Sci. Rep., Niigata Univ., Ser. E (Geology), No. 17, 1-6, 2002

Gigantoproductus (Brachiopoda) from the Lower Carboniferous (Upper Viséan) Onimaru Formation of the southern Kitakami Mountains, NE Japan

Jun-ichi TAZAWA* and Yukio MIYAKE**

Abstract

A sole specimen of *Gigantoproductus* cf. *okensis* (Sarytcheva, 1928) is described from the Lower Carboniferous (Upper Viséan) Onimaru Formation of the Okusakamotozawa area, southern Kitakami Mountains, northeast Japan. This specimen is the first described *Gigantoproductus* from the Lower Carboniferous succession of the South Kitakami region.

Key words: *Gigantoproductus*, Lower Carboniferous, Okusakamotozawa, Onimaru Formation, southern Kitakami Mountains.

Introduction

Some large-sized productoid brachiopods have been listed or figured as *Gigantoproductus* species from the Lower Carboniferous of the southern Kitakami Mountains, northeast Japan (Minato, 1950, 1955; Onuki, 1969; Minato et al., 1959, 1979; Tazawa et al., 1981; Tazawa, 1984), but they have never been described. Recently, the junior author (Y. Miyake) collected a specimen of *Gigantoproductus* from a dark grey limestone float at the upper stream of Sakamotozawa Valley (Loc. MHK1), Okusakamotozawa, Hikoroichi-cho, Ofunato City, Iwate Prefecture, viz., the Okusakamotozawa area, southern Kitakami Mountains, northeast Japan (Fig. 1). In addition to this brachiopod specimen, he collected some rugose coral fossils such as *Siphonodendron*, *Yuanophyllum* and *Kueichouphyllum* from the limestone floats at this locality. According to Niikawa (1983a, b), dark grey to black limestone of the upper part of the Onimaru Formation (Upper Viséan), with *Siphonodendron densitabulata* (Yabe and Hayasaka), *Yuanophyllum kitakamiense* Minato and Rowett, *Kueichouphyllum yabei* Minato,

* Department of Geology, Faculty of Science, Niigata University, Niigata 950-2181, Japan
** Miya-mura 331-1, Ono-gun, Gifu Prefecture 509-3502, Japan
(Manuscript received 22 November, 2001; accepted 21 December, 2001)

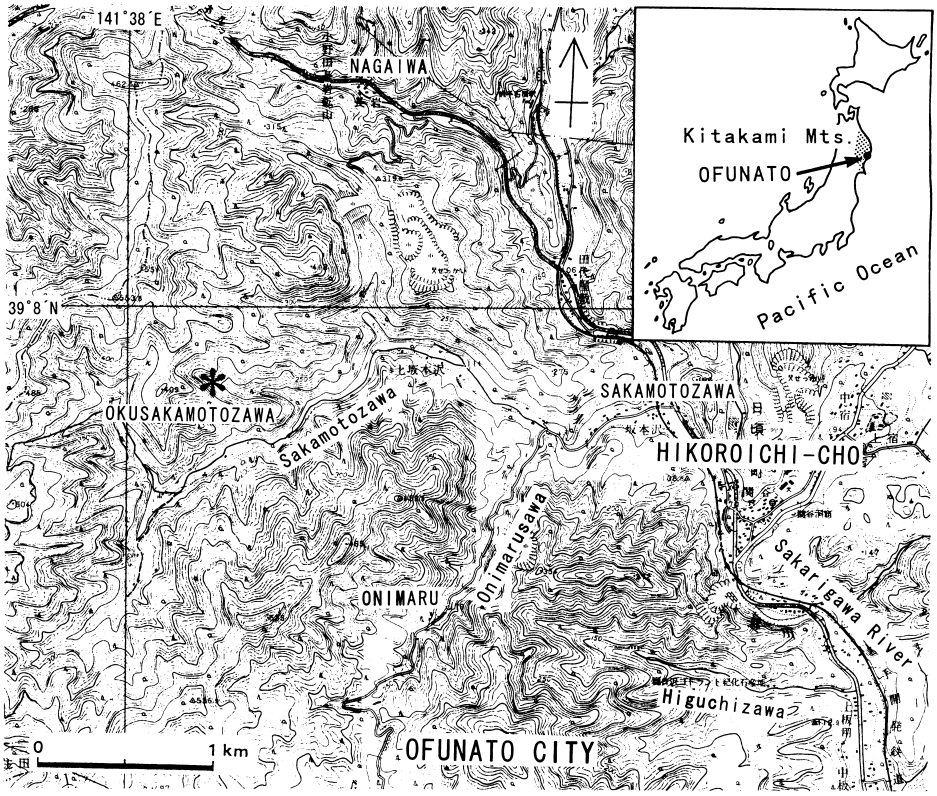

Fig. 1. Map showing the fossil locality (asterisk). Using the topographical map of "Sakari" scale 1:25,000 published by Geographical Survey Institute of Japan.

etc., is distributed and cropped out along the upper Sakamotozawa Valley in the Okusakamotozawa area. It is certain that the limestone float, containing the brachiopod fossil and collected by Miyake, is derived from the limestone of the upper Onimaru Formation in this area.

The brachiopod specimen from Okusakamotozawa was examined by the senior author (J. Tazawa). This specimen is a fragment of a conjoined valve, lacking a part of the anterior portion and most of right side of both ventral and dorsal valves, and the external ornament of the ventral valve is severely abraded. But it can be identified with the genus *Gigantoproductus* Prentice, 1950, and most like to *Gigantoproductus okensis* (Sarytcheva, 1928), originally described from the lower Alexinsky Horizon (Upper Viséan) of the Moscow Basin, Russia. The Okusakamotozawa specimen is systematically described and figured below as *Gigantoproductus* cf. *okensis* (Sarytcheva, 1928). This specimen is housed in the brachiopod collection of the Department of Geology, Faculty of Science, Niigata University (NU-B).

Description of species

Order Productida Sarytcheva and Sokolskaya, 1959
Suborder Productidina Waagen, 1883
Superfamily Linoproductoidea Stehli, 1954
Family Monticuliferidae Muir-Wood and Cooper, 1960
Subfamily Gigantoproductinae Muir-Wood and Cooper, 1960
Tribe Gigantoproductini Muir-Wood and Cooper, 1960
Genus *Gigantoproductus* Prentice, 1950

Gigantoproductus cf. *okensis* (Sarytcheva, 1928)
Figs. 2, 3.

Compare.—
Gigantella okensis Sarytcheva, 1928, p. 41, pl. 5, figs. 4a, b.
Gigantoproductus okensis (Sarytcheva): Sarytcheva and Sokolskaya, 1952, p. 126, pl. 28, fig. 163; Pattison, 1981, p. 7, pl. 7, fig. 1; pl. 9, fig. 9.

Material.—One specimen, from locality MHK1, incomplete conjoined valve, NU-B482.

Description.—Shell medium size for genus, transverse subcircular in outline, with greatest width at midvalve; length about 120 mm, width more than 120 mm. Ventral valve strongly convex at umbo, and gradually decrease the curvature towards anterior portion. Umbo large, inflated, and strongly incurved over hinge. Ears small, ill-defined. Sulcus absent. External surface of ventral valve ornamented by numerous costae. Costae irregular, slightly flexuous, numbering 11-14 in 10 mm at about midvalve. Rugae absent. Ribbing obscure, very shallow and irregular. Spines or spine bases absent or not preserved. Dorsal valve strongly concave in posterior portion, but nearly flattened in anterior portion.

Remarks.—This specimen most resembles the shells of *Gigantoproductus okensis* (Sarytcheva, 1928), described from the Upper Viséan (Alexsinsky- Mikhailovsky Horizon, Brigantian) of the Moscow Basin and northern England (Sarytcheva, 1928; Sarytcheva and Sokolskaya, 1952; Pattison, 1981), in size, shape and external ornament of the ventral valve. In particular, its longitudinal profile of the ventral valve, strongly convex in the posterior half but flattened in the anterior half. However, the preservation of the Kitakami specimen is too poor for critical comparison with the Russian and British specimens.

Gigantoproductus elongatus (Sarytcheva, 1928) is characterized by its elongate outline which is similar to the Kitakami specimen, but the former differs from the latter in having narrow, distinctive ribbing on the anterior half of the ventral valve.

Gigantoproductus janischewskii (Sarytcheva, 1928) is somewhat similar to the present

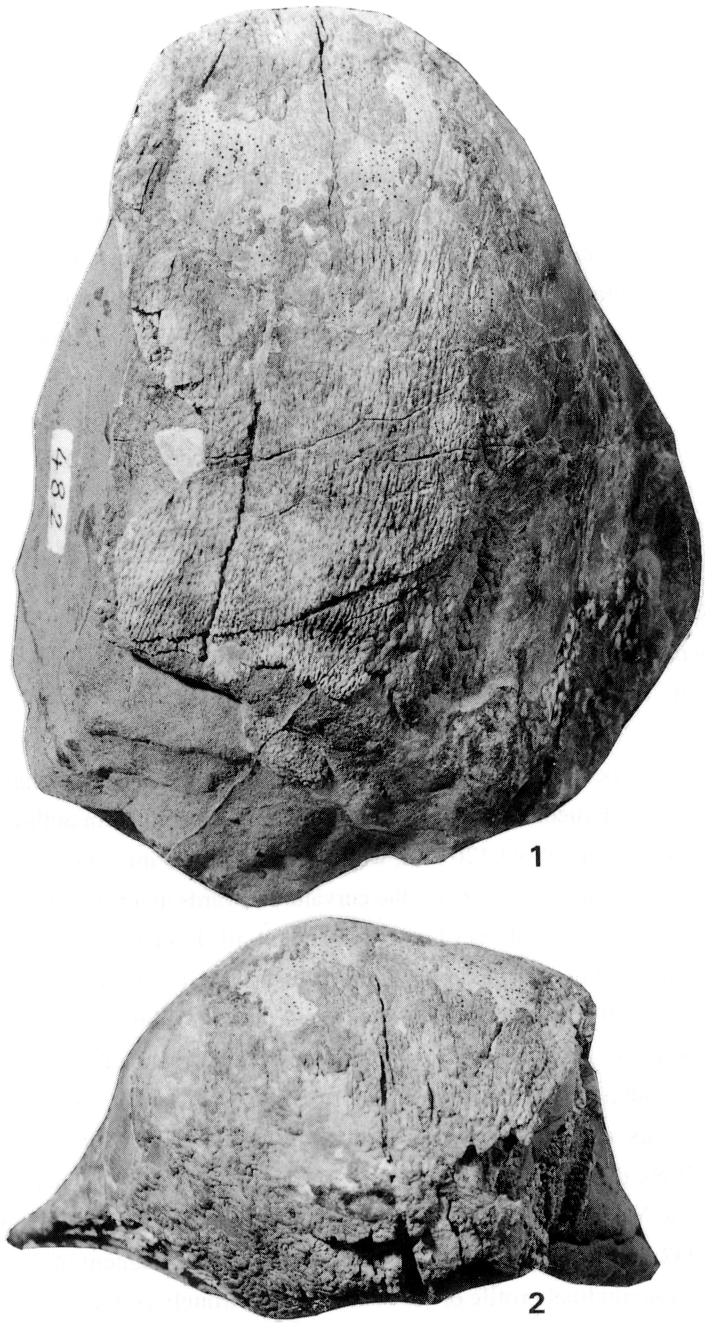

Fig. 2. *Gigantoproductus* cf. *okensis* (Sarytcheva), from the upper part of the Onimaru Formation at the upper Sakamotozawa Valley, Okusakamotozawa, NU-B482, 1: Ventral view of ventral valve. 2: Posterior view of ventral valve. (In natural size).

Fig. 3. *Gigantoproductus* cf. *okensis* (Sarytcheva), NU-B482, lateral view of both ventral and dorsal valves. (In natural size).

form in shape and external ornament of the ventral valve, but differs in having much strongly convex ventral valve.

Gigantoproductus giganteus (Sowerby), the type species of the genus *Gigantoproductus*, is clearly distinguished from the present form by its strong ribbing and large ears on the ventral valve (*see* Sarytcheva and Sokolskaya, 1952, pl. 24, fig. 159; Muir-Wood and Cooper, 1960, pl. 128, fig. 6).

Gigantoproductus sp. A and *Gigantoproductus* sp. B, from the Lower Carboniferous Hikoroichi Formation of the southern Kitakami Mountains (Tazawa, 1984), are easily differentiated by their much transverse shells.

Gigantoproductus sp., from the Lower Carboniferous Karoyama Formation of the southern Kitakami Mountains (Tazawa et al., 1981), is based on a single poorly preserved specimen. Its preservation is inadequate for comparison.

Acknowledgements

We thank to Dr. I. Niikawa of the Department of Geology, Niigata University for critical reading of the manuscript. The junior author indebted to Mr. T. Ono of Hozumi-cho, Gifu Prefecture for information of the fossil locality.

References

Minato, M., 1950, Zur Orogenese und zum Vulkanismus im jüngeren Palaeozoikum des Kitakami-Gebirges, N. Honshu, Japan. *Jour. Fac. Sci., Hokkaido Univ., Ser. 4*, **7**, 277-302.

Minato, M., 1955, Japanese Carboniferous and Permian corals. *Jour. Fac. Sci., Hokkaido Univ., Ser. 4*, **9**, 1-202.

Minato, M., Hunahashi, M., Watanabe, J. and Kato, M., 1979, *Variscan geohistory of northern Japan: The Abean Orogeny*. Tokai Univ. Press, Tokyo, 427p.

Minato, M., Takeda, H., Kakimi, T. and Kato, M., 1959, Zur Biostratigraphie der Onimaru- und Nagaiwa-Serie. *Jour. Fac. Sci., Hokkaido Univ., Ser. 4*, **10**, 337-347.

Muir-Wood, H.M. and Cooper, G.A., 1960, Morphology, classification and life habits of the Productoidea (Brachiopoda). *Geol. Soc. Amer., Mem.*, **81**, 1-135.

Niikawa, I., 1983a, Biostratigraphy and correlation of the Onimaru Formation in the southern Kitakami Mountains, Part 1 Geology and biostratigraphy. *Jour. Geol. Soc. Japan*, **89**, 347-357. (in Japanese)

Niikawa, I., 1983b, Biostratigraphy and correlation of the Onimaru Formation in the southern Kitakami Mountains, Part 2 Correlation and conclusion. *Jour. Geol. Soc. Japan*, **89**, 549-557. (in Japanese)

Onuki, Y., 1969, Geology of the Kitakami Massif, northeast Japan. *Contr. Inst. Geol. Paleont., Tohoku Univ.*, no. 69, 1-239. (in Japanese)

Pattison, J., 1981, The stratigraphical distribution of gigantoproductoid brachiopods in the Viséan and Namurian rocks of some areas in northern England. *Rep. Inst. Geol. Sci.*, no. 81/9, 1-30.

Prentice, J.E., 1950, The genus *Gigantella* Sarytcheva. *Geol. Mag.*, **87**, 436-438.

Sarytcheva, T.G., 1928, Podmoskovnye produktidy gruppy *Productus giganteus* Mart. (*Gigantella* gen. nov.). *Tr. Geol. Nauchn.-Issled. Inst., MGU*, no. 1, 1-71. (in Russian)

Sarytcheva, T.G. and Sokolskaya, A.N., 1952, Opredelitel paleozoyskikh brakhiopod Podmoskovnoy kotloviny. *Tr. Paleont. Inst.*, **38**, 1-307. (in Russian)

Sarytcheva, T.G. and Sokolskaya, A.N., 1959, O klassifikatsin lozhnoporistykh brakhiopod. *Doklady, Akad. Nauk SSSR*, **125**, 181-184. (in Russian)

Stehli, F.G., 1954, Lower Leonardian Brachiopoda of the Sierra Diablo. *Bull. Amer. Mus. Nat. Hist.*, **105**, 263-358.

Tazawa, J., 1984, Occurrence of *Gigantoproductus* (Carboniferous Brachiopoda) from the lower Hikoroichi Formation, Kitakami Mountains and its significance. *Earth Science (Chikyu Kagaku)*, **38**, 132-134. (in Japanese)

Tazawa, J., Itabashi, F. and Mori, K., 1981, Lower Carboniferous System in the Nisawa district, southern Kitakami Mountains, Japan. *Contr. Inst. Geol. Paleont., Tohoku Univ.*, no. 83, 21-37. (in Japanese)

Waagen, W., 1883, Salt Range fossils, 1. Productus-Limestone fossils. *Palaeontologia Indica, Ser. 13*, **1**, 391-546.