Bull. Kitakyushu Mus. Nat. Hist. Hum. Hist., Ser. A, **9**: 3–7, March 31, 2011

A new paramunnid isopod of the genus *Heterosignum* Gamô, 1976 (Crustacea: Asellota) from central Japan

Michitaka Shimomura

Kitakyushu Museum of Natural History & Human History,
Kitakyushu 805-0071, Japan

(Received January 16, 2011; accepted February 25, 2011)

ABSTRACT — *Heterosignum bicornis* sp. nov. is described from the deep water near the mouth of Suruga Bay, central Japan. The new species differs from its congeners in having two remarkable frontal processes on the head.

KEY WORDS: *Heterosignum*, Paramunnidae, Asellota, taxonomy, Japan

INTRODUCTION

Gamô (1976) described a new genus and species of Paramunnidae, *Heterosignum mutsuensis*, from Mutsu Bay, northern Japan, based on a single female specimen. Up to now, the genus is represented by six described species: five species occurring in Japanese waters and one species in the Indian Ocean: *H. mutsuensis* Gamô, 1976 from 20–63 m deep (Gamô 1976; Shimomura and Mawatari, 2002); *H. elegans* Shimomura and Mawatari, 2002 from 115–290 m deep (Shimomura and Mawatari, 2002; Shimomura and Ohtsuka, 2005); *H. ohtsukai*, Shimomura and Mawatari, 2002 from 135 m deep (Shimomura and Mawatari, 2002); *H. otsuchiensis* Shimomura and Mawatari, 2002 from 67–89 m deep (Shimomura and Mawatari, 2002; Shimomura, 2006); *H. hashimotoi* Shimomura, 2009 from 498–533 m deep (Shimomura, 2009); *H. unicornis* (Kensley, 1976) from 30 m deep (Kensley, 1976).

Collections of small crustaceans obtained during a survey of deep-sea benthic fauna of central Japan by the TR/V *Tansei-maru* of the University of Tokyo in 2004, contained a new species of *Heterosignum*. In the present paper I report an undescribed species of *Heterosignum* from the upper bathyal zone of near mouth of Suruga Bay, Japan, as a seventh member of the genus.

MATERIALS AND METHODS

The gear used for the collection was an ORI dredge of 1 m span. Samples were suspended on board, and the suspensions containing light particles such as small organisms were decanted through a sieve with a pore size of 0.5 mm. The processed sediment samples were fixed in 10% borate buffered formalin sea-water immediately. Thereafter, the isopod specimens were sorted out under a stereomicroscope and preserved in 70% ethanol. Each specimen was dissected and prepared for observation under a differential interference contrast microscope (Nikon E600) equipped with a camera lucida. Total length was measured from the tip of the head to the end of the pleotelson. The type specimens are deposited in the Kitakyushu Museum of Natural History and Human History (KMNH IvR).

TAXONOMY

Genus *Heterosignum* Gamô, 1976
Heterosignum bicornis sp. nov.
(Figs. 1–2)

Material examined. Holotype: male, 1.57 mm (KMNH IvR 500,226), St. KS-1, Kanesu-no-se Bank, 443.4 m, 30 April 2004, 34°17.2610′N, 138°15.0480′E–34°17.0770′N, 138°14.7340′E, 1 m ORI dredge, T/RV *Tansei-maru*. Paratype: male, 1.47 mm (KMNH IvR 500,227), same data as holotype.

Description. –Body (Fig. 1A, B) width 0.4 times length (excluding lateral spine like processes on pereon and frontal processes on head), widest at pereonite 3, covered with many small granules dorsal-laterally. Head (Fig. 1A, B) 0.3 times as long as wide (including eyestalks), partly fused with pereonite 1. Frontal margin having pair of processes arising from base of anterior margin of eyestalks; frontal processes directed

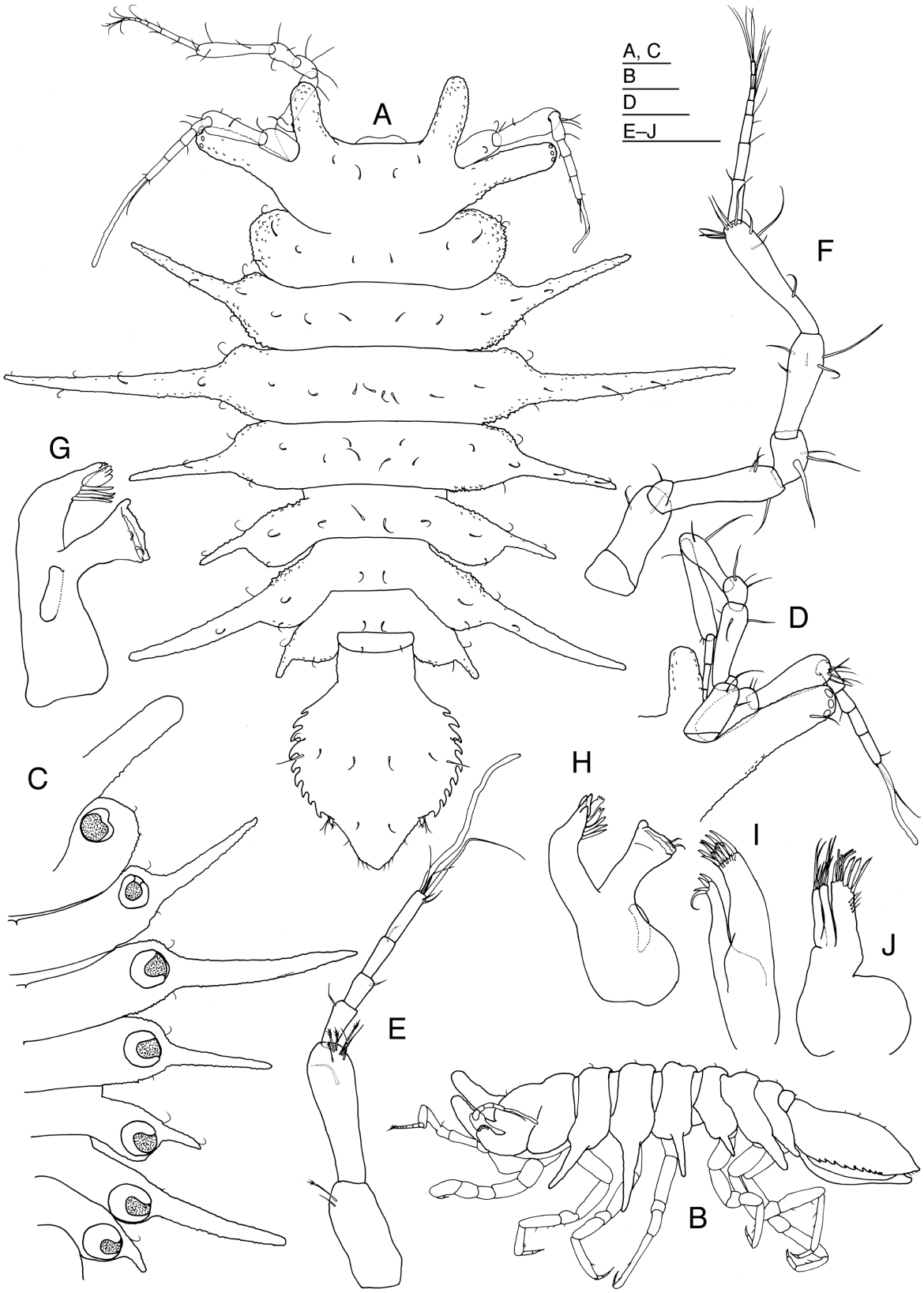

Fig. 1. *Heterosignum bicornis* sp. nov. Holotype, male. A, habitus, dorsal; B, habitus, lateral; C, coxae on pereonites, ventral; D, antennae 1 and 2, ventral; E, left antenna 1, ventral; F, left antenna 2, dorsal; G, left mandible, dorsal; H, right mandible, ventral; I, left maxilla 1, ventral; J, left maxilla 2, dorsal. Scales = 100 μm.

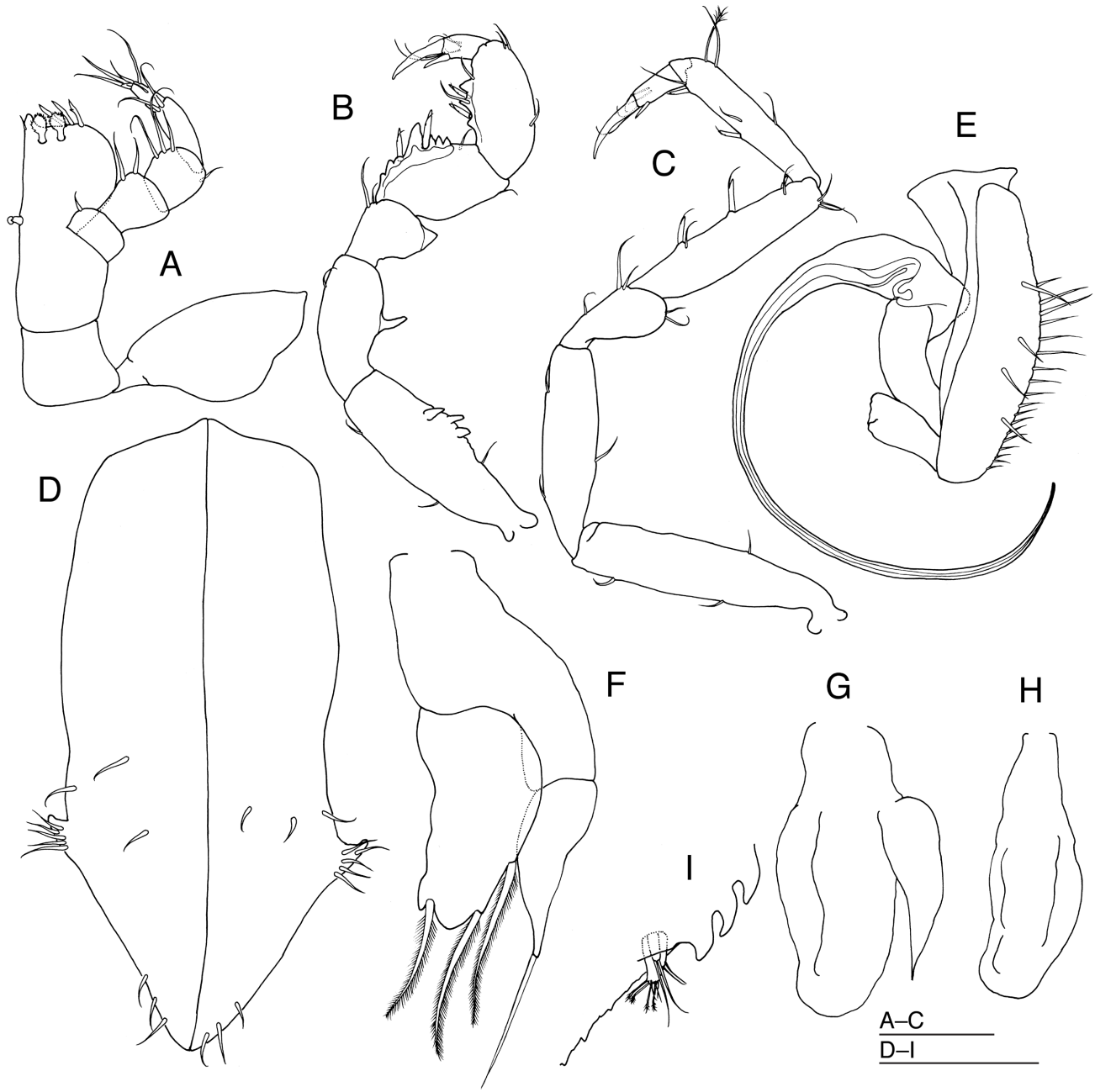

Fig. 2. *Heterosignum bicornis* sp. nov. Holotype, male. A. left maxilliped, ventral; B, left pereopod 1, lateral; C, left pereopod 2, lateral; D, pleopod 1, ventral; E, left pleopod 2, ventral; F, right pleopod 3, dorsal; G, right pleopod 4, dorsal; H, right pleopod 5, dorsal; I, right uropod, dorsal. Scales = 100 μm.

upward; apex rounded. Eyestalks (Fig. 1A) 0.9 times as long as head, each with 3 ocelli apically; long axis angling forward at approximately 27°.

Pereonites (Fig. 1A) scattered with short setae on dorsum. Pereonite 1: lateral margin broadly rounded. Pereonites 2–7 each with spine like processes on bilateral margins. Pleon (Fig. 1A) 0.3 times as long as wide, with pair of fine setae dorsally. Pleotelson (Fig. 1A) 1.3 times as long as wide, with 8 short setae dorsally; lateral margins of anterior part nearly parallel; lateral margins of posterior part denticulate, with 9 denticles per side; posterior margin with fine denticles and fine setae laterally; anterior narrow cylindrical part 0.2 times as long as pleotelson.

Antennula (Fig. 1A, D) articles 1 and 2 combined reaching eyestalk apex; article 1 with simple seta and broom seta distal-medially; article 2 approximately 1.3 times as long as article 1, with simple seta dorsally, 2 simple setae and 4 broom setae distal-ventrally; article 3 approximately 0.4 times as long as article 2, with simple seta distal-medially; article 4 shorter than article 3, with simple seta distal-laterally; article 5 as long as article 3, with simple seta distal-dorsally; article 6 approximately 1.3 times as long as article 5, with 4 short and 1 long simple setae and aesthetasc apically.

Antenna (Fig. 1A, F) articles 1 and 2 combined as long as articles 3 and 4 combined; article 1 trapezoidal in dorsal view; article 2 with simple seta distal-laterally; article 4 with 2 simple setae distal-laterally and simple seta distal-medially; article 5 with 3 simple setae medially; article 6 approximately twice as long as article 5, with 2 simple setae laterally and medially and simple seta ventrally; article 7 approximately 1.3 times as long as article 6, with 4 simple setae medially and 7 simple setae distally. Flagellum with 7 articles; proximal article 1.2 times as long as second article.

Left mandible (Fig. 1G) with 4 robust setae on incisor and 2 short setae on molar process; right mandible (Fig. 1H) with 3 setae and bifid setae on incisor and 2 simple setae on molar process.

Maxillula (Fig. 1I) with 4 robust setae on inner ramus and 12 robust setae and some fine setae on outer ramus. Maxilla (Fig. 1J) with 8 robust setae distally and 4 fine setae medially on inner ramus; 4 robust setae on medial and outer rami.

Maxilliped (Fig. 2A): article 1 of palp with seta medially; article 2 approximately 1.9 times as long as article 1, with 2 setae medially; article 3 as long as article 2, with 3 setae medially and 1 seta laterally; article 4 as long as article 3, with 2 setae distally; article 5 approximately 0.4 times as long as article 4, with 5 setae. Endite with 2 fun-shaped setae, 3 robust setae and fine seta distally and coupling hook medially; epipod subtriangulate, pointed apically.

Pereopod 1 (Fig. 2B): basis with 3 spines and simple seta dorsally and 2 simple setae ventrally; ischium 0.6 times as long as basis, with spine dorsally and simple seta ventrally; merus trapezoidal, half as long as ischium, with spine dorsally and 2 simple setae distal-ventrally; carpus 1.7 times as long as merus, with 5 denticles, 1 spine, 2 robust setae and simple seta on ventral margin and simple seta dorsally; propodus as long as carpus, with 3 denticles, 2 robust setae and 2 simple setae on palm and 3 simple setae dorsally; dactylus with 3 subapical and 2 apical simple setae. Pereopod 2 (Fig. 2C): basis with 1 dorsal and 2 ventral simple setae; ischium 0.8 times as long as basis, with 1 dorsal and 2 ventral simple setae; merus half as long as ischium, with 2 dorsal and 3 ventral simple setae; carpus twice as long as merus, with 3 simple setae distal-dorsally and 3 robust and 2 simple setae ventrally; propodus 0.9 times as long as carpus, with 2 simple and 1 broom setae dorsally and 2 robust and 2 simple setae ventrally; dactylus with 2 subapical and 2 apical simple setae. Coxae (Fig. 1C) without spines and setae.

Pleopod 1 (Fig. 2D): lateral lobes distinctly projecting from midlateral margin, width 0.2 distance to midline; distal projection 0.3 times as long as pleopod total length, forming acute angle, with pointed apices. Pleopod 2 (Fig. 2E): protopod 3.6 times as long as wide, with 4 ventral and 18 lateral simple setae; second article very long. Pleopod 3 (Fig. 2F): second article of endopod 1.2 times as long as second article of exopod. Pleopod 4 (Fig. 2G): endopod 1.6 times as long as exopod. Pleopod 5 (Fig. 2H) 2.8 times as long as wide.

Uropod (Fig. 2I): endopod with 2 simple setae laterally and 2 simple and 4 broom setae apically; exopod with 2 simple setae apically.

Etymology. –The specific name refers to two frontal processes on anterior margin of head.

Remarks. –The present new species is assigned to *Heterosignum* Gamô, 1976 having a set of the following characters: body elongate oval, with a distinct waist between pereonites 4 and 5; pereonites with single lateral spine-like processes; coxal plates invisible in dorsal view on all pereonites; pleotelson anteriorly narrow, cylindrical, posteriorly bulbous, with some teeth on lateral margin; article 3 of antenna 2 elongate, longer than broad; mandible without palp; and molar process of mandible large, cylindrical, distally truncate, with irregular teeth on grinding surface (Shimomura and Mawatari, 2002).

Heterosignum bicornis differs from other *Heterosignum* species by having two remarkable frontal processes on anterior margin of the head. The pereonites 2–7 having long lateral spine-like processes link *Heterosignum bicornis* to *H. elegans* Shimomura and Mawatari, 2002 from Yamaguchi Prefecture, western Japan (type locality) and the Nansei Islands, southern Japan (Shimomura and Ohtsuka, 2005). The present new species is distinguished, however, from *H. elegans* by following characters (those of *H. elegans* in parentheses): eyestalk 0.9 times as long as head (1.5 in male, 1.4 in female), anterior narrow cylindrical part of pleotelson 0.2 times length

in total (0.3), lateral margins of pleotelson with 9 denticles per side (6 or 7 denticles) and head with 2 frontal processes (without processes).

ACKNOWLEDGMENTS

I thank Dr. T. Akiyama of Okayama University and the staff of the T/RV *Tansei-maru* of University of Tokyo, for providing the material and facilities. I also thank two anonymous reviewers for their critical reading of the manuscript. This research was partly supported by the Ministry of Education, Science, Sports and Culture, Grant-in-Aid for Young Scientists (B).

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