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Yakunopora mabutii, a New Species of Tabulate Coral from the Permian Iwaizaki Limestone, Miyagi Prefecture, Japan

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Abstract A pachyporid tabulate coral, *Yakunopora mabutii* sp. nov., is described from the Wordian (middle Middle Permian) gray limestone of the Iwaizaki Limestone in the South Kitakami Belt, Miyagi Prefecture, Northeast Japan. The genus *Yakunopora* was elected on the basis of *Y. matsushitai* Niko, 2005, from the Wuchiapingian (lower Upper Permian) rocks in the Maizuru Belt. This new species can be distinguished from *Y. matsushitai* by characters of its septal spines and squamulae. The present discovery represents the second record of this genus and suggests the juxtaposition of the South Kitakami and Maizuru Belts in Permian time.

Key words: Wordian (middle Middle Permian), South Kitakami Belt, Iwaizaki Limestone, tabulate coral, Pachyporidae

Introduction

The Permian rocks of the South Kitakami Belt in Northeast Japan consist of shallow marine carbonates and thick clastic deposits. The Iwaizaki Limestone, named by Mabuti (1935a), is a representative in the former strata. It crops out around the Cape Iwaizaki in Kesennuma City, Miyagi Prefecture (Fig. 1). Kawamura and Machiyama (1995) subdivided the limestone into eight lithologic units. The main purpose of this paper is to describe a new species of pachyporid tabulate coral derived from Unit 6 in their subdivision. This unit predominates coral and algal biolithites indicating reef facies (Shen and Kawamura, 2001) and belongs to the *Pseudofusulina paramotohashii* fusulinacean zone of Wordian (= middle Guadalupian; middle Middle Permian) age (Morikawa, 1960).

Well-preserved and diverse shallow marine fossils occur in the Iwaizaki Limestone. Among them, rugose corals have been reported by several authors (e.g., Morikawa *et al.*, 1958; Minato, 1955; Minato and Kato, 1965), whose generic composition is *Iranophyllum*, *Lophophyllidium*, *Parawentzelella*, *Waagenophyllum*, *Wentzelella*, and *Yatsengia*. On the other hand, little has been published on reliable records of tabulates, except for some preliminary references, such as "*Michelinia*", *Sinopora*, and *Syringopora* (Mabuti, 1935a, b; Kawamura and Machiyama, 1995).

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 ***Yakunopora*** Niko, 2005

Type species: *Yakunopora matsushitai* Niko, 2005.

Yakunopora mabutii sp. nov.

(Figs. 2-1–5)

Material examined: Holotype: NMNS

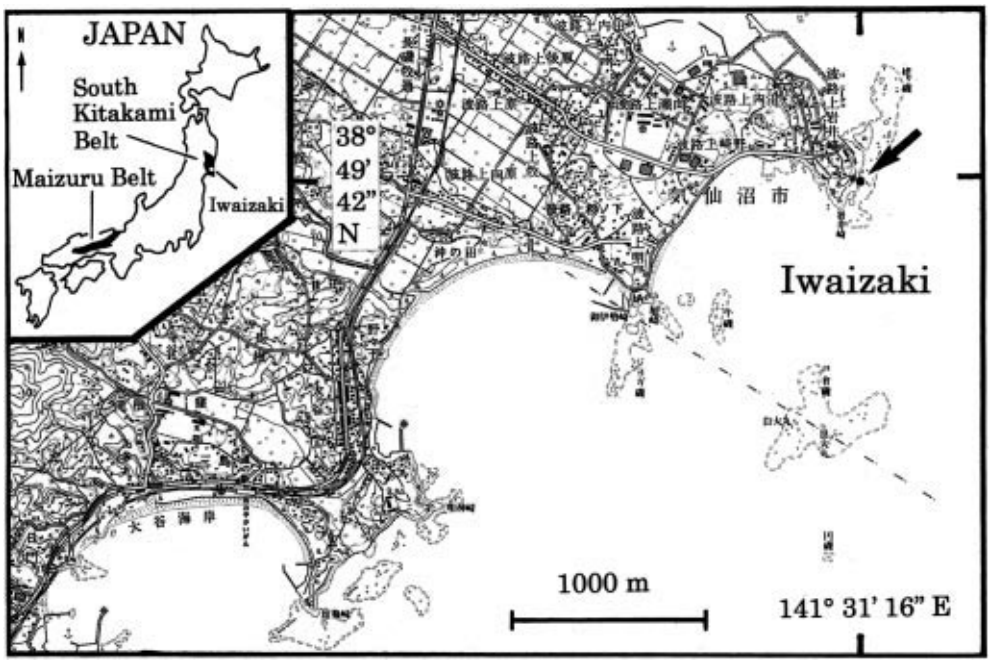

Fig. 1. Index map showing fossil locality (arrow) at the Cape Iwaizaki, Miyagi Prefecture, on the topographic map of "Tuya" scale 1:25,000 published by the Geographical Survey Institute.

PA18337, from which two thin sections were made. In addition, nine thin sections were studied from five paratypes, NMNS PA18338–18342. Repository of these specimens is National Museum of Nature and Sciences, Tokyo.

Diagnosis: Species of *Yakunopora* with short conical septal spins at distal portions of corallites; squamula spacing variable, 0–9 squamulae in 1 mm.

Description: Six fragmentary branches available for study. They are subcylindrical, cerioid, and composed by subprismatic corallites; diameters of branches are slender, 2.5 to 4.5 mm. Corallites gradually divergent having indistinct polygonal transverse sections with 4–7 sides in axial zone of branch, then they turn outwardly to form peripheral zone; transverse sections of distal corallites are rounded subpolygonal; corallite diameters are small for the family, 0.5–1.4 mm with 1.0 mm mean in distal portion; there are approximately 20 corallites in transverse section; calices shallow; calical opening obliquely upward with 42°–57° in angle to branch surface; transverse sections of lumina are polygonal to rounded subpolygonal; no increase of new corallite observed in examined thin sections. Intercorallite walls relatively thick even in axial zone, 0.15–0.21 mm, then they gradually more thickened and attaining 0.63 mm in peripheral one; microstructure of intercorallite walls differentiated into median dark line and stereoplasm; constituents of the latter layer are rect-radiate fibers; mural pores well-developed and have longitudinally elliptic to circular profiles; in thickened walls, they shift mural tunnels; diameters of pores (tunnels) are small, approximately 0.15 × 0.19 mm, 0.13 mm in typical ones; septal spines common but restricted at distal portions; short conical in form with approximate length of 0.06 mm; squamulae alternately arranged, well-developed; spacing of squamulae is variable, ranging from almost absent to crowded; there are 0–9 squamulae in 1 mm of corallite length; each squamula is thin, very long; profiles of squamulae somewhat variable, ranging from weakly concave to weakly convex, or oblique; tabula-

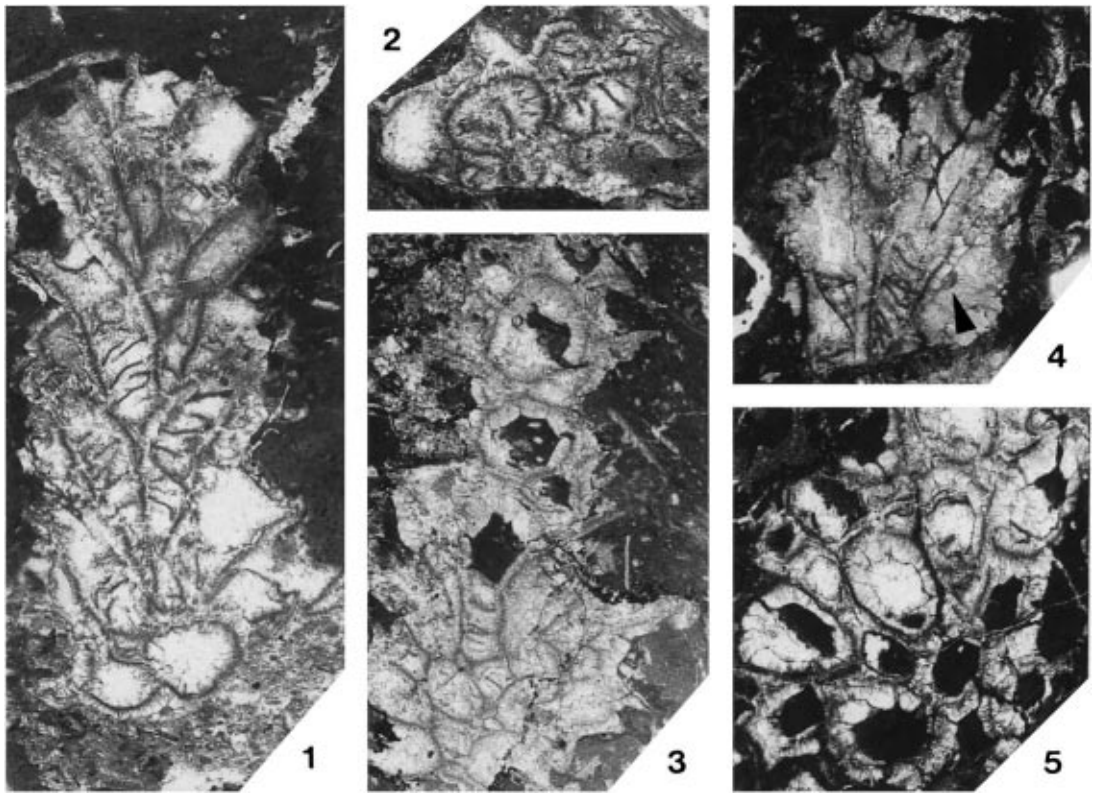

Fig. 2. *Yakunopora mabutii* sp. nov., thin sections. **1**, **2**, holotype, NMNS PA18337; **1**, longitudinal section of branch, ×10; **2**, transverse section of branch (incomplete), ×10. **3**, paratype, NMNS PA18340, longitudinal (out of central axis) to oblique section of branch, ×10. **4**, **5**, paratype, NMNS PA18338; **4**, longitudinal sections of corallites, arrow indicates mural tunnel, ×10; **5**, transverse sections of corallites, ×10.

like thin diaphragms between adjoining two squamula and dissepiments on squamula are rarely developed.

Etymology: The specific name honors the late Dr. Seiiti Mabuti, in recognition of his geological and paleontological results concerning the Iwaizaki Limestone.

Occurrence: Wordian (= middle Guadalupian; middle Middle Permian) gray limestone (bioclastic packstone to grainstone) in coral biolithite.

Discussion: The type species, *Yakunopora matsushitai* Niko (2005, p. 34, 36, figs. 2-1–7; 3-1–5), previously was an only known species of the genus. This species was recovered from the Wuchiapingian (lower Upper Permian) "Takauchi Limestone" in the Maizuru Belt, Kyoto Prefecture, Southwest Japan. *Yakunopora mabutii* sp. nov. closely resembles *Y. matsushitai*, but it differs in its possession of short conical septal spins and partly absence of squamulae. The present discovery from the Wordian limestone extends downwardly the stratigraphic range of *Yakunopora* to middle Middle Permian.

Paleobiogeographic implications of the Iwaizaki fauna and flora have been discussed using various taxa, such as rugose corals (Minato and Kato, 1965), fusulines (Ishii, 1990), reef builders (Kawamura and Machiyama, 1995), ammonoids (Ehiro, 1997), and gastropods (Isozaki and Kase, 2014). These results generally suggest close relationships between the Iwaizaki Limestone and the South China Continent. Taking previously known and the present new evidences into consideration, the Permian deposits of the South Kitakami Belt including the Iwaizaki Limestone were formed in juxtaposition

with the Maizuru Belt on a continental self of South China.

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