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# *Bathynomus undecimspinosus* (Karasawa, Nobuhara & Matsuoka, 1992) (Crustacea, Isopoda) from the Miocene Hidarimatagawa Formation of Southwestern Hokkaido, Japan

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*Key words*: Crustacea, Isopoda, *Bathynomus*, Miocene, Hokkaido, Japan.

## Introduction

Since Imaizumi (1953) first described *Bathynomus* sp. (Crustacea, Isopoda, Flaberifera) from the Miocene Bihoku Group of Okayama Prefecture, it has been known from the lower Middle Miocene deposits of southwest Japan (Imaizumi, 1969; Nishikawa, 1972; Matsuoka & Koide, 1980; Yamana & Yamaga, 1982; Nakagawa, 1987). Karasawa *et al.* (1992), in their review paper of *Palaega* Woodward, 1870 from Japan, described the hitherto known Middle Miocene *Bathynomus* sp. as *Palaega undecimspinosa.*

Wieder & Feldmann (1989) suggested that *Bathynomus* A. Milne Edwards, 1879 was the junior subjective synonym of *Palaega* Woodward, 1870, although Recent ICZN Opinion 1668 showed that *Bathynomus* was given precedence over *Palaega.* According to this Opinion, Obata & Omori (1993) used the generic name, *Bathynomus*, for *P. undecimspinosa.*

The purpose of our paper is to describe *Bathynomus undecimspinosus* from the Miocene Formation, southwestern Hokkaido. This discovery extends the known geographic range of *B. undecimspinosus.*

## Geological Setting

The Kitahiyama area is located in the middle part of southwestern Hokkaido and belongs to the typical Green Tuff region in Hokkaido (Fig. 1). Cenozoic strata are widely distributed in this area and unconformably overlie Pre-Tertiary systems. Cenozoic sequences are divided into the Usubetsu, Futoro, Sekinai, Hidarimatagawa, Kogawatoge, Makomanai and Setana Formations in ascending order (Sagawa & Ueda, 1968; Suzuki & Takahashi, 1969; Yoshii *et al.*, 1973).

The Hidarimatagawa Formation is mainly distributed in the upper stream of the Hidarimatagawa River and attains a maximum 1,000 m in thickness. This Formation is conformably overlain by the Kogawatoge Formation, which is mentioned Upper Miocene volcanoclastics deposits, and unconformably overlie the Futoro Formation yielding the Aniai type flora. The Hidarimatagawa Formation is divided into lower and upper parts from the lithologic characters. The lower part of this formation is composed mainly of conglomerate and sandstone and is associated with alternating beds of sandstone and siltstone. The

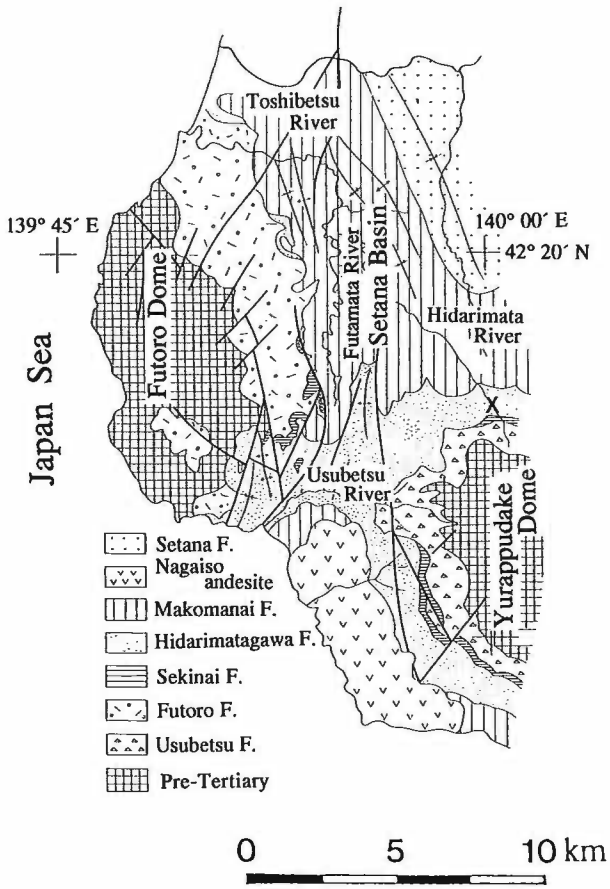



Fig. 1. Geological map of the Kitahiyama area, showing isopod fossil locality in the Hidarimatagawa Formation. (modified from Yoshii *et al.*, 1973)

upper part consists mainly of greenish tuff and andasitic breccia, and considered to "the Green Tuff Formation".

Based upon similarity of lithologic character and stratigraphic relationships, the Hidarimatagawa Formation is correlated with the Babagawa Formation in the Setana area, Kunnui Formation in the Oshamanbe area and Tsurikake Formation in Okushiri Island of southwestern Hokkaido (Yoshii *et al.*, 1973; Yahata, 1989). The Hidarimatagawa Formation is, namely, considered to the Kunnui stage of the Neogene standard sequence in southwestern Hokkaido (Ganzawa, 1992; Suzuki *et al.*, 1992). From the recent biochronologic and radiochrolonogic studies (Masatani & Okura, 1980; Ganzawa, 1992), the Kunnui stage is assigned to early Middle Miocene age (ca. 16-15 Ma) corresponded to the Mid-Neogene climatic optimum (Chinzei, 1986b).

The Kunnui Formation and its equivalents are dominated with marine molluscs (Suzuki *et al.*, 1992). Especially, so-called the Arcid-Potamid fauna reported from the various formations such as Babagawa Formation (Suzuki *et al.*, 1994), Kunnui Formation (Kanno *et al.*, 1988) and Tsurikake Formation (Uozumi & Fujie, 1966). These molluscan faunas include the subtropical elements such as *Vicarya, Vicaryella, Nipponomarcia* and *Hiatula*, and is identical to the Kadonosawa fauna in Northeast Honshu (Chinzei, 1986b).

## Locality and Horizon

The locality of the present report is located in the upper stream of the Hidarimatagawa River (Fig. 1), and exposed medium- to coarse-grained sandstone and conglomerate. The sandstone is massive and partly intercalated with tuffaceous layers. The fossil-bearing horizon is indicated the lower member of the Hidarimatagawa Formation. Only a dissolved cast of a pectinid, *Mizuhopecten kimurai*, occurred from the massive sandstone near the locality. Therefore, faunal characteristics of molluscan fossils from the formation is obscure.

## Description of the Kitahiyama Specimen

*Bathynomus undecimspinosus*
(Karasawa, Nobuhara & Matsuoka, 1992)
(Figs. 2-1, 2)

*Bathynomus* sp., Imaizumi, 1953, p. 84, pl. 12, figs. 1, 2; Imaizumi, 1969, p. N-7, figs. 10a-c; Holthuis & Mikulka, p. 388; Nishikawa, p. 3, fig. 20; Matsuoka & Koide, p. 54, pl. 1, figs. 1-3; Yamana & Yamaga, 1982; p. 4, pls. 2-4; Nakagawa, p. 291, fig. 2.

*Palaega undecimspinosa* Karasawa, Nobuhara & Matsuoka, 1992, p. 6, figs. 5-1-4.

*Bathynomus undecimspinosa* (Karasawa, Nobuhara & Matsuoka), Obata & Omori, 1993, p. 62.

*Palaega* sp., Nomura, Fukuhama & Tabara, 1993, p. 872, fig. 2.

*Repository*: All specimens is in the Department of




Fig. 2. 1, 2. *Bathynomus undescimspinosus* (Karasawa, Nobuhara & Matsuoka, 1992), dorsal view, × 1.0.

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*Description*: Specimens consist of pereonites 5–7, all pleonites and pleotelson. All tergites flattened, punctuate, much wider than long. Pereonites longer than pleonites, subequal in size; laterals directed posteriorly. Pleotelson broadly semicircular, slightly wider than long, with median ridge; posterior margin with large, median spine, other posterior spines wanting.

## Discussion

*Bathynomus undecimspinosus* was established by two type specimens collected from the Yatsuo Group (lower Middle Miocene) of Toyama Prefecture (Karasawa *et al.*, 1992). The species has been found in lower Middle Miocene rocks (i.e. Asagaya Formation, Shimo Formation, Tottori Group, Bihoku Group) of southwest Honshu (Matsuoka & Koide, 1980; Karasawa *et al.*, 1992) (Fig. 3). An additional material was reported from the lower Middle Miocene

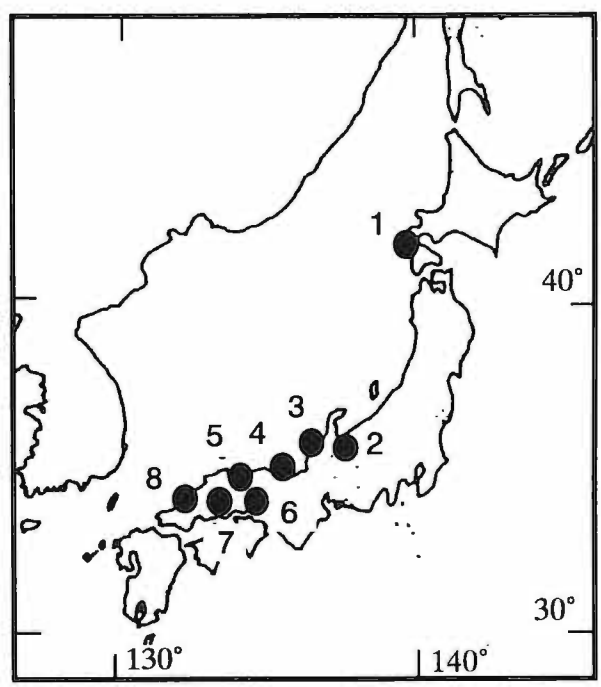



Fig. 3. Geographic distribution of *Bathynomus undecimspinosus*. 1, Hidarimatagawa F.; 2, Yatsuo G.; 3, Asagaya F.; 4, Shimo F.; 5, Tottori G.; 6, Katsuta G.; 7, Bihoku G.; 8, Masuda G.

Masuda Group of Shimane Prefecture by Nomura *et al.* (1993). Obata & Omori (1993) also described *Bathynomus* sp. having a greater affinity with *B. undecimspinosus* from the Lower Miocene Nenokami Sandstone Formation of Saitama Prefecture. The discovery of the present described specimen extends the known geographic range of the species from the Masuda area, southwest Honshu (Nomura *et al.*, 1993) to the Kitahiyama area, southwestern Hokkaido.

Matsuoka & Koide (1980) considered that *Bathynomus* sp. (= *B. undecimspinosus*) was an inhabitant in an lower sublittoral zone, based on benthic foraminifers and molluscs. Obata & Omori (1993) also suggested that *Bathynomus* sp. inhabited the depth of 100–150 m in warm waters. Karasawa (1993) reported the *Carcinoplax antiqua–Trachycarcinus huziokai* assemblage from the *Bathynomus*-bearing locality of Toyama Prefecture, and the assemblage was considered to have lived in a subtropical, lower sublittoral–upper bathyal environment by Karasawa. *Bathynomus doederleini* Ortmann, 1894, a known Recent Japanese species, is distributed in warm Kuroshio current areas (Sekiguchi *et al.*, 1982). Thus it appears that *B. undecimspinosus* preferred a lower sublittoral zone in warm waters. Accordingly, the occurrence of the specimen provides an additional biotic support for the warm current in the early Middle Miocene of southwestern Hokkaido discussed by Chinzei (1986a), Suzuki *et al.* (1992) and Ogasawara & Nagasawa (1992), based on molluscs.

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## 北海道南西部の中新統左股川層より産した *Bathynomus undecimspinosus* (Karasawa, Nobuhara & Matsuoka, 1992) (等脚目)

柄沢宏明・鈴木明彦・加藤久佳

### 要　　旨

北海道の中新統左股川層より産した *Bathynomus undecimspinosus* (Karasawa, Nobuhara & Matsuoka, 1992) (甲殻亜門, 等脚目) を記載する. 本種はこれまで本州南西部の中部中新統から産出が知られていたが, 同時期に北海道南西部まで分布していたことが明らかとなった.