Donetzites miyakei, a new species of Early Carboniferous tabulate coral from the Omi Limestone, Niigata Prefecture, central Japan

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Abstract

A new species of cleistoporid tabulate coral, *Donetzites miyakei*, is described from the *Endothyra* Zone (late Visean, Early Carboniferous) of the Omi Limestone at the Nishiyama quarry in the Omi area, Niigata Prefecture, central Japan. It represents the earliest *Donetzites* recorded so far. Stratigraphic and geographic distributions of *Donetzites* may be explained as the result of westward spread reaching into the Tethys from it possible origin in the central Panthalassa. Comparable taxon with *D. miyakei* is *D. vermiculatus* Niko, 1999 from the *Eostaffella- Millerella* Zone of the Hina Limestone, Okayama Prefecture, southwest Japan.

Key words: Cleistoporidae, *Donetzites miyakei*, Omi Limestone, tabulate coral, Visean.

Introduction

The tabulate coral genus *Donetzites*, characterized by the tabular to discoid corallum consisting of the spongy intercorallite walls, was elected by Dampel (1940) on the basis of *D. milleporoides* Dampel, 1940 from the Moscovian (Middle Carboniferous) of the Donetz Basin. Except for the generic type, seven species attributable to the genus have previously been described from the Carboniferous of the Donetz Basin (*D. lutugini* Dampel, 1940), Iran (*D. mariae* Flügel, 1975), Vietnam (*D. dovjicovi* Dubatolov and Tong-dzuy, 1965), North China (*D. multispinosus* Lin, 1985), South China (*D. regularis* Wu and Zhao, 1974) and Japan (*D. kibiensis* Niko, 1999, *D. vermiculatus* Niko, 1999). This paper describes *D. miyakei* sp. nov. as

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(Manuscript received 30 November, 2009; accepted 21 December, 2009)

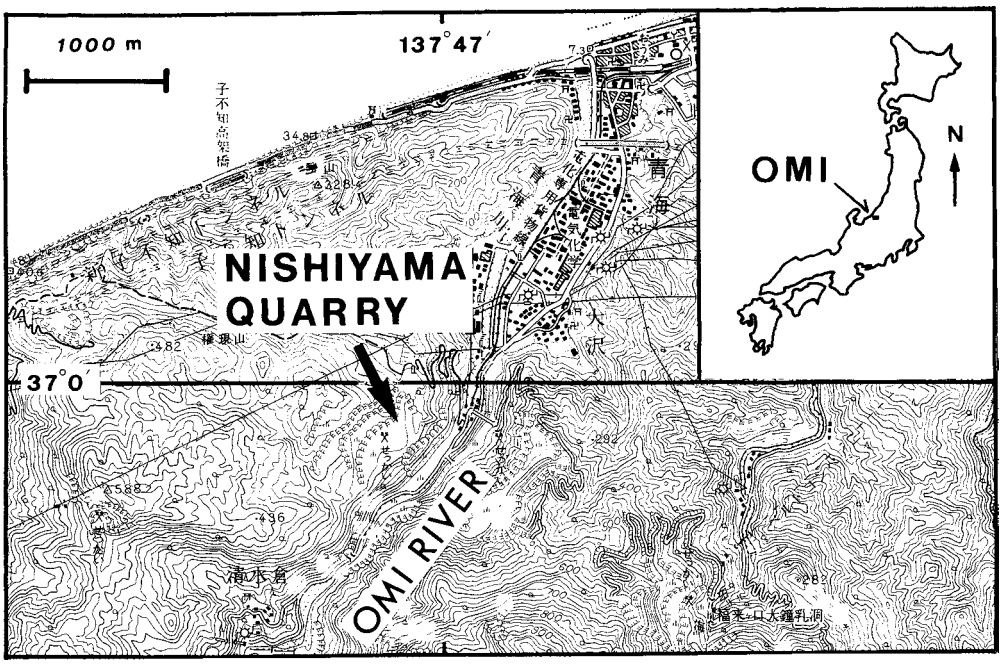


Fig. 1. Index map showing the fossil locality (Nishiyama quarry) in the Omi area, on the topographical maps of "Itoigawa" and "Kotaki" scale 1:50,000 published by the Geographical Survey Institution of Japan.

a ninth member of the genus from the Omi Limestone in the Omi area, Niigata Prefecture, central Japan. The holotype and only known specimen of the new species was collected from a float block of limestone (bioclastic to peloidal wackestone) in the Nishiyama quarry located on a western bank of the Omi River (Fig. 1), where the lower part of the limestone, including the *Endothyra*, *Eostaffella-Millerella* and *Profusulinella* Zones, is exposed. The more detailed geologic background of the fossil locality is referable in Hasegawa et al. (1982) and Tazawa et al. (2002).

Systematic Paleontology

Order Favositida Wedekind, 1937
Suborder Favositina Wedekind, 1937
Superfamily Favositoidea Dana, 1846
Family Cleistoporidae Easton, 1944
Genus *Donetzites* Dampel, 1940

Type species.—*Donetzites milleporoides* Dampel, 1940.

Donetzites miyakei sp. nov.
Fig. 2

Etymology.—The specific name honors Mr. Y. Miyake, who discovered the coral.

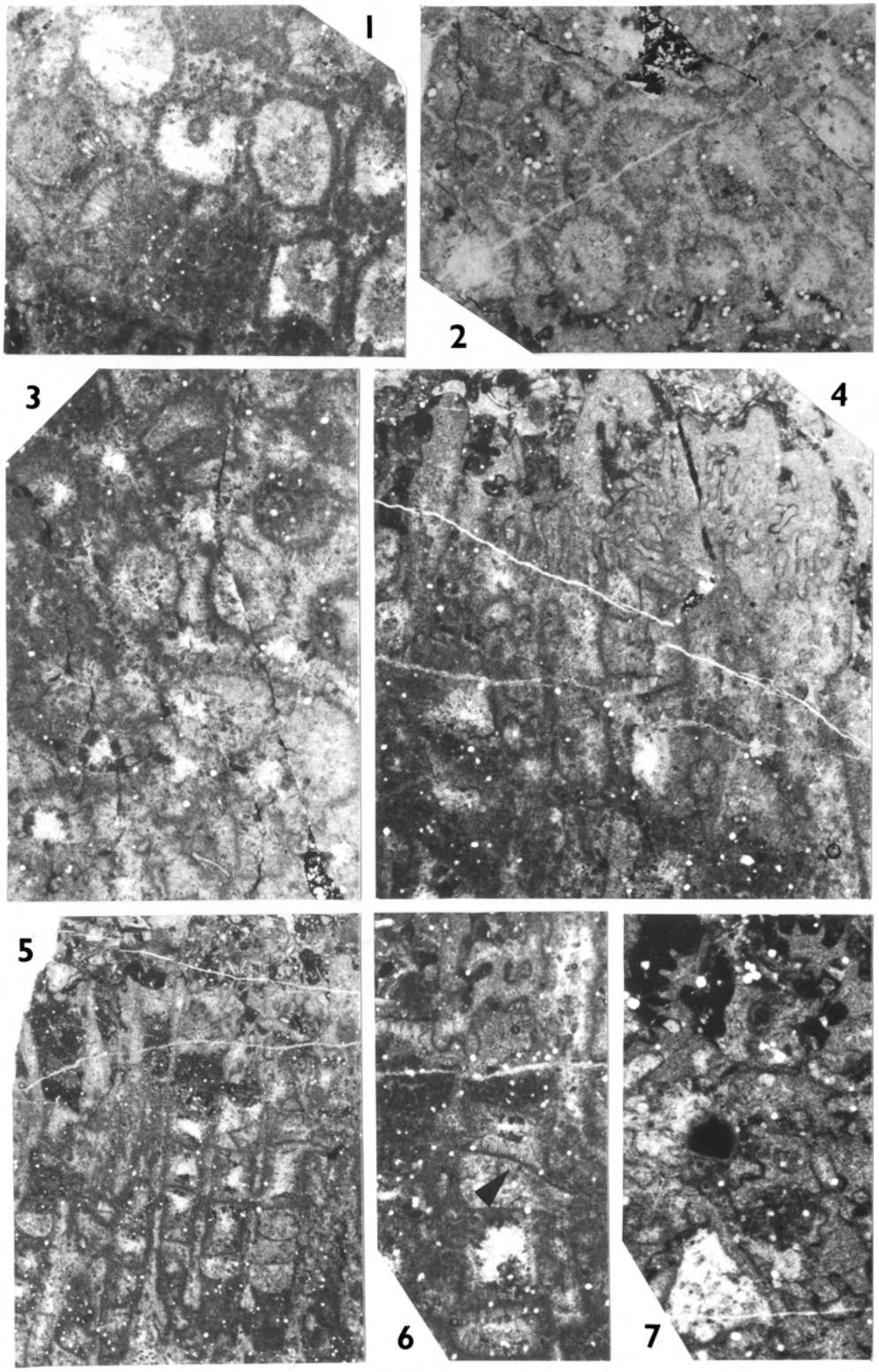
Material.—Holotype, FMM1780, from which 19 thin and three polished sections were prepared. Repository of the specimen is in the Fossa Magna Museum, Itoigawa.

Diagnosis.—Species of *Donetzites* with sub-discoid corallum; approximate diameters of corallites are 1.9 mm; intercorallite walls 0.19-0.94 mm in thickness, rarely exhibit spongy structure; apertural margins of connecting tunnels on spongy walls bear ridge-like projections; tabula rarely continues to adjoining corallites; there are 3-8 tabulae in 5 mm.

Description.—Corallum encrusting, thick sub-discoid in growth form with nearly flat surface and bluntly pointed base, more than 110 mm in diameter and 45 mm in height, cerioid; basal holotheca probably present. Corallites subprismatic having indistinct 4-8 sided transverse sections; each corallite consists of proximal prostrate and erect distal portions; diameters of corallites range from 1.5 to 2.2 mm with 1.9 mm mean; calices shallow to very shallow; increase of new corallite is not observable in the sectioned parts of this corallum. Intercorallite walls variable in thickness, thin to moderately thick for the genus, ranging from 0.19 to 0.94 mm; microstructure of walls is not preserved; mural pores are usually common, but almost absent portion and numerous and closely spaced one are also developed as rare cases; in the latter portion, pores are anastomosed and shift to connecting tunnels, where intercorallite walls indicate spongy structure; profiles of pores and tunnels are subcircular to longitudinally elliptical with 0.15-0.23 mm in usual diameter; tabularia and calical pits have subcircular transverse sections; besides apertural margins of tunnels on spongy walls that bear sinuate and anastomosed ridge-like projections, apparent septal element is absent; tabulae mostly complete, rectangular to corallites and weakly concave proximally to straight in longitudinal section; in rare cases, tabula continues to adjoining two corallites through mural pore; there are 3-8 tabulae in 5 mm of corallite length.

Age.—Judging from associated foraminifers, with *Donetzites miyakei* sp. nov., characterized by dominance of *Eotuberitina*, *Endothyra*, *Planoendothyra, Haplophragmella* and *Tetrataxis*, and by absence of primitive fusulinaceans such as *Eostaffella* and *Millerella*, the present coral specimen is derived from the *Endothyra* Zone indicating the late Visean (Early Carboniferous) age (Watanabe, 1975; Ueno and Nakazawa, 1993).

Discussion.—*Donetzites miyakei* sp. nov. from the late Visean *Endothyra* Zone of the Omi Limestone represents the oldest record for the genus. The only other possible Early Carboniferous occurrence has been recorded by *D. kibiensis* Niko, 1999 and *D. vermiculatus* Niko, 1999, whose stratigraphic horizon is slightly younger than that of the new species, namely they occur from the *Eostaffella-Millerella* Zone (late Visean to early Bashkirian) in the Hina Limestone, Okayama Prefecture, southwest Japan. The accreated reef complexes, including the Hina and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Omi Limestones, of the Akiyoshi Terrane were formed near the equator of the Panthalassa Ocean in Early Carboniferous time (e.g., Ozawa and Kanmera, 1984; Ross and Ross, 1990). Although direct ancestor of *Donetzites* is uncertain, there is a possibility that the genus is considered to have originated in the central Panthalassa and succeeded in spreading to the Tethys under influence of a westward warm current.

Except for their dimensions, *Donetzites miyakei* resembles *D. vermiculatus* Niko (1999, p. 35, 37, figs. 5-1-4) in respects of its overall shape of the corallum, intercorallite wall structure and tabula nature. The new species has smaller corallite diameters (approximately 1.9 mm) and much thinner intercorallite walls (0.19-0.94 mm), whereas measurements of *D. vermiculatus* are respectively approximately 3.3 mm and attaining 1.56-2.44 mm.

Acknowledgements

We thank Mr. Y. Miyake of Takayama City for bringing the tabulate coral specimen of *Donetzites* to our attentions, and he kindly donated it to the Fossa Magna Museum. We are also indebted to the reviewer Dr. I. Niikawa of the Department of Geology, Niigata University for his critical and constructive discussions.

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⬅ **Fig. 2.** *Donetzites miyakei* sp. nov., holotype, FMM1780, thin sections. **1, 2, 3:** transverse sections of corallites, × 10, **4:** longitudinal sections of corallites, showing spongy structure of intercorallite walls, × 10, **5:** longitudinal sections of corallites, × 5, **6:** longitudinal sections of corallites, arrow indicates continuous tabula, × 10, **7:** transverse sections of corallites, showing ridge-like projections, × 14.

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