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Sadayoshi MIYAKE and Masatsune TAKEDA  
(Zoological Laboratory, Faculty of Agriculture, Kyushu University)

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## On Two Majid Crabs of the Genus *Achaeus* from the Ogasawara Islands (Crustacea, Brachyura)<sup>1</sup>

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The spider crabs of the genus *Achaeus* of the family Majidae inhabit usually rocky bottom, sometimes sandy or muddy bottom of rather deep water. Sakai (1938) enumerated twelve species from the Japanese waters, and according to his excellent monograph, the genus *Achaeus* is most characterized by having no prominent postocular spine in front of the hepatic lobe and duly separated from the allied genus *Achaeopsis*. Recently Griffin and Yaldwyn (1965) reviewed a New Zealand and some Australian species based on the numerous specimens. According to them, the names of two Japanese species, *A. elongatus* Sakai and *A. spinifrons* Sakai should be changed to *A. fissifrons* (Haswell) and *A. lacertosus* Stimpson, respectively. Otherwise, *A. trituberculatus* Rathbun is now admitted to be synonymous with *A. japonicus* de Haan, due to a high degree of variability, especially with respect to the cardiac tubercle. Accordingly, altogether eleven species enumerated below in chronological order are known to date from the Japanese waters.

*Achaeus japonicus* de Haan, 1839 (= *A. trituberculatus* Rathbun, 1894)

*A. lacertosus* Stimpson, 1857 (= *A. spinifrons* Sakai, 1938)

*A. spinosus* Miers, 1879

*A. tuberculatus* Miers, 1879

*A. fissifrons* (Haswell, 1879) (= *A. tenuicollis* Miers, 1886)

(= *A. elongatus* Sakai 1938)

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1) Contributions from the Zoological Laboratory, Faculty of Agriculture, Kyushu University, No. 402.

- A. superciliaris* (Ortmann, 1893)  
*A. suluensis* (Rathbun, 1916)  
*A. pugnax* (de Man, 1928) (= *A. stenorhynchus* Rathbun, 1932)  
*A. robustus* Yokoya, 1933  
*A. brevidactylus* Sakai, 1938  
*A. akanensis* Sakai, 1938

In this paper two species from the Ogasawara (=Bonin) Islands, *Achaeus brevifalcatatus* Rathbun and *A. bcninensis* sp. nov., are described and figured as new to the Japanese waters. The specimens examined including the holotype of the new species are preserved in the Zoological Laboratory, Kyushu University (ZLKU).

The authors are greatly indebted to Dr. D. J. G. Griffin of the Australian Museum for his kind information about the Australian species and his suggestive opinion about the variability with regard to individuals and sexes.

*Achaeus brevifalcatatus* Rathbun, 1911

(Fig. 1)

*Achaeus affinis*, Rathbun, 1906, p. 877 - Molokai I., 110-115 m deep, Laysan I., 105-295 m deep, Hawaii I., 90-95 m deep and Maui I., 100-105 m deep, Hawaiian Is.

*Achaeus brevifalcatatus* Rathbun, 1911, p. 244, fig. 2 - Seychelles, 70-80 m deep.

*Achaeus brevifalcatatus*, Monod, 1938, p. 102 - Gulf of Suez, Red Sea, 70 m deep.

*Description.* The carapace is elongate with a long neck and rather depressed. The regions are demarcated by wide interregional furrows; the gastric median elevation is small, but conical with two long setae at the summit; the gastric lateral elevations are very low and almost obscure; each hepatic projection is conical in dorsal view, projecting only slightly downward; it is tipped with a long seta and two or three spinules, bearing a spinule on its anterior slope; the lateral margin between the orbit and the hepatic projection is provided with a minute spinule at lower level where is nearly the lateral margin of the epistome; the cardiac region has two large tubercles side by side and a much smaller one on the posterior slope, the two tubercles being tipped each with a long seta; a small spine is placed below the anterolateral margin of the branchial region, pointing downward and a little forward and being only slightly visible in dorsal view; a low tubercle is also found just in front of the base of each last ambulatory leg. The true posterior border of the carapace is constricted between the hindmost tubercles.

The rostrum is separated into two lobes by a median V-shaped sinus; the free margin of each lobe is tipped with a small spine, being fringed with short soft hairs. The supraorbital eave is raised, but unarmed and glabrous. The slender eyestalk has a small tubercle on the anterior middle portion and a terminal spinule, each of which is tipped

with a seta; the eyestalk is more or less constricted near the base and the cornea.

The antennular fossae are very large and longitudinally subovate; the antennular basal segment bears five or six minute granules somewhat in a longitudinal row; the inter-antennular septum is well produced in a sharp crest; its anterior portion is somewhat wide and medially excavated; the anterior process of the epistome is also crested as an antennular septum and nearly reached the half way of the fossae; thus the fossae are almost completely separated by the well produced anterior and posterior septa.

The antennal basal segment is slender and armed with a prominent forward-directing spine near the antero-inner angle; the free portion of the antenna is rather sparsely provided with long secondary hairs, being only slightly less than the length of the carapace; the first segment of the free portion is about one-third as long as the second, and hardly beyond the tips of the rostral spines.

The epistome is long, widening posteriorly. The pterygostomial region is almost triangular and armed with a spine at the summit; the spinule is visible in dorsal view between the hepatic projection and the branchial region.

The third maxillipeds almost meet in median line. The antero-inner angle of the ischium is greatly extended anteriorly, while its distal outer half is weakly concave to bear the merus; the inner margin of the ischium is irregularly and minutely toothed, being almost disguised by a fringe of longish hairs; a shallow groove extends longitudinally along the middle of the surface; the inner margin of the groove is furnished with eight or nine equidistant spinules, and the outer margin proximally and distally with a spinule, respectively. The merus is longitudinally subovate and much narrower than the ischium; its inner border is armed proximally with three very prominent spines and distally with a spine, of which the anterior most of the proximal ones are the most prominent; medially the outer surface is shallowly excavated as a longitudinal groove, at the outer proximal margin of which a spine is placed; the antero-external angle is rounded and armed with three spines which are curved upward and inward.

The chelipeds are robust in the larger male. The merus is swollen and subtrigonal; it is spinulated on the inner lower, the outer lower and the upper borders, each spinule being more or less lobiform. The inner border of the carpus as well as the upper border of the palm is fringed and armed with a row of long hairs and spinules; the hairs are directed inward; the outer surface of the carpus is sparsely covered with curled hairs, and proximally with some spinules, of which the most proximal one is very prominent and tuberculated. The palm is stout, somewhat spindle-shaped and nearly smooth only with scant hairs. The fingers are shorter than the palm, leaving a wide gape in their basal halves and meeting at the distal halves; a broad tooth is placed near the proximal end of the movable finger; at the base of the immovable finger a subacute large tooth is present, pointing obliquely upward and fitting with the

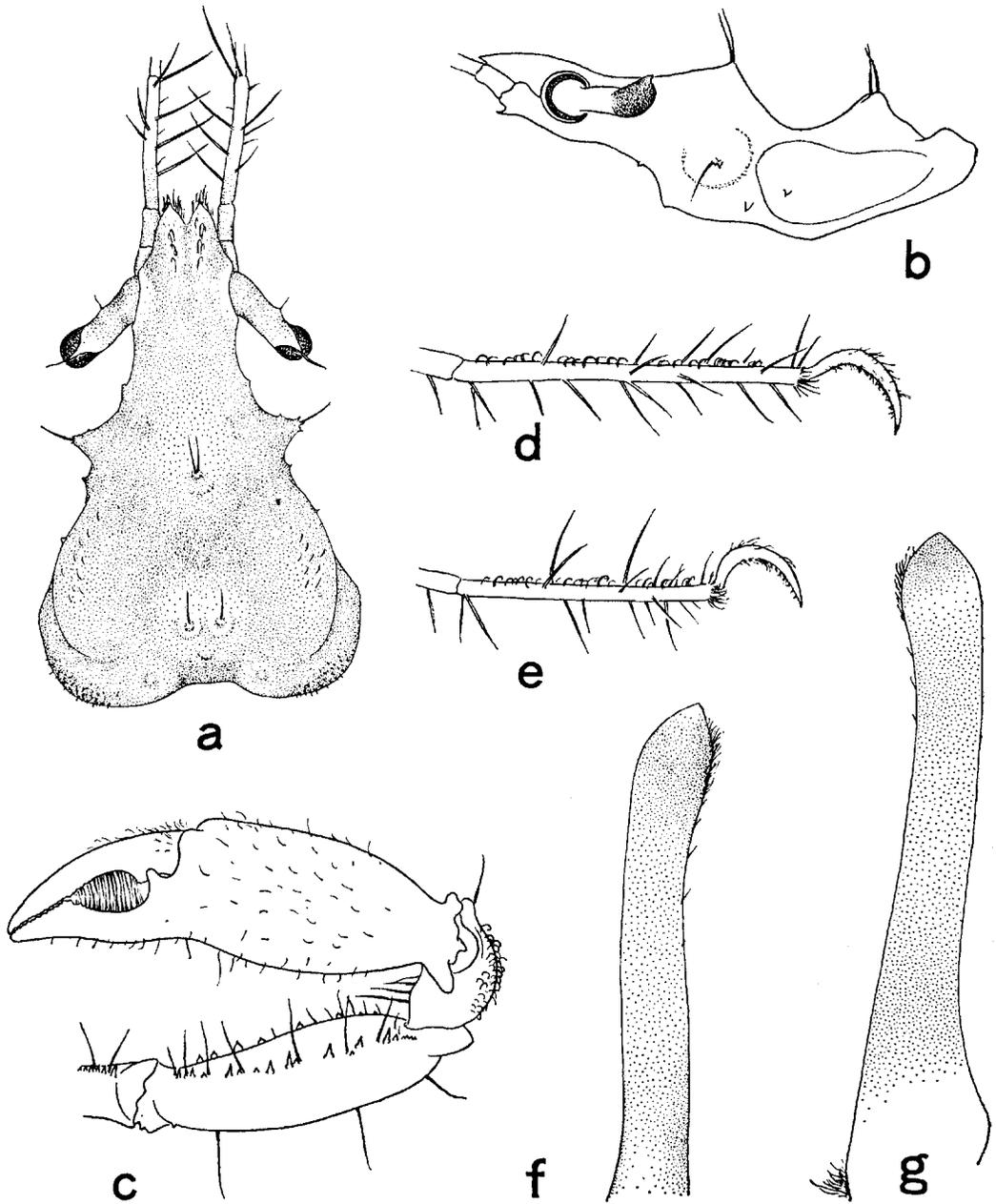


Fig. 1. *Achaeus brevifalcatus* Rathbun, ♂ (No. 1962).  
 a, b, Carapace in dorsal and lateral view,  $\times 12$ ; c, left cheliped,  $\times 12$ ;  
 d, e, distal two segments of right third and fourth ambulatory legs,  $\times 8$ ;  
 f, g, left first pleopod in abdominal and sternal view respectively,  $\times 62$ .

tooth of the movable one; the distal halves of both cutting edges are finely toothed; both fingers are fringed with long hairs on the prehensile edges in the gape; otherwise, the upper border of the movable finger is bordered with a row of long hairs that are directed inward. The chelipeds of the smaller male are slender, but the armatures are nearly like those of the larger male. The spinules on the merus are not lobiform, but slender without broad bases. The fingers are irregularly toothed and meet throughout the whole cutting edges.

The ambulatory legs are exceedingly long and filiform. The dactyli of the anterior two pairs are slender and only slightly curved at the tips, while those of the posterior two pairs are about one-third as long as the propodi and strongly falcated, each being armed with about ten spinules of nearly same size along the posterior border.

In the male abdomen the terminal coalescent segment is rather sharp at the tip and bears a median tubercle. In the larger male the penultimate segment as well as the preceding one is also medially marked by a less prominent median tubercle near the distal end, though in the smaller male the tubercles are rather obsolete. The first male pleopod is simple as represented in Fig. 1, f, g.

*Material examined.* 2 ♂♂, ZLKU No. 1962 and 1964; Muko-shima I., Ogasawara Is., 200 m deep, rocky bottom; Jul. 21, 1938; Hayato Ikeda leg.

*Measurements* (in mm).

|  | ♂ (No. 1962) | ♂ (No. 1964) |
|--|--------------|--------------|
| Length of carapace.....                    | 6.1          | 4.9          |
| Breadth of carapace.....                   | 3.9          | 3.1          |
| Length of rostrum from preocular edge..... | 0.8          | 0.6          |
| Antenna, free portion.....                 | 5.7          | 4.5          |
| First ambulatory leg.....                  | 26.9         | 24.2         |
| (propodus) .....                           | 7.5          | 7.4          |
| (dactylus).....                            | 5.7          | 5.2          |
| Second ambulatory leg .....                | 29.2         | 26.2         |
| (propodus) .....                           | 8.3          | 5.2          |
| (dactylus).....                            | 5.2          | 4.3          |
| Third ambulatory leg.....                  | 20.9         | 17.1         |
| (propodus) .....                           | 5.1          | 4.9          |
| (dactylus).....                            | 1.8          | 1.6          |
| Fourth ambulatory leg.....                 | 19.2         | 16.8         |
| (propodus) .....                           | 4.6          | 4.7          |
| (dactylus).....                            | 1.8          | 1.5          |

*Remarks.* This species is, as already pointed by Rathbun in the original description, characterized by bearing the slender carapace, the stout chelipeds with gaping fingers, the long ambulatory legs and the short falcated dactyli of the posterior two

pairs of the ambulatory legs. It is duly separated from the congeners, *A. lorina* Adams et White and *A. affinis* Miers, the latter of which was recently reduced to synonymy of *A. brevisrostris* (Haswell) by Griffin and Yaldwyn (1965).

*Distribution.* This species has hitherto been known from the Hawaiian Islands, the Seychelles and the Red Sea. It is remarkable that this species occurs in those disconnected localities, and the present record from the Ogasawara Islands may show one of the intervening localities. The bathymetric range is from 70 to 295 m.

*Achaeus boninensis* sp. nov.

(Fig. 2)

*Diagnosis.* Carapace remarkably spinose. Supraorbital eave with some minute spinules, and eyestalk with a laterally-directing spine. Antennal basal segment with a spine near its distal end. Chelipeds slender; both borders of palm with some spines, and fingers irregularly toothed and meet throughout their whole lengths. Dactyli of posterior two pairs of ambulatory legs strongly falcated and about one-third of lengths of propodi.

*Description of holotype.* The carapace is slender and markedly spinose, bearing a long neck. The dorsal surface is rather depressed, well separated into regions by deep and wide interregional furrows, and sparsely covered with curled hairs on the anterior portion and on the lateral surfaces of the branchial regions; in addition, each spine is basally fringed with one or two long straight hairs; the gastric region is armed with three spines; the median spine is almost erect with two long hairs, while the lateral two spines are slightly smaller and directed obliquely forward and outward each with a long hair; two cardiac spines are placed side by side and a little divergent each with two long hairs, being slightly shorter than the gastric median spine; each branchial region is armed with two spines on the upper surface along the furrow; they are more or less lobiform each with an expanded base, the anterior one being slightly directed outward and the posterior one being directed obliquely outward and forward; otherwise, a small tubercle with a prominent and a minute spines projects horizontally and slightly forward from the anterolateral border of the branchial region, and another small spine is anteriorly placed near and lower the posterior one; furthermore, a high prominence is found each just in front of the base of the last ambulatory leg, being tipped with two or three spinules and a long hair; each hepatic projection is very prominent and conical, nearly reaching the greatest breadth of the carapace; it is tipped with a long hair and armed with two or three spinules at the tip and a spinule on the anterior slope; a spinule is found on the lateral surface of the neck at the lower level and at the middle or only slightly near the orbit.

The rostrum is cut into two lobes by a deep median sinus; each lobe is tipped with a slender spine that is strongly curved upward. The supraorbital cave is raised, subparallel and armed with some minute spinules at the middle portion. The eyestalk is long and armed with a sharp, laterally-pointing spine at the middle of the anterior border and with a terminal tubercle above the cornea; the eyestalk is weakly constricted near the base and the cornea.

The antennular fossae are very large and longitudinally subovate; the antennular basal segment bears only two or three minute indistinct granules near its inner border; the inter-antennular septum is rather wide and deeply excavated medially and its lower extremity ends in a granule; the anterior process of the epistome is sharply crested as an antennular septum, but it is short and by far not reached the anterior antennular septum, so that the fossae bear no septum at the middle portion.

The antennal basal segment is slender and armed with a prominent procurved spine on its exposed surface near the antero-inner angle; the free portion of the antenna is scantily provided with long secondary hairs on each side, and only slightly less than the length of the carapace including the rostrum; the first segment of the free portion is short and not reached the tip of the rostrum, while the second is slightly longer than the antennal basal segment.

The epistome is rather long, widening posteriorly. The pterygostomian region is not strongly expanded, and is armed with a prominent spine at the middle way of the outer margin; the spine is visible in dorsal view between the hepatic projection and the branchial region.

In the third maxilliped, the antero-inner angle of the ischium is strongly produced anteriorly, and its inner margin is minutely toothed throughout the whole length; a longitudinal shallow groove is present at the middle of the surface; the inner margin of the groove is armed with a row of eight or nine spines, and the outer margin with a row of three spines. The merus is longitudinally subovate and much narrower than the ischium; there is a row of spines just inside the inner margin, the distal spine of which is very prominent; the surface is impressed by a longitudinal shallow groove, and armed with a spine proximally; the antero-external angle is not produced, but slightly raised and armed with three procurved spines.

The chelipeds are rather slender and furnished with long hairs and spines. The merus is roughly trigonal; its upper border is rather rounded with about two rows of granules; its outer lower border is armed with two distant long spines and some long hairs, while the inner lower border is sharp and fringed with five or six slender spines and a row of long hairs. The carpus is almost smooth only with sparse curled hairs and some long hairs, and with a spinule at the outer proximal portion; its inner margin is armed with two distant spines and with some spinules near the proximal end. The plam is compressed and its outer surface is medially marked by a low longitudinal ele-

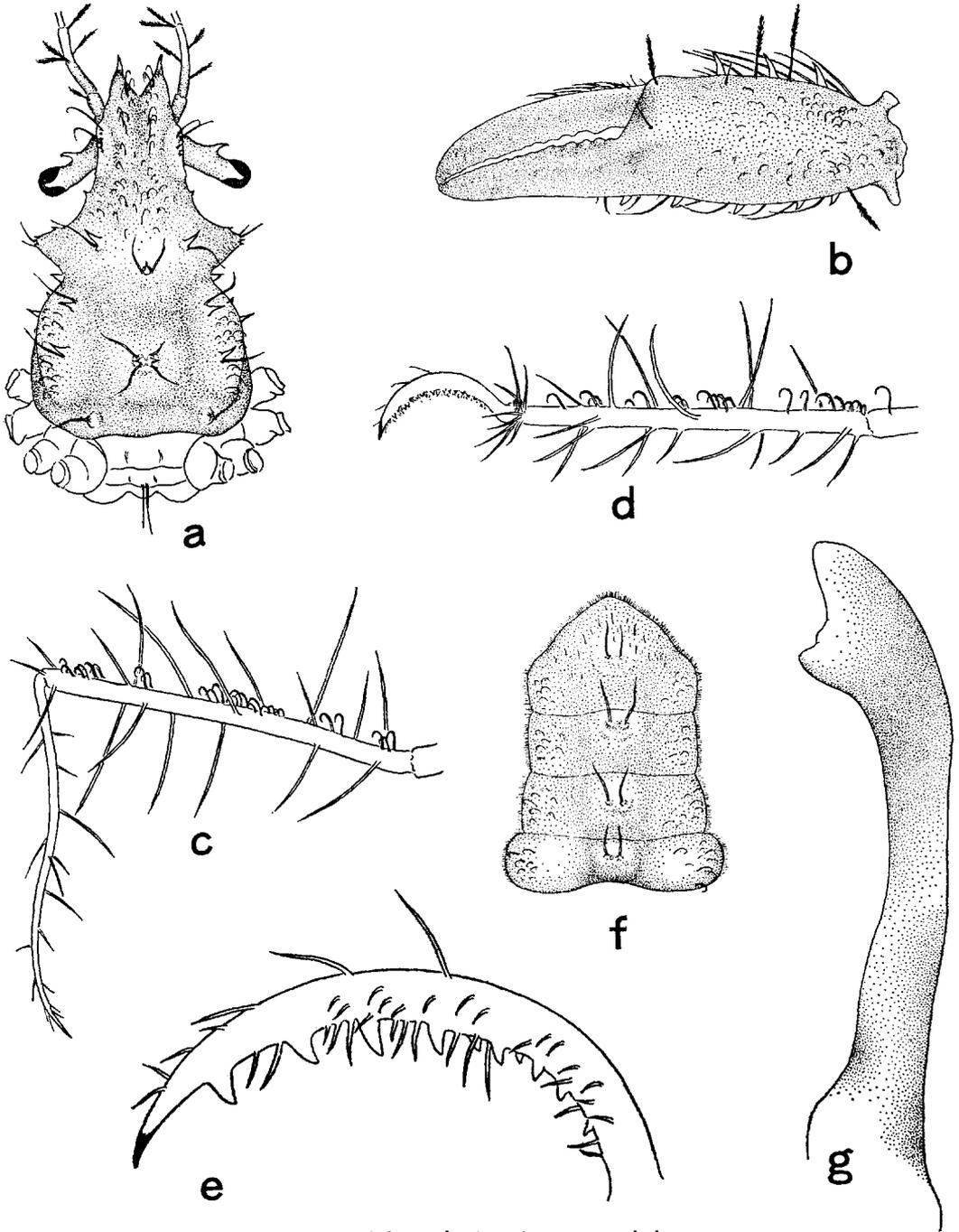


Fig. 2. *Achaeus boninensis* sp. nov., holotype.

a, Carapace in dorsal view,  $\times 10$ ; b, left chela,  $\times 14$ ; c, distal two segments of left first ambulatory leg,  $\times 10$ ; d, the same of left third ambulatory leg,  $\times 14$ ; e, dactylus of the same leg,  $\times 56$ ; f, distal four segments of abdomen,  $\times 14$ ; g, left first pleopod in abdominal view,  $\times 56$ .

vation; the upper border is armed with three long equidistant spines, and the lower border with several, more or less equidistant spines; both borders are otherwise fringed each with a row of long hairs that are directed inward. The fingers are toothed and meet throughout the whole lengths; the outer surface of each finger is impressed by a longitudinal shallow depression; the upper border of the movable finger is truncated along more than half the length.

The ambulatory legs are filiform and provided with long straight hairs and curled hairs; the first pair is the longest of all. The dactylus of the first ambulatory leg is only slightly shorter than the propodus, while that of the second ambulatory leg is considerably shorter; each dactylus of the first and second ambulatory legs is slightly curved at the middle and near the tip. The third ambulatory leg is longer than the fourth; both dactyli of the third and fourth pairs are strongly falcated and about one-third or slightly more as long as the propodi, each being armed with eight to ten spinules along the posterior border.

The sternum is deeply excavated anteriorly on each side of the median elevation; the posterior two sternites carrying the first and second ambulatory legs are provided each with a spine associated with a hair on each side of the abdomen. In the abdomen the terminal coalescent segment is rather sharp at the tip; all the segments are medially marked each by a low tubercle and two hairs. The first pleopod is flattened and bears a fleshy transparent prominence near its inner distal end.

*Material examined.* 1 ♂ (holotype), ZLKU No. 1963; Muko-shima I., Ogasawara Is., 200 m deep, rocky bottom; Jul. 21, 1938; Hayato Ikeda leg.

*Measurements* (in mm).

|  |      |
|--|------|
| Length of carapace including rostral spines..... | 5.4  |
| Breadth of carapace .....                        | 3.3  |
| Length of rostrum from preocular edge.....       | 0.9  |
| Antenna, free portion.....                       | 3.8  |
| First ambulatory leg.....                        | 19.6 |
| (propodus) .....                                 | 5.6  |
| (dactylus) .....                                 | 5.0  |
| Second ambulatory leg .....                      | 17.2 |
| (propodus) .....                                 | 5.1  |
| (dactylus) .....                                 | 3.4  |
| Third ambulatory leg.....                        | 14.6 |
| (propodus) .....                                 | 4.3  |
| (dactylus) .....                                 | 1.5  |
| Fourth ambulatory leg .....                      | 13.6 |
| (propodus) .....                                 | 3.9  |
| (dactylus) .....                                 | 1.4  |

*Remarks.* The new species is closely related to *A. inimicus* Rathbun 1911, and readily distinguished from all the other members by the spines on the carapace. *A. inimicus* was originally described only on a female from Mauritius, 180-360m deep, and afterwards by Buitendijk (1939) was reported a female from the Celebes Sea, 72-80m deep. It may be possible that the male is somewhat different from the female in the general contour of the carapace as usual case in *Achaeus*. As remarked above, the less convex slender carapace and the long neck and ambulatory legs may be proper to the male characteristics. *A. inimicus* is, however, said that the supraorbital cave is armed with a prominent spine directed a little outward and forward, and the eyestalk is armed with a few spinules on the anterior surface, and also that the basal antennal segment is spinulose with two larger distal spinules. In the present male, on the contrary to those features, the supraorbital cave is armed with some spinules, the eyestalk is armed with a prominent spine, and the antennal basal segment bears only a spine near the distal end. Moreover, the free portion of the antenna is much shorter than half the length of the carapace in *A. inimicus*, while that of the present species distinctly exceeds half the length of the carapace. In *A. inimicus* the dactyli of the posterior two pairs of the ambulatory legs are long in relation to the propodi, i. e. only slightly shorter than the propodi. In the present species, however, the dactyli of the posterior two pairs are about one-third, or slightly more, the length of the propodi.

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