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# A New Species of Marine Harpacticoid Copepod of the Genus *Zausodes* from the Bonin Islands

By

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(With 6 Text-figures)

The present paper deals with a new species of the genus *Zausodes* C.B. Wilson, 1932 (Harpacticoida, Harpacticidae) from Chichi-jima Island in the Bonin Islands, southern Japan, as the fourth report from my faunistic study carried out previously at the Bonin Islands (Itô, 1975, 1977, 1978). This is the first record of the genus from Japan.

The material was collected from the bottom sediment, which consisted of coarse sands with broken shells and corals, at very shallow depths off Miyanohama in an inlet located on the north of Chichi-jima Island. The type-specimens are deposited in the Zoological Institute, Faculty of Science, Hokkaido University.

Before going further, I would like to express my sincere thanks to Professor Mayumi Yamada of Hokkaido University for reading the manuscript.

## *Zausodes biarticulatus* n. sp.

*Female* (Holotype). Body (Fig. 1-1) much depressed dorso-ventrally, being of a shield-like appearance as Peltidiidae-species, about 0.32 mm long excluding rostrum and furcal setae, 0.21 mm in greatest width. A nauplius eye present. Rostrum (Fig. 2-1) demarcated at base, reaching distal end of first antennular segment, with two pairs of fine sensillae. Dorsal surface of most somites delicately areolated (Figs. 1-2, 1-3). Thoracic pleurotergites as well as abdominal integuments thickly sclerotized especially along each outer rim. Genital double-somite (Figs. 1-4, 1-5) about 0.1 mm wide, subdivided by a chitinous suture laterally and ventrally, ornamented with some spinules along each hind lateral edge; genital area (Fig. 1-5) being of a laterally expanded appearance, with two hair-like setulae on each postero-lateral limit. Antepenultimate and penultimate abdominal somites ornamented with spinules laterally. Anal somite 0.06 mm wide; anal operculum not prominent. Furcal ramus a little shorter than wide, furnished with two principal terminal setae, of which the inner is broken off, and

one fine seta arising from each of inner distal edge, outer distal edge, the middle of outer side, and a midway of dorso-outer side. No gelatinous string was detected on the furcal rami (broken ?).

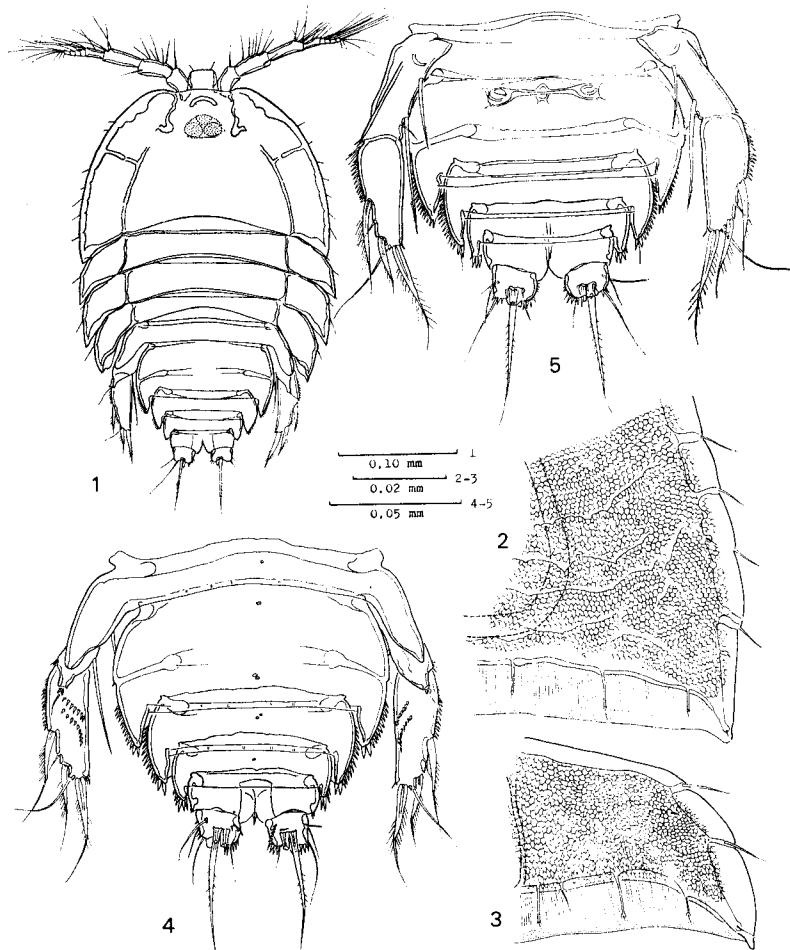


Fig. 1. *Zausodes biarticulatus* n. sp. Female (holotype). 1. habitus, dorsal; 2. integument of cephalothorax; 3. pleurotergite of first thoracic somite; 4. leg 5 and abdomen, dorsal; 5. ditto, ventral.

*Antennule* (Fig. 2-1) eight-segmented; second and third segments subequal in length, more than twice as long as diameter; fourth segment approximately half times as long as preceding one, furnished with an aesthetasc; apical four segments

very short, and these four combined somewhat longer than the fourth but much shorter than the third; all setae naked. *Antenna* (Figs. 2-2, 2-3). Coxa (broken off in the left) short and unornamented. Allobasis about three times as long as greatest diameter, with no particular ornamentation. Exopodite two-segmented;



Fig. 2. *Zausodes biarticulatus* n. sp. Female (holotype). 1. rostrum and antennule; 2. right antenna; 3. left antenna, without coxa; 4. right mandible; 5. exopodite of left mandible; 6. left maxillula; 7. right maxillula.

first segment with two bare setae; second one shorter than the first, terminating in a bare setula accompanied by a very fine hair-like setula and a few spinules. Endopodite shorter than allobasis, armed with one short seta (spine?) and two

close spiniform setae on anterior face; four geniculate spines and three setae on or near distal end. *Mandible* (Fig. 2-4). Praecoxa much sclerotized, well extending inwards; pars molaris well developed; a few spinules arranged near anterior base of coxa-basis. Coxa-basis widened apically, armed with two plumose thick setae on inner distal corner, and two setae, of which the inner is plumose, on distal edge. Exopodite represented by a short subcylindrical segment armed with two setae on its anterior face (see Fig. 2-5), one seta on ventral edge, and terminating in three close setae, one of which is very thick and markedly plumose; a circumambient row of spinules occurring near its tip; a few spinules on the middle of dorsal edge. Endopodite one-segmented, about twice as long as exopodite, armed with two close setae at the middle of ventral edge, and terminating in three juxtaposed and three narrow close setae. *Maxillula* (Figs. 2-6, 2-7). Arthrite of praecoxa armed with two parallel setae on its anterior face; six or seven spines and two spinulose setae on inner edge. Coxal inner process of the left maxillula armed with three setae apically, though five setae on the right. Basal inner process armed with two close setae on its ventral edge and four setae apically. Exopodite represented by a short segment with four setae, one of which is thick and plumose. Endopodite about as long as exopodite, terminating in three narrow setae. *Maxilla* (Fig. 3-1). Syncoxa with three endites; first (proximal) endite with four setae (cf. variability), second and third ones each with three setae apically or subapically. Basis forming a strong claw which is accompanied by a setula dorsally and two setae ventrally. Endopodite represented by three juxtaposed setae. *Maxillipede* (Fig. 3-2). Coxa short and unornamented. Basis approximately three times as long as coxa, with an oblique row of spinules on anterior face, one short seta on a subapical ledge of inner rim. First endopodite segment a little longer than basis, with a straight inner rim; a bare setula arising from a point at four-fifths of the length of inner edge. Second endopodite segment represented by a slender claw which is about as long as previous segment; a small spherical area, which is seemingly not sclerotized, occurring at a point of subproximal anterior face, though neither hair nor seta is detected here.

*Leg 1* (Figs. 3-3, 3-4). Coxa fringed with some very fine hairs along outer margin. Basis about 1.5 times as long as greatest width, armed with a spinulose thick seta at proximal a third of the length of outer edge; a short seta attached onto anterior face near base of endopodite; proximal inner edge spinulose; a vertical row of spinules occurring on anterior surface near outer margin; a few delicate hairs arising from inner edge. Exopodite three-segmented; first segment, including membranous apical part, about two-thirds times as long as basis or more, armed with one thick spinulose seta on subapical outer edge; second segment about 1.4 times as long as the first, armed with one short hairy seta arising from a point at two-thirds of the length of outer edge; third segment very short, armed with two geniculate spines and two arched claws. Endopodite arising from a conspicuous ledge of basis, consisting of two narrow segments; first segment a little longer than first exopodite segment, without any seta; second segment

small, armed with one geniculate spine and one arched claw apically and some fine spinules on outer distal edge. *Leg 2* (Fig. 4-1). Coxa with some spinules on outer distal edge. Outer seta of basis very thick and hairy. Both rami three-segmented. Exopodite: first segment furnished with a serrate hyaline

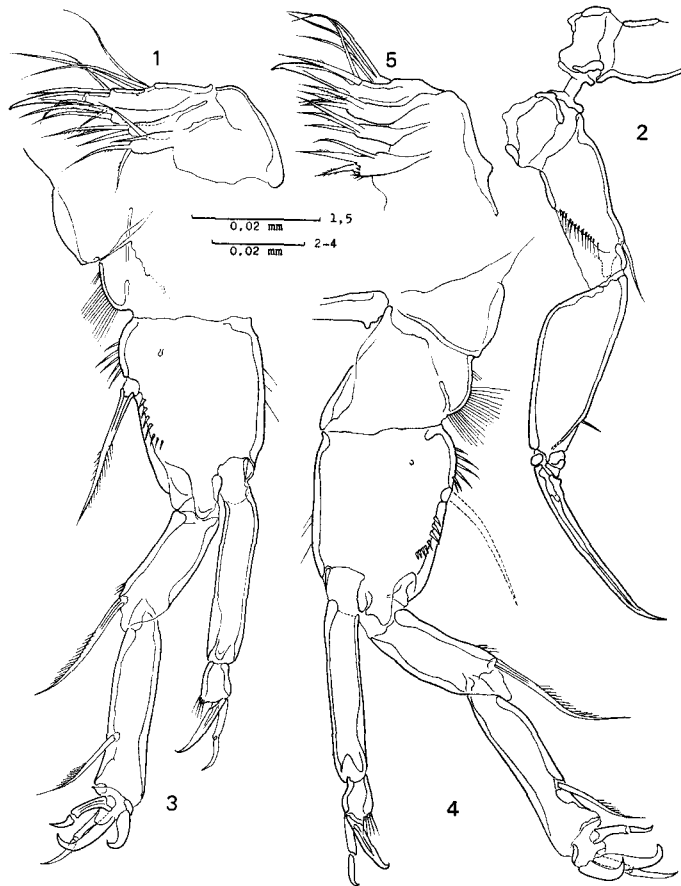


Fig. 3. *Zausodes biarticulatus* n. sp. Female (holotype). 1. maxilla; 2. maxillipede; 3. right leg 1; 4. left leg 1. Female (paratype-1). 5. maxilla.

membrane, armed with one outer spine which is delicately spinulose along its outer side; second segment a little longer than first one, with one bare outer spine and one hairy short inner seta; third segment about 1.3 times as long as the second, with three bare outer spines, one elongate spine and one hairy seta apically, and two hairy inner setae each arising from a point at a quarter of the

length and the middle. Endopodite shorter than exopodite; first segment with no seta, ornamented with a dense row of fine spinules (17 spinules are detected in the leg illustrated) along outer margin; second segment about as long as first one, armed with one plumose inner seta, which extends beyond last segment, and a

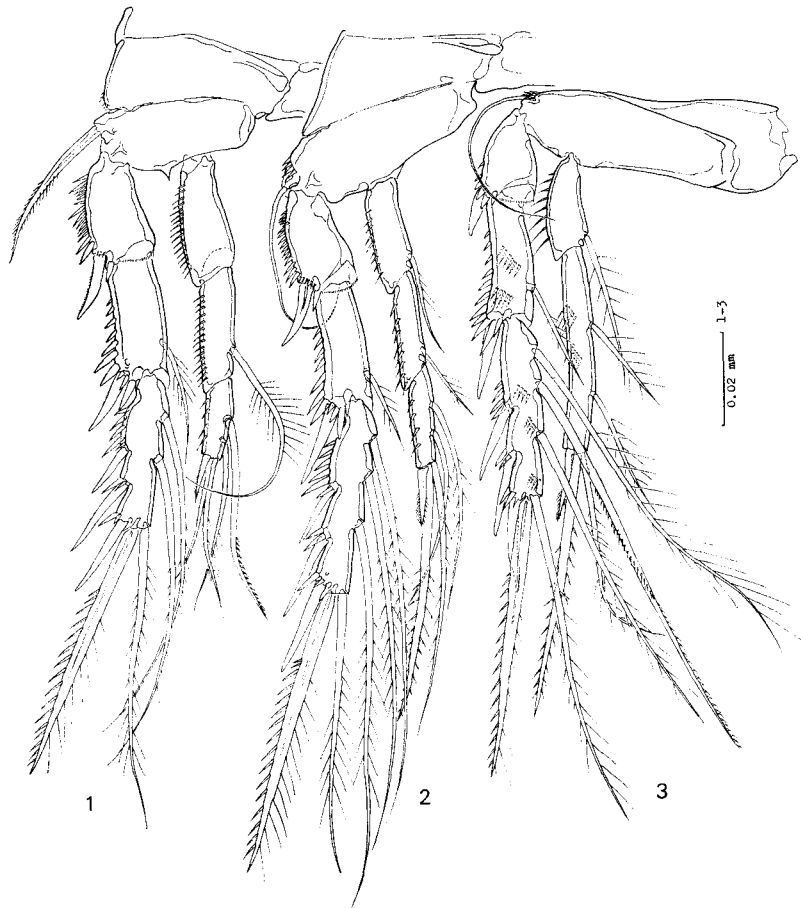


Fig. 4. *Zausodes biarticulatus* n. sp. Female (holotype). 1. leg 2; 2. leg 3; 3. leg 4.

dense row of fine spinules as in preceding segment; third segment about two-thirds times as long as the second, armed with a spinulose short spine on subapical outer edge, two hairy terminal setae, and two inner setae, of which the proximal is rather rigid and spinulose along its distal half. *Leg 3* (Fig. 4-2). Coxa bare. Outer seta of basis narrow, bare, and extending far beyond first exopodite segment. Exopodite almost as in leg 2, but third segment with three inner setae.

Endopodite consisting of three rather narrow segments which are subequal in length; first segment armed with one hairy inner seta; inner seta of second segment short; inner terminal seta of third segment fairly rigid and bilaterally spinulose; first inner seta of third segment hairy, not rigid; first two segments furnished with fewer spinules along each outer margin than those of leg 2. *Leg 4* (Fig. 4-3). Exopodite as in leg 3, but differing in the following structures; second and third segments each furnished with two and three oblique rows of spinules on posterior surface; second inner seta of third segment somewhat rigid and spinulose. Endopodite two-segmented; first segment widened apically, armed with one hairy inner seta, which extends beyond the middle of second segment, and eight narrow spinules along its outer margin; second segment about twice as long as the first, armed with one subapical spine and two terminal setae as in leg 3, furnished with two widely spaced inner setae, and with two oblique rows of narrow spinules on its posterior surface. *Leg 5* (Fig. 5-1). Baseoendopodite represented by a subcylindrical segment (probably being of a triangular section) armed with two widely spaced thick setae, which are spinulose along a short length of apical portion, on inner rim; a bare setula occurring near outer base of the outer of these thick setae; two close hair-like setulae near inner base of exopodite; outer seta short, bare. Exopodite about twice as long as wide, tapering apically, armed with five setae in all; first seta, which arises from the middle of outer edge, thick and hairy; second one bare and short; third one the same as the first in appearance; fourth one bare, elongate; fifth one thickest, almost as the first in appearance; two oblique rows of spinules on posterior (dorsal) surface; some spinules occurring on and near outer edge.

*Male* (Allotype). Body (Fig. 5-2) 0.3 mm long. Rostrum (Fig. 5-3) tapering apically. Abdomen (Figs. 5-4, 5-5) gradually tapering behind. *Antennule* (Fig. 5-3) subchirocer. *Antenna* and *oral appendages* almost as in the female. The exact number of spines on arthrite of maxillular praecoxa was not counted. Inner process of maxillular coxa with three setae. First endite of syncoxa of each maxilla with three setae.

*Leg 1* as in the female. *Leg 2* (Fig. 6-1). Third endopodite segment apically ending in a spiniform process without articulation, armed with three setae along inner edge; first seta short, rather rigid, finely spinulose along apical half of its inner margin; second seta well developed, hairy; third seta probably bare, extending beyond the apical end of the terminal process. *Leg 3* as in the female. *Leg 4* (Fig. 6-2) principally as in the female except for minor differences in spinular ornamentation. *Leg 5* (Fig. 5-4). Baseoendopodites fused with each other as shown in the figure, armed with two inner setae on each. Exopodite furnished with six thick hairy setae of an equal length (two setae of the left leg were broken during the dissection). *Leg 6* (Fig. 5-5) represented by a cylindrical process terminating in a bare setula.

*Notes on the paratypes and variability.* Besides the pair described, two



ovigerous females (body length; 0.36 mm, 0.30 mm) and two males (0.25 mm, 0.26 mm) were dissected. Egg sac is single, depressed dorso-ventrally, containing five eggs. No individual has gelatinous strings on the furcal rami. Although I was unable to examine the armature of some oral appendages because of the difficulty of dissection due to their minute size, each of the coxal inner process of maxillula and the first endite of maxillary syncoxa (see Fig. 3-5) seems to have normally three setae.

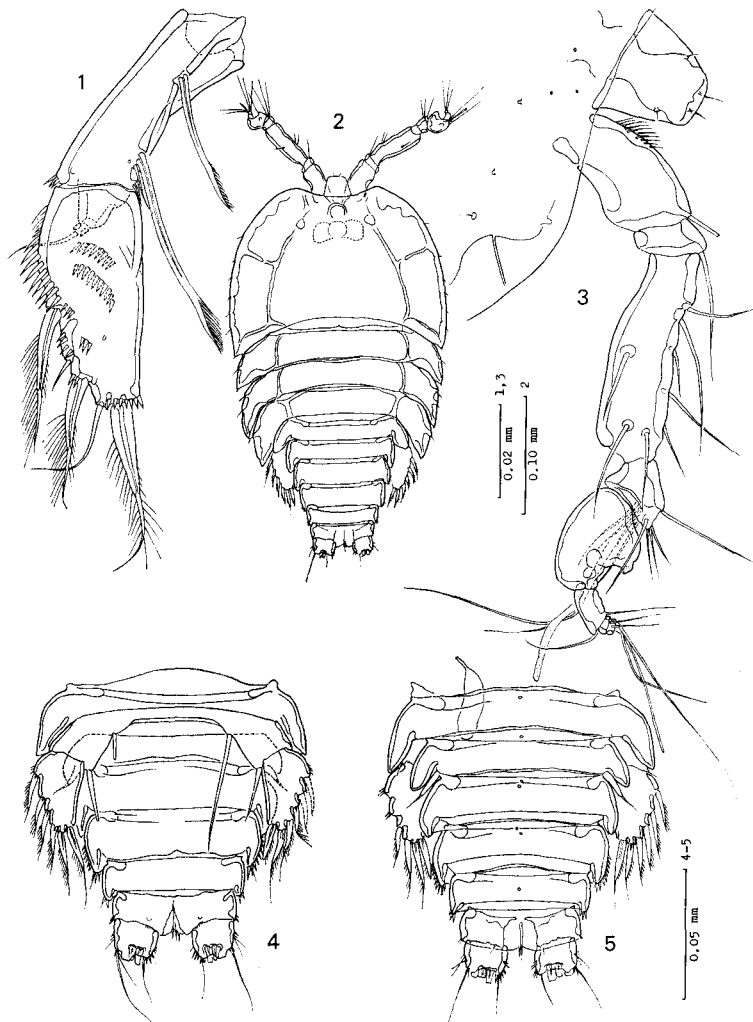


Fig. 5. *Zausodes biarticulatus* n. sp. Female (holotype). 1. leg 5. Male (allotype). 2. habitus, dorsal; 3. rostrum and antennule; 4. leg 5 and abdomen, ventral; 5. ditto, dorsal.

*Remarks.* Up to the present the following eight species have been referred to the genus *Zausodes*; *Z. arenicolus* C.B. Wilson, 1932, *Z. cinctus* Krishnaswamy, 1954, *Z. stammeri* Jakobi, 1954, *Z. limigenus* Jakobi, 1954, *Z. paranaguaensis* Jakobi, 1954, *Z. sextus* Lang, 1965, *Z. septimus* Lang, 1965, and *Z. areolatus* Geddes, 1968. The antennal exopodite of these species is represented by a simple segment, but the present new species has two-segmented exopodite (the trivial name alludes to this). In this respect the present species is easily discernible from all of other congeneric species.

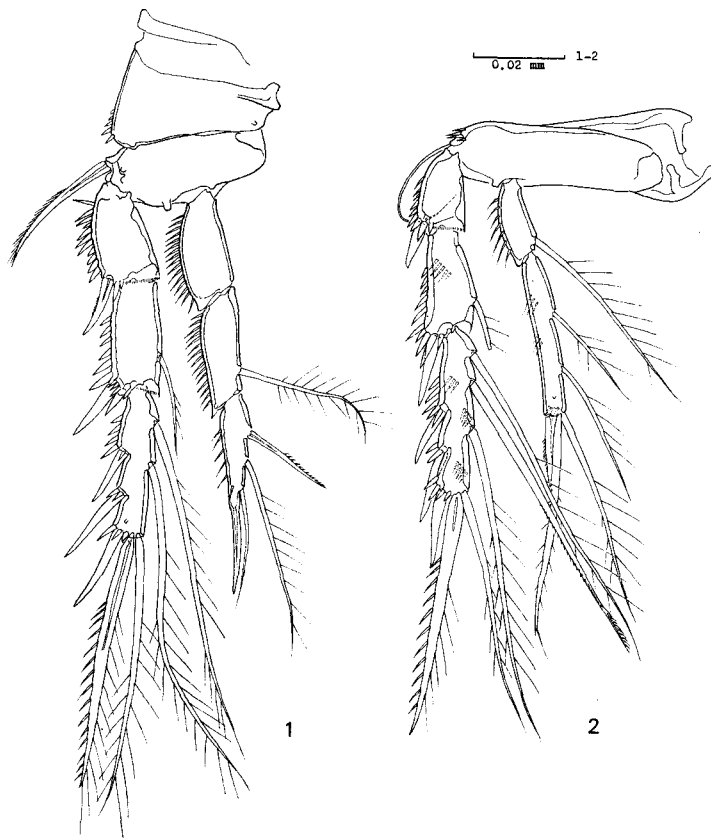


Fig. 6. *Zausodes biarticulatus* n. sp. Male (allotype). 1. leg 2; 2. leg 4.

On the other hand, the new species resembles *Z. sextus*, *Z. septimus*, *Z. stammeri*, *Z. limigenus*, *Z. paranaguaensis*, and *Z. areolatus* in having two-segmented endopodite of leg 4. The new species, however, differs from the latter in the armature of this endopodite; the second segment with five spines and setae in all in the new

species, whilst four or three in the latter. The shape of the leg 5 of female of the new species resembles that of *Z. cinctus*. In the eight previously known species, the species whose leg 2 of the male is fully illustrated are only three, namely *Z. sextus*, *Z. septimus*, and *Z. areolatus*. The males of these three species have no spiniform process on the last endopodite segment of leg 2. In addition, the relative length of the first exopodite segment of leg 1 of the new species is somewhat longer than those of other species. The shape of the exopodite of leg 1 is rather similar to those of *Perissocope*-species. But the new species does not belong to the genus *Perissocope*, because no proximally-born inner seta is present on the first endopodite segment of leg 1.

Considering such unique characteristics as the two-segmented antennal exopodite, the longer first exopodite segment of leg 1, the armature of the last endopodite segment of leg 2 of the male, it is suggested that the present new species occupies a separate taxonomic position within the genus (cf. the definition of the genus given by Lang, 1948, 1965).

*Type-series.* Holotype; non-ovigerous female. Allotype; male. Paratypes; two ovigerous females and two males. Type-locality; Chichi-jima Isl., the Bonin Islands (8-IV-1973; Itô leg.).

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