

**Devonian tabulate corals from pebbles in Mesozoic conglomerate,
Kotaki, Niigata Prefecture, central Japan
Part 4: Auloporida**

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Abstract

As a fascicle of a serial work that describes tabulate corals in pebbles from the Kotaki area in Itoigawa, Niigata Prefecture, central Japan, this paper describes four Devonian species of auloporid tabulate corals, namely an auloporid *Aulopora chiharai* Niko, Ibaraki and Tazawa sp. nov., a palaeofavosiporid *Kanashiropora* sp. cf. *K. kozui* Niko, a syringoporid *Syringopora* sp. indet., and a multithecoporid *Syringoporella* sp. indet. *Aulopora chiharai* is distinguished from comparable species of the genus principally by its small corallite diameters and the possession of complete tabulae. *Kanashiropora* sp. cf. *K. kozui* represents the first record of the genus outside the type locality in the Fukuji area, Gifu Prefecture. *Aulopora chiharai*, *Syringopora* sp. indet., and *Syringoporella* sp. indet. are involved in stromatoporoids.

Key words: Devonian, auloporid tabulate corals, Kotaki area, Mesozoic conglomerate, *Aulopora chiharai* sp. nov.

Introduction

This paper is the fourth fascicle of a serial work on the Devonian tabulate coral fauna from the Kotaki area in Itoigawa, Niigata Prefecture, central Japan. This fauna is preserved in limestone and shale pebbles in a float block of conglomerate that most probably belongs

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to the Lower Jurassic Kuruma Group in the Hida-Gaien Belt (Niko et al., 2014). The present fascicle focuses into specimens of the order Auloporida. Their repository is the Fossa Magna Museum (abbreviation: FMM).

Systematic Paleontology

Subclass Tabulata Milne-Edwards and Haime, 1850

Order Auloporida Sokolov, 1947

Superfamily Auloporoidea Milne-Edwards and Haime, 1851

Family Auloporidae Milne-Edwards and Haime, 1851

Genus *Aulopora* Goldfuss, 1829

Type species.—*Aulopora serpens* Goldfuss, 1829.

Aulopora chiharai sp. nov.

Figs. 1-A-E

Etymology.—The specific name honors the late Dr. Kazuya Chihara in recognition of his contributions to the geology in the Hida-Gaien Belt.

Material.—Holotype, FMM6259, from which three thin sections were prepared. Six thin sections were studied from the three paratypes, FMM6260–6262. In addition, a single corallum, FMM6263, was also examined.

Diagnosis.—Species of *Aulopora* with coralla occurring inside stromatoporoids; corallite diameters small, 0.3–1.1 mm in proximal and 0.6–0.7 mm in distal portions; except for a levee-like projection at transposal portion of proximal-distal corallites, corallite walls mostly thin, 0.08–0.15 mm; septal spine absent; tabulae complete.

Description.—Coralla mat-like in growth form, occur inside stromatoporoids. Corallites small in diameter and uniserially arranged forming linear chains; anastomoses with adjoining corallites frequently developed; each corallite differentiated into adherent proximal and free distal portions; proximal corallites reptant, 1.0–1.8 mm in length, whose transverse sections are hemi-circular with relatively wide fringes in non-anastomosed corallites and sub-trapezoidal to rectangular in anastomosed corallites; diameters of proximal corallites are 0.3–1.1 mm; distal corallites cylindrical and upwardly directed with 100°–125° for proximal corallite; diameters of distal corallites are 0.6–0.7 mm; calical rims faintly inflated; calices very shallow; lumina (tabularia) subcircular in transverse section throughout all growth stages; daughter corallite arises near proximal-distal transposal portion of parent one. Corallite walls consist of epitheca and stereoplasm; wall thickness mostly thin, 0.08–0.15 mm, but it abruptly thickened on upper wall at transposal portion of proximal-distal corallites to form a levee-like projection, where wall thickness attains 0.33 mm; microstructure of

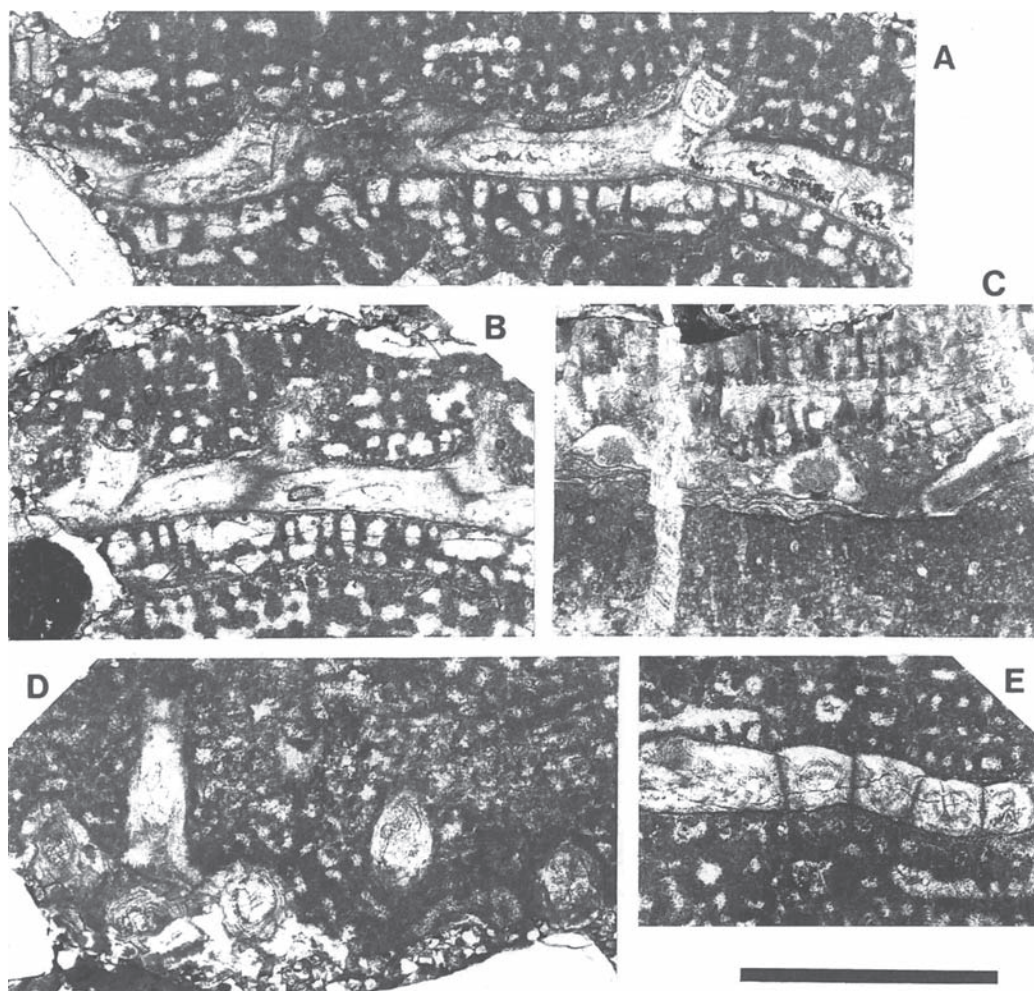


Fig. 1. *Aulopora chiharai* Niko, Ibaraki and Tazawa sp. nov., thin sections. **A, B:** holotype, FMM6259, longitudinal sections of corallites. **C:** paratype, FMM6261, transverse and longitudinal sections of non-anastomosed proximal corallites. **D:** paratype, FMM6260, longitudinal to transverse sections of distal corallites. **E:** paratype, FMM6262, transverse sections of anastomosed proximal corallites. Scale bar = 2.5 mm.

stereoplasm is not preserved; septal spine absent; tabulae rare in proximal and common in distal corallites, complete; profiles of tabulae vary from nearly flat to weakly concave proximally or distally; there are 2–4 tabulae in a single corallite.

Discussion.—The examined all specimens occur inside the skeletons of stromatoporoids. This fact indicates a possibility that there is a symbiotic relationship between them. Similar associations are also known in *Multithecopora* (Niko, 2001b; Niko and Senzai, 2006), *Syringopora* (i.e., Phillips, 1841; Stasińska, 1974; this report), *Syringopora?* (Mistiaen, 1984; Young and Noble, 1989; Young et al., 1991), and *Syringoporella* (i.e., Nowiński, 1992; Niko, 2001a; 2008; Zapalski, 2012; this report).

Aulopora chiharai sp. nov. is comparable with *A. mixta* Deng (1979, p. 158, pl. 3, fig. 4) and *A. sorasyamaensis* Niko (2001b, p. 74, 76, 77, figs. 1-1-7; 2-1-4; Niko and Senzai, 2006, p. 33, figs. 2-1-3). The former species described from the Middle Devonian Houershan Formation in Guizhou, South China. The latter species was named on the basis of specimens from the Lochkovian (lower Lower Devonian) Takaharagawa Member of the Fukuji Formation in the Fukuji area, Gifu Prefecture and subsequently discovered from the synchronous Oisedani Member in the Kamianama Formation in the Kuzuryu Lake-Ise River area, Fukui Prefecture. The new species is well differentiated from *A. mixta* and *A. sorasyamaensis* by its small corallite diameters and the possession of complete tabulae. In addition, these previously known species are not associated with stromatoporoids.

Family Palaeofavosiporidae Stasińska, 1976

Genus *Kanashiropora* Niko, 2001b

Type species.—*Kanashiropora kozui* Niko, 2001b.

Kanashiropora sp. cf. *K. kozui* Niko, 2001b

Figs. 2-A-C

Compare with:

Kanashiropora kozui Niko, 2001b, p. 82, 84, 86, figs. 5-1-5; 6-5, 6.

Material.—FMM6264, 6265. They were recovered from dark gray limestone pebbles.

Description.—Coralla phacelo-cerioid, probably massive. Corallites cylindrical in phaceloid and prismatic to subprismatic in cerioid portions. Transverse sections of corallites in cerioid portion are variable, indicating polygonal with 3-6 sides or sub-trapezoidal; corallite diameters 0.7-1.2 mm; no calice preserved. Walls thin to weakly thickened 0.10-0.19 mm in corallite and 0.19-0.44 mm in intercorallite walls; mural pores common, occur on corallite face, 0.17 mm in diameter; septal spine absent; tabulae uncommon, complete to rarely incomplete.

Discussion.—*Kanashiropora* was proposed by Niko (2001b) as a monotypic genus on the basis of a Lochkovian species, *K. kozui* Niko, 2001b, from the Takaharagawa Member. The present species from the Kotaki area is represented by two fragmentary specimens. Although their characters such as phacelo-cerioid coralla with mural pores and usually complete tabulae warrant the generic assignment, the available material is not complete to enough for a confident specific identification. This is the first record of *Kanashiropora* outside the type locality.

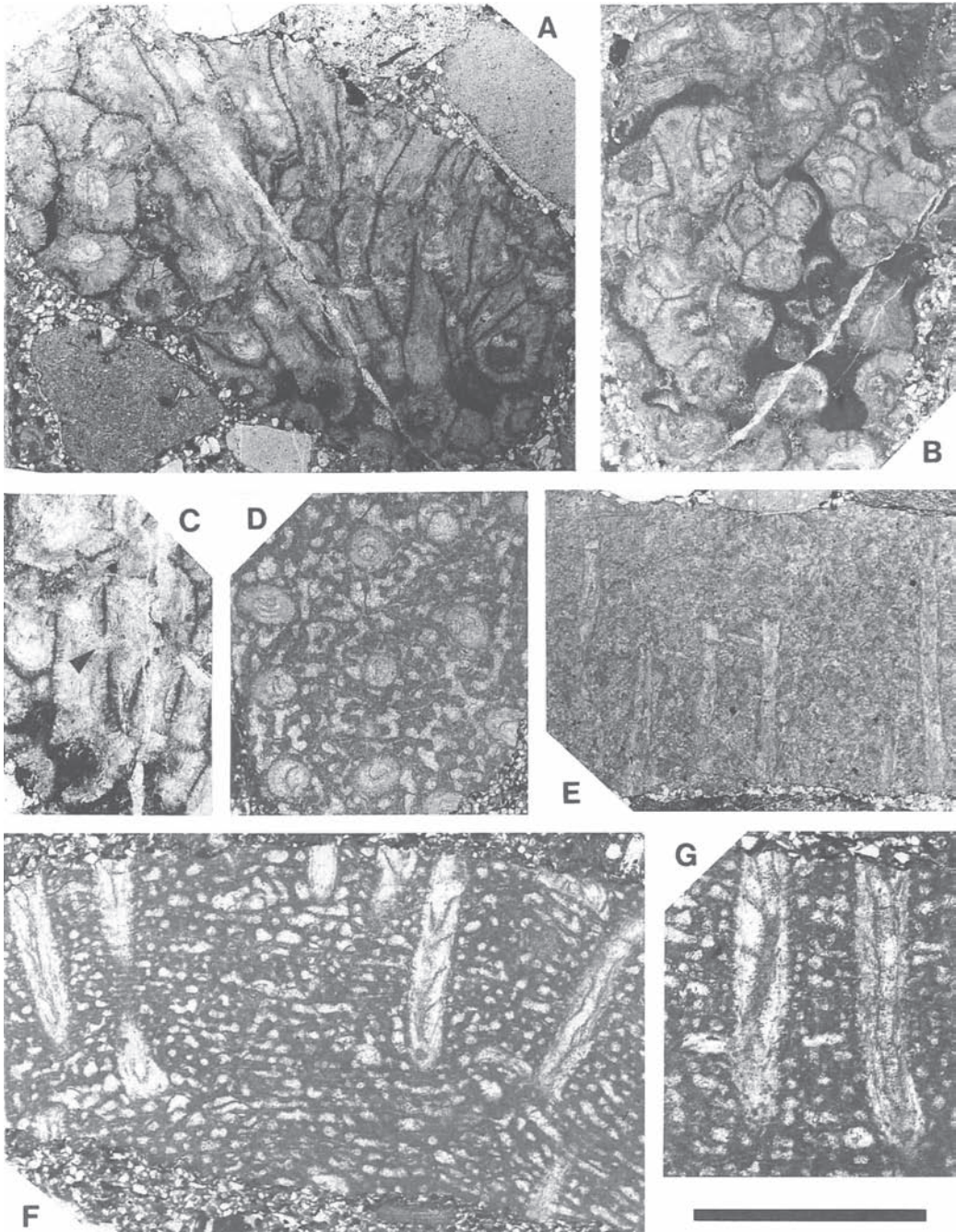


Fig. 2. A–C: *Kanashiopora* sp. cf. *K. kozui* Niko, 2001b, FMM6264, thin sections. A, longitudinal to transverse sections of corallites; B, transverse sections of corallites; C, partial enlargement of A, longitudinal sections of corallites, arrow indicates mural pore. D, F, G: *Syringopora* sp. indet., FMM6266, thin sections. D, transverse sections of corallites; F, G, longitudinal sections of corallites. E: *Syringoporella* sp. indet., FMM6272, thin longitudinal sections of corallites. Scale bar = 3.5 mm for A, B, D–F; 2.5 mm for C, G.

Superfamily Syringoporoidea Fromentel, 1861

Family Syringoporidae Fromentel, 1861

Genus *Syringopora* Goldfuss, 1826

Type species.—*Syringopora ramulosa* Goldfuss, 1826.

Syringopora sp. indet.

Figs. 2-D, F, G

Material.—FMM6266–6271. They were recovered from gray to milky white limestone pebbles composed almost entirely of skeletons of stromatoporoids.

Description.—Coralla phaceloid, occur inside stromatoporoids. Corallites cylindrical and narrow, 0.4–0.8 mm in diameter; connecting tubuli relatively rare, more than 0.9 mm in length; calice not preserved. Corallite walls thin to moderate, usually 0.04–0.19 mm in thickness; no apparent septal spine observable; tabulae well developed, infundibuliform forming relatively wide axial syrinx, whose diameter is approximately 26–38% of corresponding corallite diameter; horizontal diaphragms rarely recognized in syrinx.

Discussion.—The examined specimens refer to *Syringopora* rather than *Multithecopora* Yoh, 1927, *Syringoporella* Kettner, 1934, and *Syringoporinus* Sokolov, 1955, because of the possessions of infundibuliform tabulae and axial syrinx. The preservations of these specimens are not good enough to identify the species.

Family Multithecoporidae Sokolov, 1950

Genus *Syringoporella* Kettner, 1934

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

Syringoporella sp. indet.

Fig. 2-E

Material.—FMM6272. It was recovered from gray limestone pebble composed almost entirely of skeletons of stromatoporoid.

Description.—Corallum phaceloid, occurs inside stromatoporoid. Corallites cylindrical and very narrow, 0.2–0.3 mm in diameter; connecting tubuli common, 0.4–0.7 mm in length; calical rims weakly inflated. Corallite walls thin, usually 0.04–0.08 mm; septal spine absent; tabulae rare, complete.

Discussion.—This fragmentary specimen is suggestive of *Syringoporella* but is not well preserved enough for a confident specific identification.

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