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A New Species of *Lithostrotion* (*Siphonodendron*) (Rugosa) from the Hina Limestone, Okayama Prefecture, Southwest Japan

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A new rugose coral species, *Lithostrotion (Siphonodendron) hinensis* is described in this paper. It was collected from the Carboniferous Hina limestone in Okayama Prefecture, Southwest Japan. Judging from the paleontological data, the age indicates probably Late Visean, Early Carboniferous.

Key words: Early Carboniferous, rugosa, *Lithostrotion* (*Siphonodendron*), Hina Limestone, Okayama

I. Introduction

A new rugose coral species, *Lithostrotion* (*Siphonodendron*) *hinensis* was collected by Mr. Reijiro Tsuboi from a boulder of Shigi River, which flow throughout the Hina Limestone, Yosii-Cho, Shituki-Gun, Okayama Prefecture (Fig. 1). Judging from the sedimentary petrographical characters of the boulder containing the present specimen, there can be not doubt that the boulder limestone was derived from the lower part of the Hina Limestone characterized by the bryozoan and crinoidal bioclastic rudite, and biolithite with pelmicrite matrices and fillings, respectively.

The Hina Limestone is an unstratified Carboniferous limestone mass overlying the basic rocks consisting mainly of the basaltic lava and tuff, which built up the submarine sea mount as well as anthracolithic limestone Massifs in the Chugoku Region (Yabe, 1958). From the lower part of this limestone mass, two brachiopod faunas of lower *Spirifer* sp. aff. *S. vesnosovae* and upper *Striatifera striata* have been found by Hase and Yokoyama in 1975, and their geological ages were correlated to Early and Late Visean, respectively. This correlation based on the foraminiferal assemblages of *Endothyra* and *Eostafella-Millerella* zones identified by one of the authors (Okimura). However, Kobayashi and Hamada (1978) who described four new trilobites from lowest part of the Hina Limestone indicate that the age may be ranged down to the Tournaisian.

Recently, Mizuno (1997) defined systematically six conodont zones by the stratigraphical and paleontological close studies of the working face in the Kokan-Kogyo (Co.) quarry, and moreover four new and an undetermined species

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of tabulate corals have been described by Niko (1999) from the limestone blocks of Shigi River-bed. According to them, the geological age of the Hina Limestone corresponds with Early Visean to Late Bashkirian.

The present new species of rugose coral is similar to the species described from the Upper Visean of Japan and China. Furthermore it is noteworthily that such accompanying smaller foraminifers as *Archaediscus* spp., *Endothyra* spp., *Globivalvulina* spp. and *Tetrataxis* spp. resemble the Late Visean forms reported from the lower part of other limestone masses ("gigant-olistoliths") in the Akiyoshi Terrane.

II. Systematic Description

Family Lithostrotionidae d'Orbigy, 1852
Subfamily Lithostrotioninae d'Orbigy, 1852
Genus *Lithostrotion* Fleming, 1828
Subgenus *Siphonodendron* M'Coy, 1849
Lithostrotion (*Siphonodendron*) *hinensis* n. sp.
(Pl. 1, figs. 1-7)

Material: A single specimen, ESO-F01001 (Holotype). The specimen described herein is housed in the Department of Earth Sciences, Faculty of Science, Okayama University.

Diagnosis: *Lithostrotion* (*Siphonodendron*) with small sized corallites and narrow dissepimentarium having one row of concentric dissepiments. Tabularium wide, consisting of outer and inner tabulae. Outer tabulae mostly complete and steeply to gently ascending towards inner tabulae. Inner tabulae complete and steeply ascending towards columella. Columella distinct; it united with counter septum and rarely some major septa. Major septa 14 to 16 in number. The axial ends of major ones often terminated by the ring-like cut edges of tabulae. Minor septa relatively long. Tabularial increase.

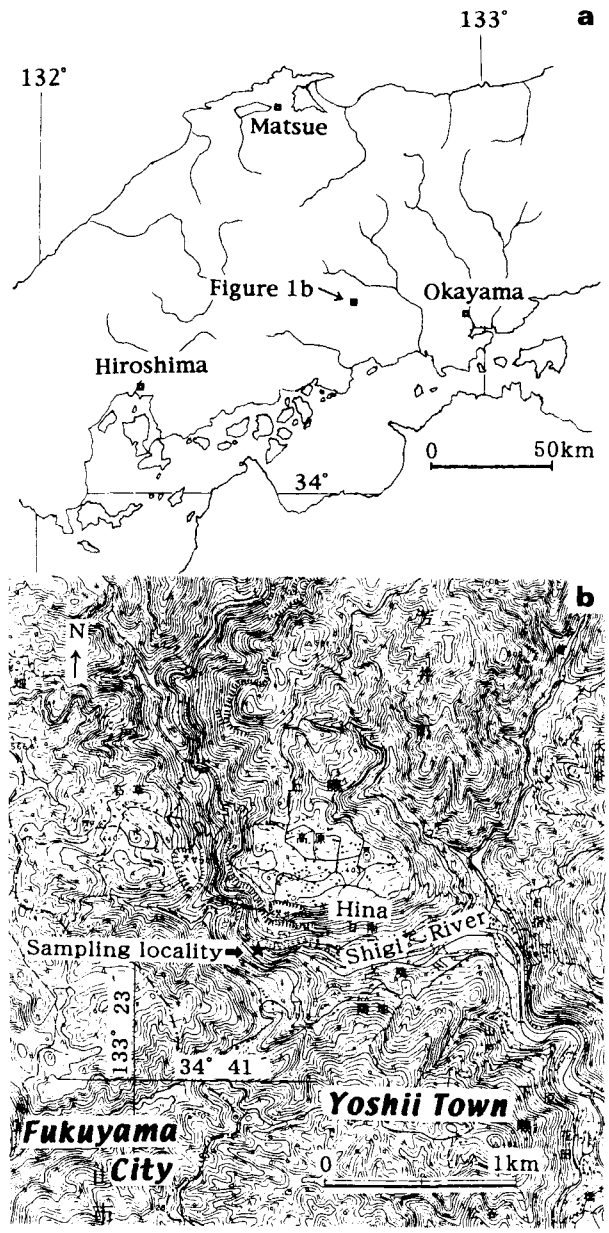

Fig. 1. Index map showing the sampling locality.

Description: Corallum compound, fasciculate and phaceloid. Corallites subcylindrical and subparallel. They separated from each other in mature stage. Increase tabularial type by Hill (1981) (Pl. 1, figs. 1-a, 5-b in this paper).

In transverse section, corallites subcircular in outline, ranging from 3.5 to 4.5mm in diameter

in mature stage. Corallite wall moderately thick and crenulated inside. Its fine structure fibro-normal type by Kato (1963). Dissepimentarium narrow, usually consisting of one row of dissepiments. Dissepiments arranged concentrically. Tabularium wide; sparsely concentric tabulae observed. The axial ends of major septa often terminated by the ring-like cut edges of tabulae. Septa of two orders, major and minor in alternation; they straight or slightly sinuous. Septa moderately thick. Their fine structure diffuso-trabecular type by Kato (1963). Major septa 14 to 16 in number in mature stage. Most of them fall short of the center of corallite, as long as about 2/3 to 3/4 radius of corallite. Counter septum and rarely some major septa longer than other major ones and united with columella. Minor septa about 1/2 to 2/3 length of major ones, but short or lacking in young stage. Columella distinct, elongate fusiform to elliptical.

In longitudinal section, dissepimentarium narrow. It composed of vesicle-like dissepiments with convex sides facing upwards as well as inwards. Dissepiments usually arranged in one row. Tabularium wide. Outer tabularium about 1/2 to 2/3 radius of tabularium. Tabulae mostly complete and steeply to gently ascending towards inner tabularium in typical sections (Pl. 1, figs. 5-a, 6-7 in this paper); they 3 to 4 in vertical distance of 2mm. Clinotabellae rarely present. In inner tabularium, relatively densely constructed tabulae complete and steeply ascending towards columella, forming subtent-like structure in typical sections (Pl. 1, figs. 5-a, 6-7 in this paper); they 5 to 7 in vertical distance of 2mm. Columella moderately thick and continuous. It straight or slightly sinuous.

Discussion: The present form resembles *Lithostrotion* (*Siphonodendron*) *asiatica minor* described by Sato (1956, p. 248-249, Pl. 9, figs. 1a-c) from the Upper Visean Tateishi Formation, Abukuma Massif, Northeast Japan in its similar character of tabulae and dissepiments, number and length of septa and form of columella. The former is, however, clearly separable from the latter in having far larger corallites.

It is also akin to the original specimen of *Lithostrotion* (*Siphonodendron*) *asiatica minor* described by Minato (1943, p. 63-65, pl. 7, figs. 3-6) from the Upper Visean Kirin Formation, Kirin Province, China. However, the latter is distinguishable from the former in having far smaller corallites and more densely constructed tabulae in longitudinal section. In addition, the latter has gently ascending inner tabulae towards columella in longitudinal section.

It is also similar to *Lithostrotion* (*Siphonodendron*) *pauciradiale* described by Minato (1955, p. 74-76, Pl. 3, figs. 3-4; Text-figs. 6E-G) from the Upper Visean Onimaru Formation, Kitakami Massif, Northeast Japan, but differs from the latter in having less numerous septa, long minor septa and comparatively smaller corallites.

It has some similarity with *Lithostrotion* (*'Siphonodendron'*) *fasciculiseptatum* Webb (1990, p. 98-100, Figs. 51F-G, 53, 57) from the Visean part of the Lower Carboniferous Rockhampton Group, east-central Queensland, Australia. However, the latter can be distinguished from the former in having numerous septa, short minor septa and lateral increase. In addition, the latter has numerous major septa united with columella.

Etymology: The specific name is derived from the Hina Limestone in Okayama Prefecture, Southwest Japan.

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PLATE 1

Explanation of Plate 1

Figs/ 1-7. *Lithostrotion* (*Siphonodendron*) *hinensis* Yamagiwa, Suzuki and Okimura n. sp.

1. Transverse section----------X4 (ESO-F01001a)
   a. Section showing tabularial increase of coraliites
2. Transverse section----------X16 (ESO-F01001a)
3. Transverse section----------X16 (ESO-F01001a)
4. Transverse section----------X4 (ESO-F01001b)
5. Longitudinal section----------X4 (ESO-F01001c)
   a. Typical section
   b. Section showing tabularial increase of corallites
6. Typical longitudinal section----------X16 (ESO-F01001c)
7. Typical longitudinal section----------X4 (ESO-F01001d)

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Plate 1