *g*, second maxilliped ; *h*, third maxilliped ; *i*, appendix masculina and appendix interna ; *j*, endopod of first pleopod.

both the fingers are crossed when closed. The palm is very high and flat, more or less longer than its height; both the anterior and the posterior borders are slightly convex; the anteroproximal corner is produced backwards. The carpus is short and conical; the anterodistal part is somewhat scooped out so as to receive the anteroproximal convexity of the palm; the posterior border is entire without spines or rugosities. The merus is stout, subequal to the carpus in length; the posterior border is entire and to some extent convex in the middle. The ischium is shorter than the merus, becoming broader distally. The smaller pereiopod (Fig. 16, *d*) is almost similar to the larger in shape. The movable finger is less curved than in the larger; the tip is strong and bluntly pointed; a broad and shallow convexity is present a little behind the middle of the cutting edge; the distal third of the cutting edge is in minute serration. The immovable finger is much higher than the movable, especially at the base; the cutting edge is all but straight except for a slight concavity, in which the low convexity of the movable finger fits; the tip, which is bifid, is not so strongly curved as in the movable finger. Into the gap made by the division of the tip puts the tip of the movable finger when closed. Some tufts of setae are present near the tips and the cutting edges of the fingers. The palm is flat and high, as long as the movable finger, the anteroproximal border being also produced backwards. The carpus resembles that in the larger and the anterodistal corner is likewise hollowed; both the anterior and the posterior borders are smooth. The merus is like that in the larger. The ischium is somewhat shorter than the merus.

The last three pereiopods are rather stout, short and subequal. The last two pereiopods are a little less stouter than the third. The dactylus (Fig. 18, *k*) of the third pereiopod is broad and recurved, more than twice as long as the breadth at the base; the tip is biunguiculated into a narrow distal claw and subterminal posterior projection, the end of which has a shallow cut. The posterior margin followed by the subterminal projection is slightly convex and possesses several accessory teeth. The propodus is about three times as long as the dactylus; the posterior border bears several spinules and hairs. The carpus is subcylindrical and about twice as long as the dactylus. The merus is strong and as long as the carpus.

The endopod (Fig. 17, *j*) of the first pleopod is rather narrow with marginally long setae. The appendix masculina (Fig. 17, *i*) is very small and bears two long stout setae distally.

Description of ovigerous female. One ovigerous female is much larger than the male, being closely similar each other in the body form. The rostrum is very short, distinctly fails to reach the level of the middle

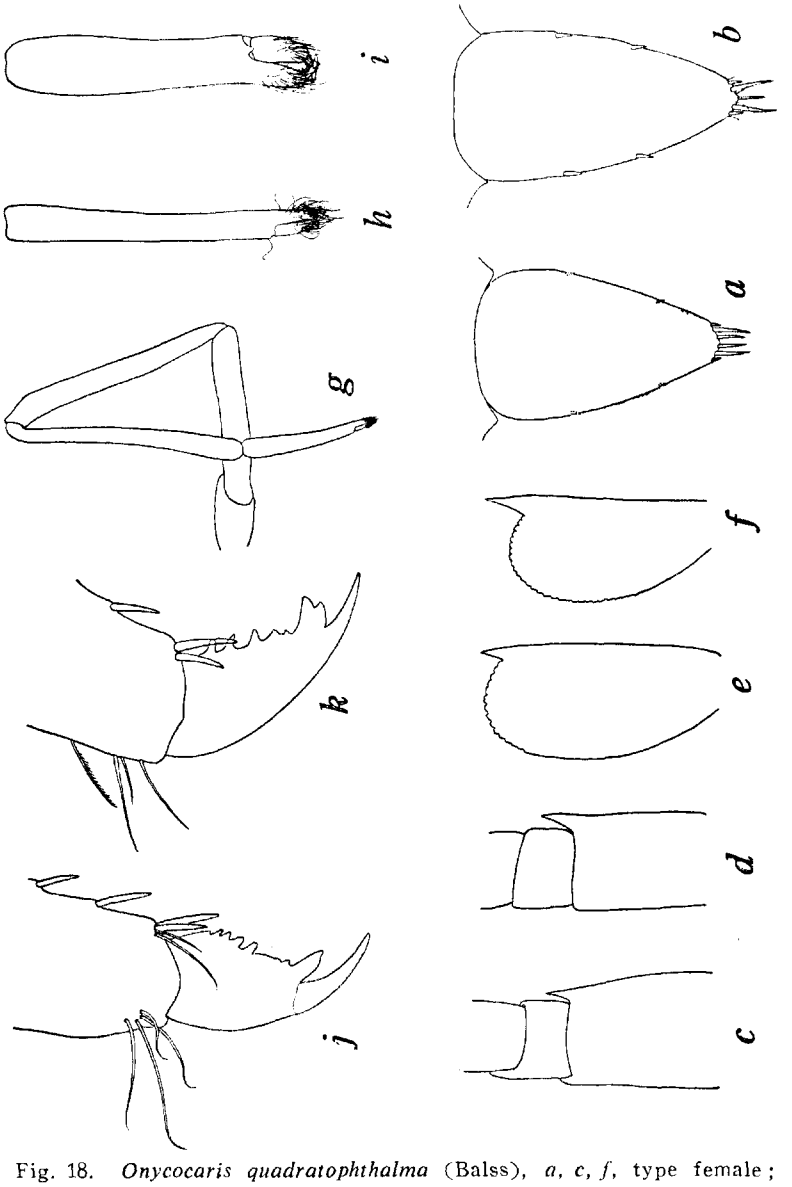

Fig. 18. *Onycocaris quadratophthalma* (Balss), *a*, *c*, *f*, type female; *b*, *d*, *e*, *g*, *h*, *k*, male; *i*, *j*, Hawaiian specimen female. a, telson, ×38; *b*, telson, ×36; *c*, antennule, ×50; *d*, antennule, ×47; *e*, antennal scale, ×47; *f* antennal scale, ×50; *g*, first pereiopod, ×28; *h*, chela of first pereiopod, ×49; *i*, chela of first pereiopod, ×49; *j*, dactylus of third pereiopod, ×79; *k*, dactylus of third pereiopod, ×119.

point of the eyepeduncle. It is nothing else but a small projection. The dorsal carina is visible. The carapace is more swollen than in the male and the inferior orbital portion is produced forwards into an obtuse projection.

The telson on the lateral margins is provided with two pairs of distinct spines, the position of which separates the length of the telson equally. There are three pairs of spines at the terminal end of the telson; the outer pair is short and as long as the lateral spines, and the intermediate pair is somewhat stouter and longer than the median which is plumose.

The upper antennular flagellum is fused for five basal segments. The longer free portion consists of five slender segments which are a bit longer than the fused portion.

The first pereiopod like in the male is extremely slender and the movable finger is very short; the carpus is narrow and cylindrical, about twice as long as the chela; the merus is somewhat shorter than the carpus. The second pereiopods are missing. The eyed eggs are about 0.65×0.5 mm in diameter.

Size. The present specimens measure 6.8 mm (♂) and 10.4 mm (ovig. ♀) in body length. Balss's type measures 9.6 mm. Edmondson's Hawaiian specimens 4.5 to 13.4 mm long (8 specimens).

Colour. The body is transparent, and the eye dark brown. The eggs are dull green.

Host. The specimens from Yoron-jima Island were collected by breaking the base of branching corals in the shallow lagoon.

Distribution. This species is known from N. W. Australia, Oceania, Hawaii and Japan.

Remarks. Unfortunately the type specimen of ***Onycocaris quadratophthalma*** (Balss) is considerably damaged, lacking all the pereiopods and certain parts of the oral appendages. Therefore the condition of the second pereiopods and the dactyli of the amburatory pereiopods cannot be known. Balss's (1921) original description and figures are too short to recognize their characters in detail, too. However, judging from the very slender first pereiopod, the shape of the chelae of the second pereiopods and the round margin at the posterodistal corners of the merus and the ischium without spine-like projections, it is most likely that two specimens from the Ryukyu Islands and Edmondson's Hawaiian specimens are referable to Balss's ***Onycocaris quadratophthalma***, though

with a doubt in the size of the dorsal spines of the telson. And no distinct differences are observed between their materials originated from the different localities, though the teeth on the cutting edges of the fingers of the larger second pereiopod in the Hawaiian specimens are more prominent than in the material from the Amakusa Islands.

The outer lateral tooth of the antennal scale appears to be variable in length. One male (Fig. 18, *e*) of the Hawaiian material bears the very strong lateral tooth which far exceeds the anterior margin of the lamella as in the Japanese material. In the others this tooth is rather well developed but not so strong as the specimens mentioned above, fluctuated from the ones distinctly beyond the anterior margin of the lamella to the ones barely reaching the end of the lamalla. The antennal scale (Fig. 18, *f*) of the type specimen is provided with the rather small lateral tooth which a trifle surpasses the end of the anterior margin of the lamella.

The short rostrum falling short of the middle of the eyepeduncle seems to be considered as the characteristic of this species, but the length of the rostrum also proves to be variable. In two specimens, male and ovigerous female, of the Hawaiian specimens, the rostrum reaches as far forwards as the level of the middle of the eyepeduncle, but in the others including the Japanese ones the rostrum is much shorter and distinctly fails to reach the middle of the eyepeduncle, forming only a small protrusion.

There seems to be also present a fluctuation concerning the proportional length and breadth of the chela of the first pereiopod. The Japanese material and three Hawaiian specimens have the first pereiopod with the excessively slender chela (Fig. 18, *h*) the palmar portion of which measures about seven and a half times as long as broad, and about six times as long as the dactylus. And the middle portion of the chelae of them is narrower than the distal part. On the other hand, one ovigerous female of the Hawaiian specimens, which is to a great degree damaged, bears the very short and broad chela (Fig. 18, *i*) of the first pereiopod. The palmar portion of the chela in this specimen is about four times as long as its maximum breadth, and four and a half the length of the dactylus. Another male specimen from Hawaii also has the rather broader chela with the palm measuring about five times the length of the dactylus.

One ovigerous female of the Hawaiian specimens bears the subterminal process on the posterior margin of each dactylus (Fig. 18, *j*) of the last three pereiopods, which is much longer and more slender than in the others and becomes narrower distally, with the tip bluntly pointed and devoid of such a distinct notch as usually seen in the others (Fig. 18, *k*). These aspects now in question may be considered as

only variations would possibly appear within the category of this species. However, the dorsal spines of the telson of the type specimen are very small, though only one of four spines is preserved and the others are missing, whereas in the other specimens they are much larger. So far as this only preserved spine, which is of very small size, is concerned, there is present a slight doubt of the type being distinctive from the material from Japan and Hawaii, because that such distinct variation as in the characters mentioned above is not observed in the size of the lateral spines of the materials examined.

Discussion

There seem to be present two groups in reference to the number of the teeth on the distal margin of the incisor process of the mandible; in one group, including *Onycocaris monodoa* sp. nov. and *O. stenolepis* Holthuis, the margin bears only few rather distinct teeth, while in the other group, the margin is finely crenulated to form many minute teeth, which are observed to range from 12 up to 23 in number except for the much longer terminal tooth. The number of the incisor teeth and its pertinent species are enumerated below.

2-3	*Onycocaris monodoa* sp. nov.
	O. stenolepis
12-13	*O. oligodentata* sp. nov.
16	*O. quadratophthalma*
20	*O. callyspongiae* sp. nov.
22-23	*O. amakusensis* sp. nov.
	O. spinosa sp. nov.

In many ways *O. amakusensis* sp. nov. and *O. oligodentata* sp. nov. appear to be closely related each other, but as already remarked, the number of the incisor teeth of these species may be a point to be duly considered in order to distinguish them. *O. oligodentata* shows the intermediate status between both the extremities in the number of the teeth. The molar process of *O. monodoa* and *O. stenolepis* is stout and the calcified end is cleft into two strongly produced processes and is devoid of spines or spinules. On the other hand, the other species each has the process more elongated and more slender distally with spines or spinules thickly settled round the tip. As to the mandible *O. monodoa* represents the closer similarity to *O. stenolepis* than to the other members. The palp of the maxillula is rectangular or slightly curved, the tip being truncated or slightly concave distally with one small spine. The upper lacinia is broader than the lower lacinia, the

latter is somewhat curved. Only in *O. callyspongiae* sp. nov. the lower lacinia is naked without any spines and setae. The upper lacinia of *O. monodoa* makes a right angle with the lower, while in the others they are much closer each other. The endite of the maxilla in all the species is well developed, unilobed and rather broad but *O. oligodentata* in which it is shallowly emarginated. In all the species the epipod of the first maxilliped is well developed, broad and somewhat bilobed. On the other hand, the epipod of *O. oligodentata* and *O. callyspongiae* is rather rectangular and unilobed. The endite is broad and unilobed. The palp is developed, especially in *O. spinosa*. The epipod of the second maxiliped of *O. oligodentata* and *O. stenolepis*[1] is wholly absent, and in the others it is strongly degenerated to form a small convexity. The third maxilliped is rather broad. The distal two segments are subequal in length. The exopod slightly exceeds the end of the antepenultimate segment. The epipod is broad and round. The arthrobranch is absent.

Four of the species here dealt with are found in association with sponges, namely, *O. amakusensis*, *O. oligodentata*, *O. callyspongiae* and *O. spinosa*. *O. amakusensis* and *O. callyspongiae* were made clear to have a habit of living commensally with sponges of the genus *Callyspongia* inhabiting the shallow waters southwards from the middle of Japan. In such cases the shrimps are liable to live taking a position on the bottom of the stomach cavities or in the other narrow pores, by judging from the condition of their being found in life. *O. quadratophthalma* has been recorded also to be associated with tubular sponges in shallow waters, though the present specimens were taken by breaking the base of the branching corals, and it is not certain whether they were living in sponges or with other animals. Unfortunately, the commensal hosts of *O. monodoa* and *O. stenolepis* are unknown, the former was put out from the cracked mass of the bases of corals.

Pontoniid shrimps have so far been known to be associated with sponges, distributing among the genera, *Periclimenes* Costa, *Periclimenaeus* Borradaile, *Anchistioides* Paulson and *Typton* Costa, besides *Onycocaris* Nobili (Holthuis, 1952). Of these genera, the pertinent species of *Periclimenaeus* amount to at least eleven in number, by adding *P. leptodactylus* Fujino et Miyake, 1968 and *P. odontodactylus* Fujino et Miyake, 1968, recorded from Japan and are the largest in number of the above-mentioned genera. *Periclimenaeus* appears to have a tendency to select the other animals such as gorgonarians and ascidians as the commensal hosts. Many of the genus *Typton* have been recorded to live, if not all, in

1) Dr. L. B. Holthuis kindly informed the authors of the condition of the second maxilliped of this species.

commensal with sponges. In *Periclimenes* only two species, *P. harringtoni* Lebour and *P. impar* Kemp are known with sponges (Holthuis, 1952), many species being freely living and partly commensally with coelenterates and echinoderms.

Onycocaris throughout the species shares some of the morphological features with the genera *Periclimenaeus* and *Typton*. These features are most conspicuous in the body form, rostrum, antennal scale, last three pereiopods and appendix masculina. Holthuis (1951) gave the remarks on the relation between *Periclimenaeus* and *Typton*. He pointed out the similarity of both the genera in the reduction of the size of the antennal scale, though the degrees are considerably different, as well as of the incisor process of the mandible and of the appendix masculina. Such characteristics are recognized also in *Onycocaris*. Like *Onycocaris*, the body of *Periclimenaeus* is nearly cylindrical, being slightly compressed and with the surface entirely smooth without hepatic spine. Such a spine-like projection of the orbital angle as in *O. monodoa* is usually observed in *Periclimenaeus*, though the broadly round margin as some species in *Onycocaris* is never known. The very short simple rostrum as in the most species of *Onycocaris* is not present in *Periclimenaeus*. The compressed and longer toothed rostrum seen in *O. monodoa* shows closer relation to the character of *Periclimenaeus*, in which the rostrum is not so developed as in *Periclimenes* but is armed with several distinct teeth. The short eyepeduncle with the obliquely situated cornea as is represented by *O. quadratophthalma* and the relatives, may not be observed in *Periclimenaeus* but some have the broad and short peduncle with the somewhat obliquely settled cornea. *Onycocaris* also resembles *Periclimenaeus* in the shape of the antennal scale, which is comparatively small, round and oval. The oral appendages of both the genera are rather similar each other. The finely crenulated incisor processes as some in *Onycocaris* is found in *Periclimenaeus rhodope* (Nobili), *P. arthrodactylus* Holthuis and *P. leptodactylus* Fujino et Miyake. Such a few teeth as in *Onycocaris monodoa* and *O. stenolepis* are observed in many species of *Periclimenaeus*. Some species, such as *P. persei* (Schmitt), *P. bermudensis* (Armstrong) and *P. pacificus* Holthuis possess the strongly reduced incisor process, but no species is contained in *Onycocaris* with regard to this point. Like *Onycocaris*, the endite of the maxllia of *Periclimenaeus* is unilobed or bilobed. The epipod of the second maxilliped in *Periclimenaeus* is well developed and so in this point *Onycocaris monodoa* appears to show closer access to *Periclimenaeus* than the others. According to Holthuis (1951), *Periclimenaeus* is provided with a small arthrobranch of third maxilliped, and if this account is constant, *Onycocaris*, which is devoid of it, may be definitely separated from *Periclimenaeus*. The other appendages are closely related each other. In the character of the

second pereiopods *Onycocaris* is markedly defined from *Periclimenaeus*. The pereiopods of *Onycocaris* are almost symmetrical, though the size is equal or slightly unequal. The chela is higher than in *Periclimenaeus*. On the contrary, the pereiopods of *Periclimenaeus* are usually unequal and the larger pereiopod possesses the movable finger with a large truncated tooth which fits in a slit or an excavation on the cutting edge of the immovable finger. However, there is an exception of *P. odontodactylus* Fujino et Miyake which in the larger side the cutting edges of the fingers do not make the tooth or excavation, and edges are thin and crosses when closed. The dactyli of the last three pereiopods in *Onycocaris* show considerable modification among species. And also in *Periclimenaeus* great modification is present, too. Except for *Onycocaris monodoa* and *O. stenolepis*, the other species of *Onycocaris* have the dactyli, the basal portions of which are more or less broader and such a tendency is present in some species of *Periclimenaeus*. In addition, this convexity, as Holthuis (1952) noted, differs from the case of the species belonging to *Coralliocaris* Stimpson and *Conchodytes* Peters. But the subterminal rectangular process and a series of the teeth on the basal broaded portion is not found in *Periclimenaeus*. The dactyli of *Onycocaris* rather reseme those of *Pontonia*. The appendix masculina of *Onycocaris* is very small and provided terminally with one or two long coarse setae, and such case is sometimes present in *Periclimenaeus*.

The species of the genus *Typton* show some common morphological characters to *Onycocaris*. But, already noted, *Typton* is characteristic of the very strongly reduced antennal scale and the entirely lacking the appendix masculina. The oral parts are similar to those of *Onycocaris*. The unequal heavy second pereiopods are to some extent modified among species, but lacking the truncated tooth and excavation on the fingers observed in *Periclimenaeus*. The dactyli of the last three pereiopods are stout and bifid, rather resembling those of *Periclimenaeus* than those of *Onycocaris*. From *Anchistioides* and *Periclimenes Onycocaris* is easily differenciated in many distinctive characters. Of the species of the genus *Anchistoioides* only two species, *A. willeyi* (Borradaile) and *A. compressus* Paulson are known to be in association with sponges. The latter species was previously reported by the present authors (1967) from the Amakusa Islands, Japan in sponges, *Haliclona oculata* (Linnaeus) and *Caminus* sp.

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