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# A New Record of *Tymolus ingens* Takeda & Tomida, 1984 (Crustacea: Decapoda: Brachyura) from the Miocene Chikubetsu Formation, Northern Hokkaido, Japan

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*Key words*: Crustacea Decapoda, Brachyura, *Tymolus ingens*, Chikubetsu Formation, Middle Miocene, Hokkaido.

## Introduction

Fossil species of *Tymolus* Stimpson, 1858 have been known only from Japan up to now and the records are still rare. They are as follows:

1. *Tymolus kamadai* Imaizumi 1952; Numanouchi Formation, Takaku Group; Fukushima Prefecture (late Early Miocene).
2. *T. itoigawai* Takeda & Tomida, 1984; Shukunohora Facies, Akeyo Formation, Mizunami Group; Gifu Prefecture (early Middle Miocene).
3. *T. ingens* Takeda &Tomida 1984; Kujiri Facies, Yamanouchi and Hazama Member, Mizunami Group, Gifu Prefecture; Oshimojo Formation, Tomikusa Group; Nagano Prefecture (late Early Miocene).

In addition to them, Karasawa (1993) recorded one living species, *T. uncifer* (Ortmann, 1892) from the Upper Pliocene Hijikata Formation, Kakegawa Group of Shizuoka Prefecture, and an unnamed species, *T.* sp. from the Lower Pliocene Sadohara Formation, Miyazaki Group of Miyazaki Prefecture.

The purpose of this work is to describe the specimen of *Tymolus ingens* from the Middle Miocene Chikubetsu Formation in the Haboro area, northern Hokkaido. The discovery of the present specimen extends the known geographic and stratigraphic range of *T. ingens*.

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## Geological setting

The Haboro area is located in the northern part

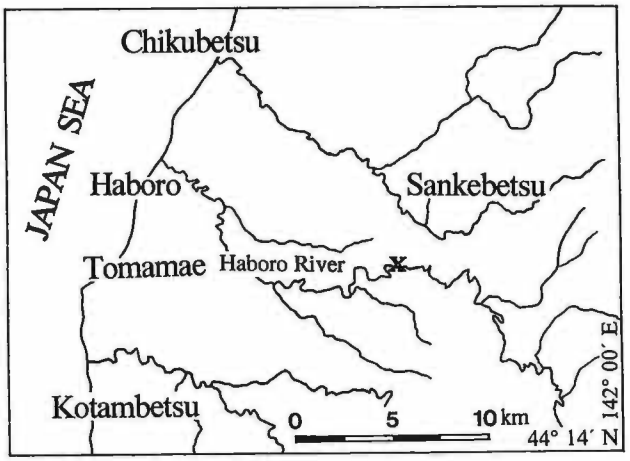



Fig. 1. Map showing the locality of *Tymolus ingens* in the Haboro area.

of central Hokkaido, and Tertiary strata are widely distributed in this area, which unconformably overlies Cretaceous systems. Tertiary sequences are divided into the Haboro, Sankebetsu, Chikubetsu, Kotanbetsu, Chepotsunai, Embetsu and Mochikubetsu Formations in ascending order (Matsuno and Kino, 1960; Yamaguchi and Matsuno, 1963).

The Chikubetsu Formation attains a maximum 400 m in thickness and composed mainly of sandstone and siltstone. The formation is conformably overlain by the Kotambesu Formation and unconformably overlie the Sankebetsu Formation.

Abundant molluscan fossils from the Formation are known as the Chikubetsu fauna (Uozumi and Fujie, 1956) and are characterized by species of cold water inhabitants (Kanno and Matsuno, 1960). The fauna is considered to be equivalent to the Kadonosawa fauna of northeast Honshu in the Middle Miocene time (Chinzei, 1986). In addition, warm water taxa such as *Cultellus*, *Dosinia* and *Sinum* are recognized in this fauna (Ogasawara *et al.*, 1982; Noda, 1992).

Among Tertiary formations in the Haboro area, the age of the Haboro and Sankebetsu Formations was considered to be Middle Miocene (Kanno and Matsuno, 1960), although Maiya *et al.* (1982) suggested that the age is Paleogene by microfossil data. Hoyanagi and Matsui (1985) also reported that K-Ar ages of the tuff layer of the Upper Sankebetsu Formation is 19.3±1.0 Ma. Moreover, recently, Kurita *et al.* (1992) stated that the upper part of the Sankebetsu Formation is assigned to early Miocene (ca. 23-19 Ma) based on planktonic microfossils and radiometric dates. The so-called Chikubetsu-Onishibetsu horizon is correlated to *Denticulopsis lauta* Zone by the diatom biostratigraphy (Maruyama, 1981). Based upon these data, the geologic age of the Chikubetsu Formation is assigned to early Middle Miocene (Tanai, 1982; Fukusawa *et al.*, 1992; Kurita *et al.*, 1992).

## Locality and horizon

*Tymolus ingens* occurred from the lower Member of the Chikubetsu Formation exposed at the middle stream of the Haboro River (Fig. 1). This Member consists of an intensely bioturbated, massive sandstone and contains fossil shells sporadically. *Tymolus ingens* was associated with some molluscs, *Mercenaria yokoyamai, Spisula onnechiuria, Serripes* sp. and *Anadara* sp. The molluscan assemblage exposed at the fossil-bearing locality is recognized as the *Mercenaria* assemblage on the basis of the dominant species, *M. yokoyamai*. According to Noda (1992), the *Mercenaria* assemblage in the Chikubetsu fauna had been lived in an euneritic zone under warm-temperate water conditions.



Fig. 2. *Tymolus ingens* Takeda & Tomida, 1984, Chikubetsu Formation, northern Hokkaido, dorsal view of internal mould of carapace, × 1.5.

The sandstone in this locality is probably compared to bioturbated sandstone facies by Hoyanagi (1992). According to him, this sedimentary facies indicated the lower shoreface to the inner shelf.

Considering the above data, it is presumed that the paleoenvironment of the horizon has been indicated sandy bottom of an upper neritic zone affected by warm water mass.

## Description of the Haboro specimen

Section Podotremata Guinot, 1977
Subsection Archaeobrachyura Guinot, 1977
Superfamily Cyclodorippoidea Ortmann, 1892
Family Cyclodorippidae Ortmann, 1892

Genus *Tymolus* Stimpson, 1858

*Type species*: By monotypy *Tymolus japonicus* Stimpson, 1858.

*Tymolus ingens* Takeda & Tomida, 1984
Fig. 2

*Tymolus ingens* Takeda & Tomida, 1984, p. 43, pl. 13, figs. 1–4; Karasawa, 1993, p. 43, pl. 7, figs. 1–4.
*Dromiopsis*? sp., Zhidkova and Sal'nikov, 1992, pl. 19, fig. 2.

*Material*: MFM83304.

*Description*: Carapace transversely elliptical by deformation. Margins poorly preserved. Dorsal regions divided by deep, broad furrows. Dorsal carapace almost worn off, but tuberculated granules on each regions distinct even on the internal mould. Postfrontal transverse depression distinct. Hepatic region broad, moderately convex. Subhepatic region of the right side preserved; its anterior part obliquely visible from above. Protogastric region subdivided into two longitudinal lobes. Mesogastric region triangular with a tip almost reaching to postfrontal depression. Cardiac region narrow, moderately convex, separated from strongly vaulted intestinal region by a shallow furrow. Epibranchial region narrow, strongly vaulted. An oblique furrow between mesobranchial and metabranchial regions deep, terminating at the lateral end of furrow between cardiac and intestinal regions.

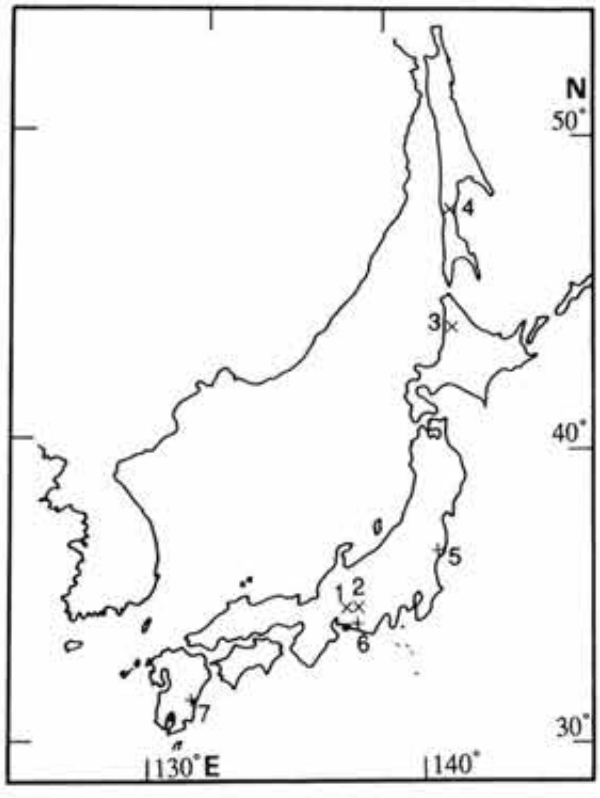



Fig. 3. Map showing the localities of fossil *Tymolus*. 1, Mizunami, *T. ingens*, *T. itoigawai*; 2, Tomikusa, *T. ingens*; 3, Haboro, *T. ingens*; 4, Makarov, *T. ingens*; 5, Takaku, *T. kamadai*; 6, Kakegawa, *T. uncifer*; 7, Miyazaki, *T.* sp.

## Discussion

*Tymolus ingens* was originally described from the Lower Miocene Yamanouchi and Hazama Members of the Akeyo Formation, Mizunami Group (Takeda and Tomida, 1984). After that, Karasawa (1993) reported additional materials from the Kujiri Facies, Akeyo Formation and the Oshimojo Formation (=Awano Formation in his paper), Tomikusa Group. Karasawa (1993) showed that the geologic range of *T. ingens* is limited in the Early Miocene (18–16 Ma).

Nevertheless, the present described specimen occurred the Chikubetsu Formation (Lower Middle Miocene) of northern Hokkaido. Furthermore, *Dromiopsis*? sp. from the Ausinskaya Formation of Makarov, southern Sakhalin figured by Zhidkova and Sal'nikov (1992, pl. 19, fig. 2) is identical to *T. ingens*. The Ausinskaya Formation was assigned to *Denticulopsis lauta* Zone (early Middle Miocene) (Zhidkova and Sal'nikov, 1992). Thus, the coexistence of both specimens extend the known geographic range to the north, northern Hokkaido and southern Sakhalin, and the geologic range to early Middle Miocene. The geographic distribution of *Tymolus* is summarized in Fig. 3.

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## 北部北海道の中新統策別層より *Tymolus ingens* Takeda & Tomida, 1984 (十脚甲殻類) の新産出

加藤久佳・鈴木明彦・柄沢宏明

## 要　　旨

北海道の中部中新統の築別層より得られた *Tymolus ingens* Takeda & Tomida, 1984 を報告する．この標本は築別層下部の浅海相から得られたものである．また，Zhidkova and Sal'nikov (1992) が図示したサハリン南部の Ausinskaya Formation から得られた *Dromiopsis*? sp. は *T. ingens* に同定される．これらの記録は，*T. ingens* は前期中新世の東部瀬戸内区（瑞浪層群・富草層群）ばかりでなく，中期中新世前期には北部北海道・サハリンに分布していたこと示し，*Tymolus* 属の古生物地理を考える上で重要である．


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