

Middle Devonian tabulate corals from the Kotaki area, Niigata Prefecture, central Japan

Shuji NIKO*, Yousuke IBARAKI** and Jun-ichi TAZAWA***

Abstract

Three species of tabulate corals were recovered from a float block of limestone collected in the Kotaki area, Itoigawa, Niigata Prefecture, central Japan. They are a pachyporid favositid *Thamnopora itoae* Niko, Ibaraki and Tazawa, 2014, an alveolitid favositid *Scoliopora hosakai* Niko, Ibaraki and Tazawa sp. nov., and a multithecoporid auloporid *Syringoporella* sp. Previously *T. itoae* was known from pebbles in Mesozoic conglomerate collected in the same area. *Scoliopora hosakai* differs from two similar species from the Qinling Mountains, China in its characters of branches and tabulae. Specific compositions of these corals suggest Middle Devonian in age for this block.

Key words: Middle Devonian, tabulate corals, *Thamnopora*, *Scoliopora*, *Syringoporella*, Kotaki area.

Introduction

This paper presents the systematic paleontology and chronological discussions of tabulate corals preserved in a float block of light gray limestone (bioclastic wackestone). This block was collected by Mr. Ryuji Hosaka at riverbed of the Kotaki River in the Kotaki area, Itoigawa, Niigata Prefecture, central Japan. Detailed collecting site is the downstream side of the Kotakigawa Hydraulic Power Plant (Denka Company Limited) near a small

* Department of Environmental Studies, Faculty of Integrated Arts and Sciences, Hiroshima University, Higashihiroshima, Hiroshima 739-8521, Japan

** Fossa Magna Museum, Ichinomiya 1313, Itoigawa 941-0056, Japan

*** Hamaura-cho, 1-260-1, Chuo-ku, Niigata 951-8151, Japan

Corresponding author: S. Niko,

niko@hiroshima-u.ac.jp

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community named Senoda (see fig. 1 of Ibaraki et al., 2009, for its position on map). All specimens examined herein are kept in the Fossa Magna Museum (abbreviation: FMM).

Age

Specific compositions of tabulate corals occur within the present limestone block are *Thamnopora itoae* Niko, Ibaraki and Tazawa, 2014, *Scoliopora hosakai* Niko, Ibaraki and Tazawa sp. nov., and *Syringoporella* sp. *Thamnopora* is a cosmopolitan genus, but its undoubted stratigraphic distributions are restricted in Devonian (Hill, 1981). Furthermore, Niko et al. (2014) in the erection of *T. itoae* suggested that this species most closely resembles a Givetian (late Middle Devonian) species. *Scoliopora* ranges from the Upper Silurian to Upper Devonian in Europe and Asia (Lin et al., 1988). Two species similar with *S. hosakai* occur in the Middle Devonian of the Qinling Mountains in China. *Syringoporella* is not effective for precise age determination; the genus is widely known in the Lower to Middle Palaeozoic rocks (Lin et al., 1988). From the evidence it is concluded that the age of the block is best constrained as Middle Devonian.

Systematic Paleontology

Subclass Tabulata Milne-Edwards and Haime, 1850

Order Favositida Wedekind, 1937

Suborder Favositina Wedekind, 1937

Superfamily Pachyporoidea Gerth, 1921

Family Pachyporidae Gerth, 1921

Genus *Thamnopora* Steininger, 1831

Type species.—*Thamnopora madreporacea* Steininger, 1831.

Thamnopora itoae Niko, Ibaraki and Tazawa, 2014

Figs. 1-1, 2

Thamnopora itoae Niko, Ibaraki and Tazawa, 2014, p. 61, 63, figs. 2-1-3, 4-1-6.

Material.—FMM6223-6233.

Discussion.—A full description of *Thamnopora itoae* is referable in Niko et al. (2014). The types of this species were recovered from limestone pebbles in a float block of conglomerate derived probably from the Lower Jurassic Kuruma Group. Collecting site of this block is riverbed of the Kotaki River in the Kotaki area.

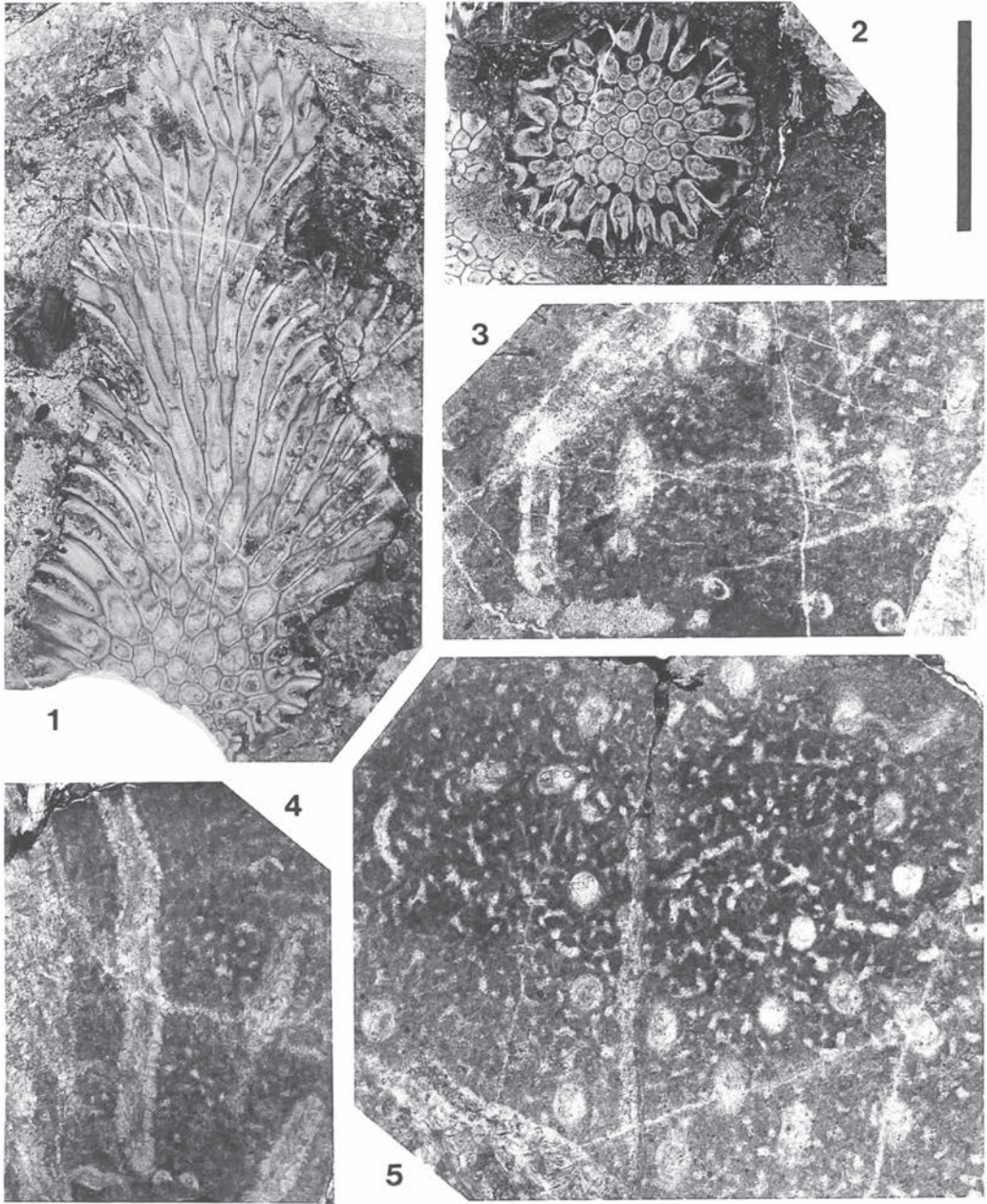


Fig. 1. 1, 2: *Thamnopora itoae* Niko, Ibaraki and Tazawa, 2014, thin sections. 1, FMM6231, longitudinal section of branch; 2, FMM6232, transverse section of branch. 3–5: *Syringoporella* sp., thin sections. 3, FMM6219, longitudinal to transverse sections of corallites; 4, FMM6221, longitudinal sections of corallites; 5, FMM6216, transverse sections of corallites. Scale bar = 6 mm for Figs. 1-1, 2; 3 mm for Figs. 1-3-5.

Suborder Alveolitina Sokolov, 1950

Family Alveolitidae Duncan, 1872

Subfamily Natalophyllinae Sokolov, 1950

Genus *Scoliopora* Lang, Smith and Thomas, 1940

Type species.—*Alveolites denticulatus* Milne-Edwards and Haime, 1851.

Scoliopora hosakai sp. nov.

Figs. 2-1-6

Etymology.—The specific name honors Mr. Ryuji Hosaka, who collected the examined limestone block containing this new species.

Material.—Holotype, FMM6222, from which six thin sections were prepared.

Diagnosis.—Species of *Scoliopora* having branch diameters of 5–12 mm; corallites up to 0.84 mm in diameter; intercorallite wall thickness 0.15–0.31 mm in peripheral zone; septal spines short conical; tabulae very rare.

Description.—Corallum ramose with subcylindrical branches, cerioid-like in axial zone and alveoliteoid in peripheral zone of branches; branching probably bifurcate; diameters of branches are 5–12 mm; total corallum diameter and growth form unknown. Corallites subcylindrical, slender, and consist of longitudinally directed proximal portion with indistinct polygonal to fan-shaped transverse sections and outwardly curved distal portion with hemi-circular to elliptical transverse sections; diameters of proximal corallites are 0.21–0.50, 0.25 × 0.38, 0.42 × 0.52 mm, then they gradually increase to 0.63 × 0.36, 0.67 × 0.33, 0.84 × 0.61 mm in distal ones; proximal and distal portions of corallites respectively form axial and peripheral zones of branch; tabularia (lumina) have subcircular transverse sections, and shift to very deep calices that open obliquely upwards to nearly perpendicular for branch surface; increases of new corallites are lateral, and frequently occur at axial zone. Intercorallite walls differentiated into median dark line and stereoplasm; thickness of walls is relatively thin for the genus, 0.07–0.17 mm in axial and 0.15–0.31 mm in peripheral zones; mural pores well developed, situate on narrow sides of corallite faces near angles, having longitudinally elongated to circular profiles; diameters of pores are 0.14 × 0.20, 0.21 × 0.29, 0.15–0.25 mm; septal spines well developed, short conical with 0.08–0.15 mm in length; tabulae very rarely developed at peripheral zone, complete.

Discussion.—The Kotaki specimen places within *Scoliopora* rather than *Natalophyllum* Radugin (1938; type species, *N. giveticum* Radugin, 1938) because of its ramose corallum, slender corallites and well developed septal spines. This discovery represents the first record of the genus in Japan.

Scoliopora hosakai sp. nov. is similar to *S. gansuensis* Zhang (1981, p. 142, pl. 75, figs. 1a, b) and *S. obliqueformis* Zhang (1981, p. 143, pl. 74, figs. 4a, b) both from the Middle Devonian of

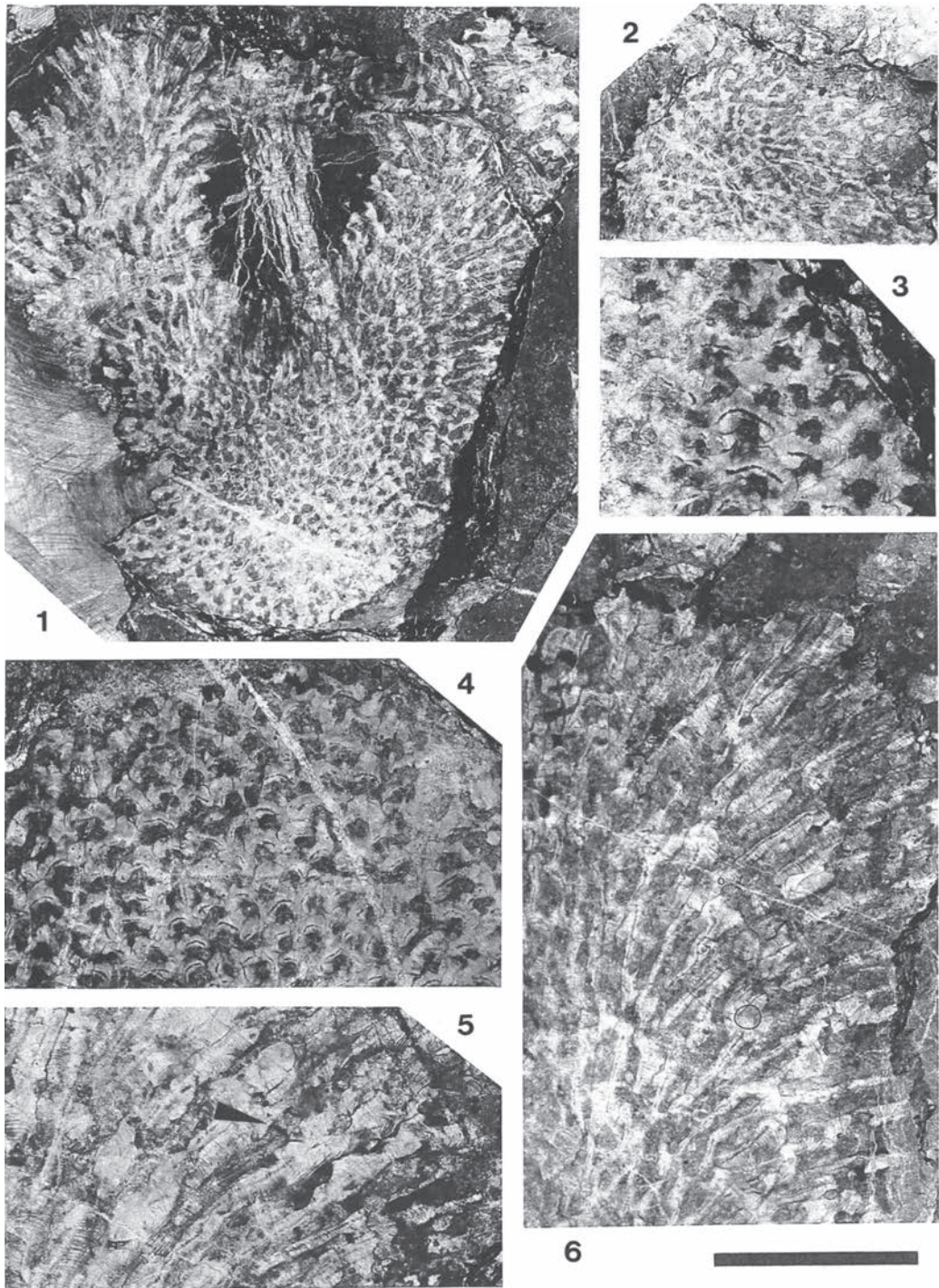


Fig. 2. 1-6: *Scoliopora hosakai* Niko, Ibaraki and Tazawa sp. nov., holotype, FMM6222, thin sections. 1, oblique section of corallum; 2, transverse (slightly oblique) section of branch; 3, transverse sections of distal corallites; 4, transverse sections of proximal to distal corallites; 5, longitudinal sections of distal corallites, arrow indicates tabula; 6, longitudinal sections of proximal to distal corallites. Scale bar = 6 mm for Figs. 2-1, 2; 2.1 mm for Figs. 2-3, 5; 3 mm for Figs. 2-4, 6.

the Qinling Mountains, Gansu Province, China. However, the new species differs from these Chinese species in having slightly larger diameters of the branches and fewer tabulae.

Order Auloporida Sokolov, 1947

Superfamily Syringoporoidea Fromentel, 1861

Family Multithecoporidae Sokolov, 1950

Genus *Syringoporella* Kettner, 1934

Type species.—*Syringopora moravica* Roemer, 1883.

Syringoporella sp.

Figs. 1-3-5

Material.—FMM6216–6221.

Description.—Coralla phaceloid, occur inside stromatoporoids. Corallites cylindrical and very narrow, 0.44–0.56 mm in diameter; connecting tubuli are relatively rare. Thickness of corallite walls is variable, ranging from 0.07 to 0.25 mm; septal element and tabula are not observed.

Discussion.—Three (or four) species of *Syringoporella* were previously known from the Silurian to Devonian rocks in Japan, namely *S. fujiwarai* Niko and Senzai, 2006, *S. yamakoshii* Niko, 2001a, *S. sp.* (Niko, 2001b), and *S.?* sp. (Niko and Adachi, 2004). The present fragmentary specimens cannot be compared with these species, owing to their poor state of preservation.

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