Devonian Coenitid Tabulate Corals from the Fukuji Formation, Gifu Prefecture

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Abstract Two Early Devonian species of coenitid tabulate corals, *Coenites fukuiensis* sp. nov. and *Planocoenites ozakii* sp. nov., are described from the D4 Member (Emsian?) or the float blocks probably derived from this member of the Fukuji Formation in the Fukuji area, Gifu Prefecture. *Coenites fukuiensis* is diagnosed by its strong sinuations in the intercorallite walls, whose morphology separates it from all other species of the genus. The most similar species with *Planocoenites ozakii* is *Placocoenites* [sic] *hinganensis* Tchi, 1980 that known from Heilongjiang, Northeast China. But, the Chinese species has the much thicker coralla and the attenuated intercorallite walls. Comparable form with *Placocoenites ozakii* is also reported from the Hitoegane Formation, Gifu Prefecture.

Key words: Early Devonian, tabulate corals, Coenitidae, *Coenites, Planocoenites*, Fukuji Formation, Gifu

Introduction

Modern systematic treatment concerning coenitid corals from the Lower Devonian Fukuji Formation is resulted in identification of two new species, namely *Coenites fukuiensis* and *Planocoenites ozakii*. Succeeding to the first one (Niko, 2001), this contribution is the second of a larger study to document the tabulate coral fauna of this formation in the Fukuji area, Gifu Prefecture, Central Japan. Specimens described herein are deposited in the Hikaru Memorial Museum (prefix HMM), Takayama or the National Science Museum (prefix NSM), Tokyo.

Systematic Paleontology

Order Favositida Wedekind, 1937
Suborder Alveolitina Sokolov, 1950
Family Coenitidae Sardeson, 1896
Genus *Coenites* Eichwald, 1829

Type species: *Coenites juniperinus* Eichwald, 1829.

*Coenites fukuiensis* sp. nov.

(Figs. 1–1–4; 2–1–4)

Holotype: HMM 03037, from which 29 thin sections were made.

Diagnosis: Species of *Coenites* with subcylindrical branches, usually 3.6–5.2 mm in diameter, and crescentic calicial pits having approximately 0.51 mm in width and 0.16 mm in height; opening angle of calices usually 60°–80°; intercorallite walls exhibit strong sinuations, attain 0.36 mm in thickness; mural pores common, large; tabulae rare.

Description: Corallum ramose with subcylindrical branches, ceroid-like in axial zone and alveolitoid in peripheral zone of branch; diameters of branches moderate for genus, range from 3.0 to 7.6 mm, usually 3.6–5.2 mm; branching common, bifurcate to umbelliferous; total corallum diameter and growth form unknown owing to fragile nature. Corallites slender for order but moderate for genus; each corallite consists of longitudinally directed proximal portion forming axial zone of branch and outwardly curved distal portion forming relatively wide pe-
Fig. 1. *Cœnites fukuiensis* sp. nov., holotype, HMM 03037, thin sections. 1, longitudinal section of branch, ×5. 2, longitudinal section of branch, ×14. 3, transverse sections of corallites near calical rim, ×14. 4, longitudinal section of branch, arrow indicates mural pore, ×14.
ripheral zone of branch; transverse sections of corallites are variable in profile with indistinct polygonal, fan-shaped, crescentic and deformed elliptical in proximal portion, and may be elliptical in distal portion; diameters of typical proximal corallites are 0.26 mm in polygonal ones and 0.51×0.20 mm in elliptical ones; diameters of distal corallites leach approximately 0.9 mm in width and 0.5 mm in height rear calical rim; increase of new corallites lateral, commonly occurs in axial zone of branch; calices deep, to open oblique upward with 38°–83°, usually 60°–80°, in angle to surface of branch; calical pits are crescentic in transverse section with 0.46–0.59 mm, 0.51 mm mean, in width and 0.10–0.23 mm, 0.16 mm mean, in height; form ratios (height/width) of calical pits range from 0.22 to 0.46. Intercorallite walls exhibit strong situations; structurally they differentiated into median dark line and stereoplasm in proximal corallites, but this differentiation becomes indistinct by lacking median dark line in distal corallites where thickness of intercorallite walls abruptly increased as peripheral stereozone, thus profiles of distal corallites become obscure; thickness of intercorallite walls is 0.06–0.13 mm in proximal corallites and attains 0.36 mm in peripheral stereozone; microstructure of stereoplasm is not preserved; mural pores common near calellite edges, large for genus, elliptical, usually 0.14×0.29 mm in diameter; septal spines well-developed, but restricted in calical pit, low conical with usually 0.08 mm in length of protruded part; tabulae rare, complete, nearly rectangular to corallite.

Discussion: The strong situations in the intercorallite walls of Coenites fukuiensis sp. nov. are distinctive, as no other species of the genus has a similar structure. Although Hamada and Itoigawa (1983, p. 11, fig. 3) figured a specimen under the generic name Coenites from the Fukuji Formation, it lacks the alveolitoid portion in the corallites. The ceroid corallites throughout all growth stages of this coral reject its assignment from Coenites.

Etymology: The specific name is derived from the Fukuji Formation, from which this species occurs.

Occurrence: Coenites fukuiensis sp. nov. was collected from a float block of black limestone (bioclastic wackestone) in talus at the Kanashirozako Valley (locality FH-6 in Niko. 2001). This block is probably derived from the D4 Member (Emsian?) of the Fukuji Formation.

Genus Planocoenites Sokolov, 1952
Type species: Coenites orientalis Eichwald. 1861.

Planocoenites ozakii sp. nov.
(Figs. 2-5; 3-1–4)

Holotype: HMM 06702, from which three thin sections were made.

Other specimens: Six thin sections were studied from the two paratypes, NSM PA14958, 15008.
Diagnosis: Species of Planocoenites with thin coralla, usually 1.0–1.6 mm in thickness, and semielliptical, elliptical to crescentic calical pits, approximately 0.36 mm in width and 0.15 mm in height; opening angle of calice usually 40°–50°; intercorallite walls abruptly thickened toward calical rim, attain 0.59 mm; mural pores relatively rare; tabulae vary rare, uparched.

Description: Coralla encrusting, laminar in growth form, consisting of less than four layers of corallites, alveolitoid; thickness of corallum is thin for genus with 0.6–1.8 mm, usually 1.0–1.6 mm; maximum observed size of largest corallum (paratype, NSM PA14958) composed of multiple lamellae attains approximately 49 mm in diameter and 56 mm in height. Corallites reclined; each corallite consists of prostrate proximal portion with subtrapezoid, semicircular or fan-shaped in transverse section, and upwardly directed distal portion of approximately 1.3–1.7 mm in length; proximal corallite diameters 0.19–0.48 mm in width and 0.21–0.33 mm in height; increase of new corallites relatively rare, lateral; calices mostly deep, oblique to nearly perpendicular with 21°–85°, usually 40°–50°, in angle to sur-
Fig. 2. 1-4. Coenites fukuiensis sp. nov., holotype. HMM 03037, thin sections. 1, longitudinal section of branch, arrow indicates tabula, ×14. 2, oblique section of branch, ×10. 3, transverse section of branch, ×10. 4, partial enlargement to show intercorallite wall structure, arrow indicates median dark line, ×75. 5, Planocoenites ozakii sp. nov., holotype, HMM 06702, thin transverse sections of corallites near calical rim, ×14.
face of corallum; calical pits sennielliptical, elliptical to crescentic in transverse section with 0.23–0.42 mm, 0.36 mm mean, in width and 0.08–0.21 mm, 0.15 mm mean, in height; form ratios (height/width) of calical pits range from 0.21 to 0.53. Intercorallite walls of proximal corallites are thin, 0.03–0.13 mm in thickness, and differentiated into median dark line and stereoplasm, then this structural differentiation becomes indistinct in distal corallites, where intercorallite walls abruptly thickened toward calical rim and attain 0.59 mm in thickness; profiles of distal corallites are obscure by lacking median dark line and abrupt thickening of intercorallite walls; microstructure of stereoplasm is lamellar, in addition innermost dark layer partly developed in stereoplasm; mural pores relatively rare, restricted in calical pits, elliptical, usually 0.09×0.15 mm in diameter; septal spine may be absent, but squamula-like projections rarely developed on less concave side of calical pit; tabulae vary rare, complete, weakly uparched in profile.

**Discussion:** *Planocoenites ozakii* sp. nov. bears strong similarities to *Placocoenites* [sic] *hinganensis* Tchi (1980, p. 177, pl. 82, figs. 2a, b) from the Middle Devonian of Heilongjiang, Northeast China. The latter species differs from this new species in having the much thicker
coralla (5 mm versus usually 1.0–1.6 mm in *Planocoenites ozakii*) and the attenuated intercoringallite walls near the calical rims. *Planocoenites* sp. (Kamiya and Niko, 1998, p. 67, 69, text-figs. 1a–c, 2) from the Upper Silurian Hitoegane Formation, Gifu Prefecture is also similar to *P. ozakii*. However, the Hitoegane species has the well-developed mural pores.

**Etymology:** The specific name honors the late Dr. Kin-emon Ozaki in recognition of his pioneering works on the Middle Palaeozoic corals in the Hida-Gaien Belt including the Fukui area.

**Occurrence:** *Planocoenites ozakii* sp. nov. was collected from gray crinoidal limestone (bioclastic grainstone–packstone) belonging to the D4 Member of the Fukui Formation at locality FH-7 in the middle of the Ichino-tani Valley (latitude 36°13’2"N, longitude 137°31’28"E; NSM PA15008), and the two float blocks of black limestone (bioclastic wackestone) in the Ichino-tani Valley (HMM 06702) and the Osobu-dani Valley (NSM PA14958), whose blocks also may be derived from the D4 Member.

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**References**


