

[SHORT NOTE]

A new record of *Zostera asiatica* Miki (Zosteraceae) in Funakoshi Bay, Iwate Prefecture

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A population of *Z. asiatica* was discovered in Funakoshi Bay, which consisted of about 60 vegetative shoots with very wide leaf blades. This is the only one recognizable population of *Z. asiatica* at present on the Pacific coasts of Honshu Island. The distribution of seagrasses through Japan has not been surveyed since 1930s. It is a new record along the coasts of Sanriku. *Z. asiatica* is presently an endemic species which distributes on the coasts of Hokkaido in Japan.

Key words: *Zostera asiatica*, endemism, Funakoshi Bay

INTRODUCTION

Species diversity of temperate seagrass, Zosteraceae, is high in the north-western Pacific including the coasts of China, Korean Peninsula and Japan Islands (Miki 1933). Three species of Zosteraceae distribute in Australia, and seven species occur in the north-western Pacific (Kuo and Aioi 1997), *Zostera marina*, *Z. caulescens*, *Z. caespitosa*, *Z. asiatica*, *Z. japonica* on soft bottom and *Phyllospadix japonicus*, *P. iwatensis* on rocky shores. Among them, *Zostera asiatica* had been reported in Noto, Japan Sea and in the east of Hokkaido by Miki (1933). However, the specimen of Noto was lost and could not be confirmed the past distribution. *Z. asiatica* has not been recorded on the Japan Sea coast after the World War II. However, the distribution of *Z. asiatica* was recently discovered along the coast of Hakodate City in Hokkaido (Omori 1993).

MATERIALS AND METHODS

The survey was conducted by SCUBA diving. *Zostera asiatica* was discovered when the general survey of *Z. caulescens* was conducted on the line transect established in Kirikiri Port, Funakoshi Bay, of the Pacific coast of Honshu Island. A patch of vegetative population of *Z. asiatica* was found by chance at several meter distant from the transect line. The underwater photos of the *Z. asiatica* vegetation were taken and specimens of vegetative shoots were cut off from the rhizome system on June 25, 1999. The morphology of vegetative shoots was compared with *Z. marina*.

RESULTS AND DISCUSSIONS

Vegetative population of *Z. asiatica* was discovered inside of Kirikiri Port, Funakoshi Bay. The locality was showed in Fig. 1. The population of *Z. asiatica* consisted of about 60 vegetative shoots but partially mixed with *Z. caulescens* in the bottom of 5 m deep (Fig. 2-a).

A vegetative shoot of *Z. asiatica* was compared with that of *Z. marina*. Morphological difference could be recognized in the picture. *Z. asiatica* has large leaf blades with the width of 15 mm, more than twice of *Z. marina* (Fig. 2-

b). Only 2 specimens of vegetative shoots were obtained for morphological comparison with *Z. marina*, for not giving disturbances to the small vegetation. The population of *Z. asiatica* was not found during 1998-census, and thus it means that the population had settled in a short time.

Survey on the distribution of seagrasses in the western Pacific was conducted in 1930s (Miki 1933). According it, the distribution of *Z. asiatica* was very limited along the coast of Korea, the southern coast of Sakhalin and eastern coast of Hokkaido. Along the coast of Honshu Island only one point was recorded in Noto, however, the specimen of *Z. asiatica* collected by Dr. Miki, was lost in the herbarium of Kyoto University and only one record of *Z. asiatica* specimen washed up on the beach at Suzu City (Higashide

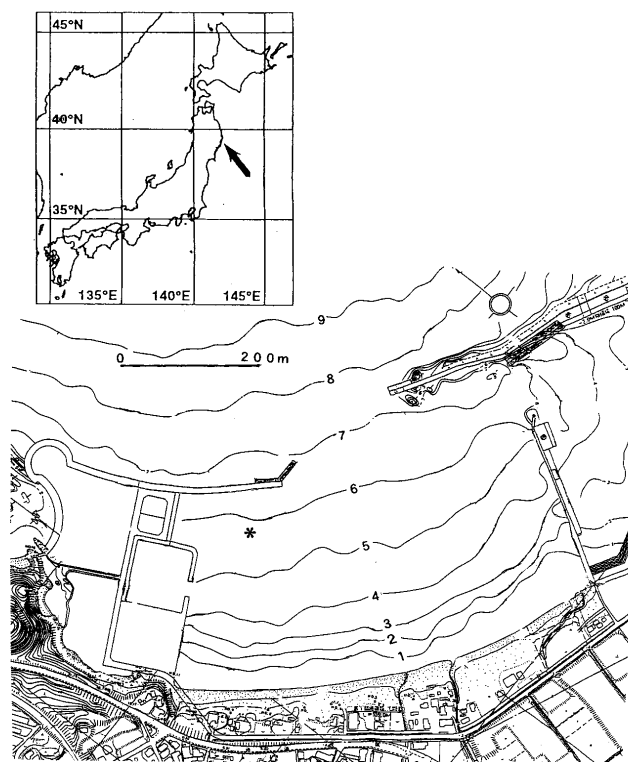


Fig. 1. Map of Funakoshi Bay and the point (*) of *Zostera asiatica* stand discovered inside of Kirikiri Port, Funakoshi Bay.

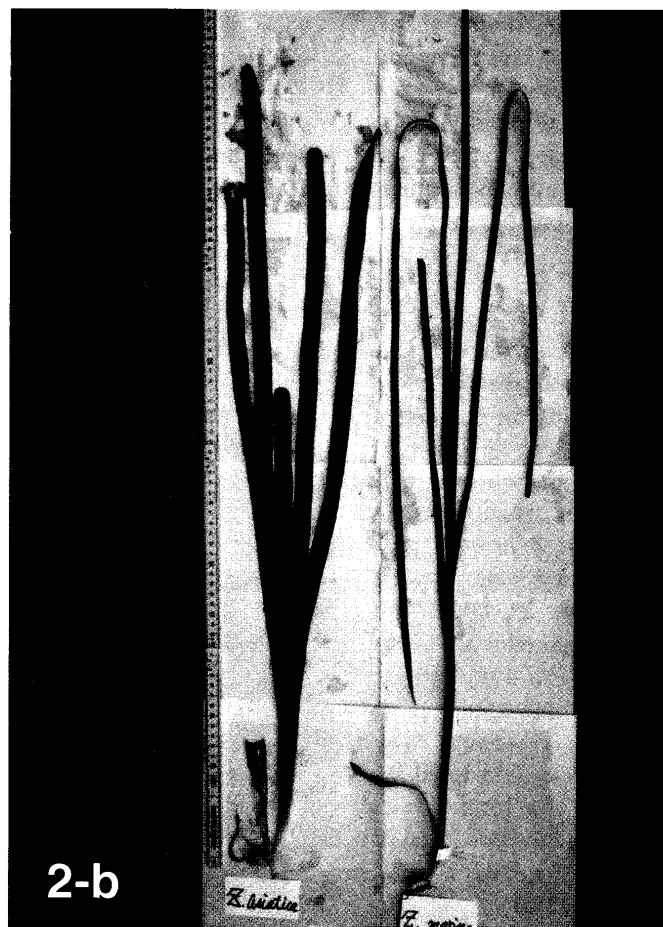
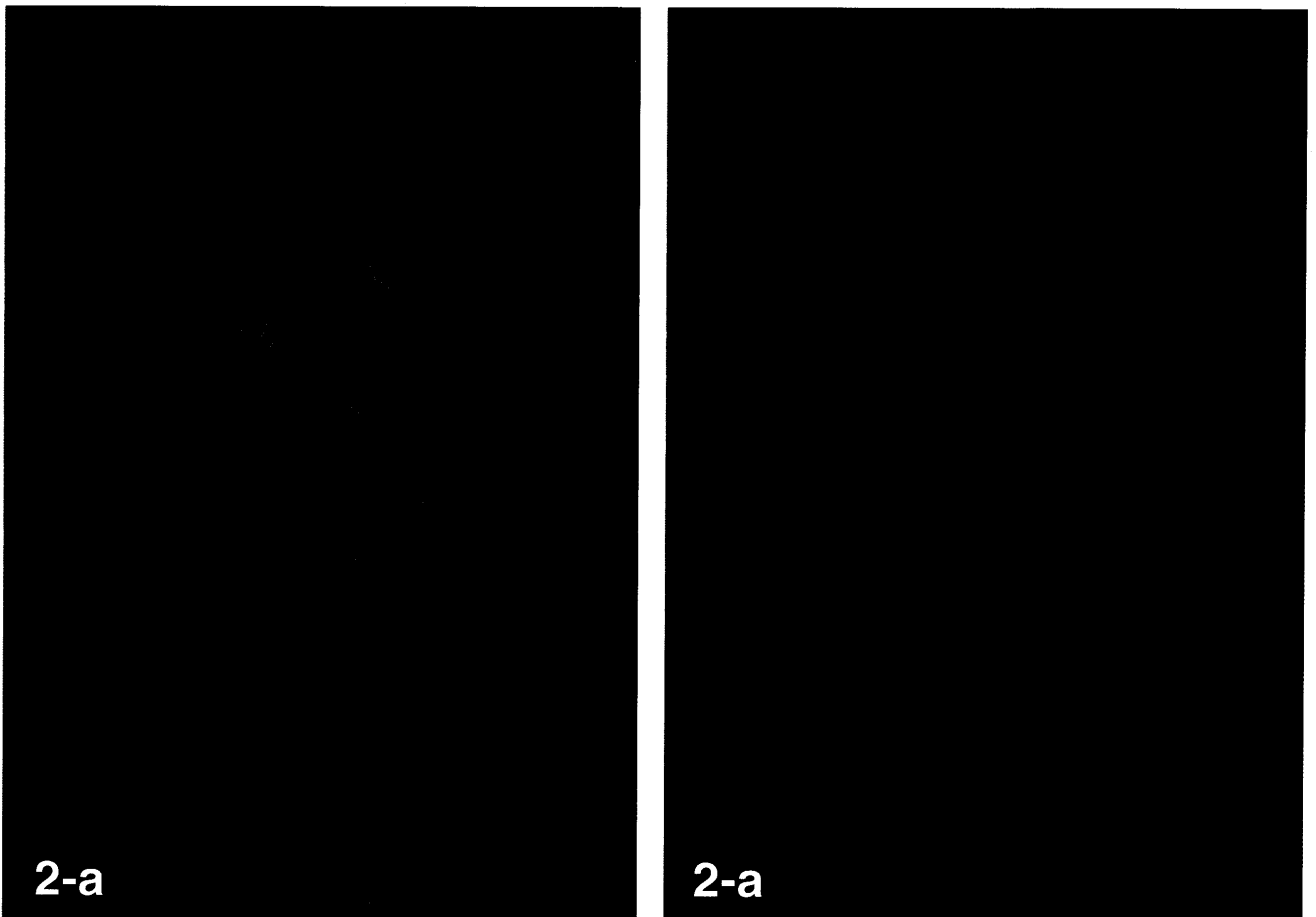


Fig. 2-a. The vegetative stand of *Zostera asiatica* in the bottom of 5 m deep. The vegetative shoots have wider leaves compared with that of *Z. caulescens*.

Fig. 2-b. Comparison of morphology in *Zostera asiatica* (left) and *Z. marina*. (right).

et al. 1999). There is a possibility of seagrass bed of *Z. asiatica* around Noto. *Z. asiatica* was found at some places near Hakodate City, and was reported as an endemic species from Hokkaido in Japan (Omori 1993). The world's longest seagrass, *Z. caulescens* with nearly 7 m of grass height was reported in Funakoshi Bay (Aioi et al. 1998) and this time *Z. asiatica* in Funakoshi Bay is a new record on the coast of Sanriku, the Pacific side of Honshu Island.

In 3 vegetative shoots with 5 or 6 leaf blades of *Z. asiatica* from Aininkappu, Akkeshi Bay, Hokkaido, which obtained on May 31, 1993, the mean of grass height was $181.0\text{ cm} \pm 23.85(\text{s.d.})$, mean length of the youngest leaves, $59.5\text{ cm} \pm 29.09(\text{s.d.})$ and the mean of maximum leaf length, $159.7\text{ cm} \pm 12.89(\text{s.d.})$, and leaf width varied from 13 mm (young leaf) to 18 mm (old leaf). The specimen of *Z. asiatica* in Funakoshi Bay was in the same range as that from Akkeshi Bay. Miki (1933) reported the sizes of vegetative parts of *Z. asiatica*, and length and width of lamina (leaf blade) were 150 cm and 15 mm respectively, sheath length, 32 cm, and rhizome thickness, 7×7 mm. Miki described that his data were measured in summer, but he did not show mean value in each part. Generally, the plant grows in spring and summer and size is variable.

How did *Z. asiatica* population settle in Funakoshi Bay? We can discuss only analogical interpretations. We have sometimes recognized drifting flowering shoots of *Z. caulescens* outside or near the bay mouth of Otsuchi Bay. As well as the case, it is likely that flowering shoots would be drifted ashore from the nearest *Z. asiatica* vegetation, for example, on the coast of Hakodate City.

In the schematic representation of principal modes of outflow jet from Tsugaru Strait, the Tsugaru Warm Current separated around Hachinohe to north and to south during warmer season and the southern current reached to the coasts of Sanriku (Conlon 1982). Moreover there is a recent tendency that a low atmospheric depression is used to come down from Aleutian Islands to the south and influences to the coastal currents, when 'El Niño' is strong and the Oyashio Current unusually reaches in the south area (personal communication from Dr. Y. Sekine, Mie University).

Flowering shoots of *Z. asiatica* might be carried off and drifted ashore by the coastal winds. A flowering shoot arrived by chance and spadices settled. Seeds could be germinated inside of Kirikiri Port and succeeded in vegetative growth. Flowering shoots could not be recognized among the vegetation in June 1999.

Observation should be continued carefully if the population of *Z. asiatica* can be stable in Funakoshi Bay until next

summer. Further survey on the *Z. asiatica* vegetation should be continued. If it happens generally for seagrass to be drifted like in this case, the distribution of *Z. asiatica* on the Japan Sea side may be possible.

The distribution of *Z. caespitosa* is newly reported in Yamada Bay located in the next door of Funakoshi Bay (Omori et al. 1996) and there is a lack of surveys about seagrasses in Japan. General survey on the distribution of Japanese seagrasses should urgently be done, because situations of seagrass beds are threatened under the developments in the coastal areas. Some of Japanese seagrasses have been listed as Data Deficient (DD) species in the Red Data List of Japanese Plants by the Environmental Agency (Aioi 1996). Further study and legislation for protection of species diversity in the northern Pacific and Japan Sea are required.

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オオアマモ (*Zostera asiatica* Miki : アマモ科) の新産地 —岩手県船越湾におけるオオアマモ—

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三陸沿岸・リアス式海岸にある岩手県・船越湾には、タチアマモおよびアマモの海草群落が形成されている。1999年6月の調査において、タチアマモが比較的安定した群落を形成している吉里吉里港内で、約60株の栄養株が集合しているオオアマモ群落が発見された。日本では、1930年代に海草の分布調査が行われたが、現在、オオアマモは、北海道にのみ分布が確認されている固有種である。本州の太平洋側沿岸では初記録である。リアス式海岸の山田湾、船越湾、大槌湾の三つの湾全体で、アマモ科に属する6種類の海草種が分布していることになる。

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