443. ADDITIONAL NOTES ON LATE PALAEOZOIC CORALS FOUND IN THE SOUTHERN PART OF THE TAMBA DISTRICT*

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The writers previously studied the late Palaeozoic corals found in the southern part of the Tamba District and resulted in describing twelve species in six genera of the Rugosa (SAKAGUCHI, S. and YAMAGIWA, N., 1958). Later, they have obtained several new specimens of the rugose coral during their field survey of the same district. Besides these materials, they have been permitted to study some specimens of coral in the collection of the Geological Institute of the Kyoto University and in SHIMIZU's possession. In this article is given the result of the study on the materials mentioned above.

Faunal evidences indicate the upper palaeozoic rocks of the district to be of middle to lower Permian age, but there are very thick non-fossiliferous strata above and below the fossiliferous ones. It is, however, thought that the overlying strata indicate an upper Permian age and the underlying ones, at least its lower part, extend into the Carboniferous. The fauna of this district is characterized by a rather abundant fusulinids as well as a considerable amount of corals.

The stratigraphical sequence and the faunal zonation have been already reported in detail by one of the writers (SAKAGUCHI, S., 1961).

The zonal subdivision of this district based on fusulinids is quoted here, together with accompanying corals of each zone:

IV Yabeina zone
- 6. Waagenophyllum indicum subzone

III Neoschwagerina zone
- 5. Neoschwagerina craticulifera subzone

II Parafusulina zone
- 4. Parafusulina kuramensis subzone
- 3. Misellina sp. subzone

I Pseudoschwagerina zone
- 2. Pseudofusulina vulgaris subzone
- 1. Triticites montiparus subzone

The Triticites montiparus subzone marks the lowest fossil horizon of this district and includes such as Clissophyllum awa (MINATO), Dibunophyllum? omorii SAKAGUCHI and YAMAGIWA, Stylophyllum sp. indet. (S. kinkiense SAKAGUCHI and YAMAGIWA, n. sp.), and Ileritschioides

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Shigeo SAKAGUCHI and Nobuo YAMAGIWA

sp. indet. As discussed in the previous paper, the former two species are of Carboniferous type of the rugose coral but are found in strata referred to the *Triticites montiparnus* subzone. The *Pseudofusulina vulgaris* subzone contains a considerable amount of corals together with leading forms of fusulinid of the subzone. As for corals of this subzone, they include *Heritschioides ojensis* SAKAGUCHI and YAMAGIWA, *Heritschioides ozakii* SAKAGUCHI and YAMAGIWA, *Heritschioides* sp. indet., *Polythealis? mean-droides* SAKAGUCHI and YAMAGIWA. *Styli-dophyllum kameokense* SAKAGUCHI and YAMAGIWA, and *Styli-dophyllum quadradatum* SAKAGUCHI and YAMAGIWA. None of coral is reported from the *Parafusulina kuramensis* subzone but a coral, genus and species indetermined, is found in the *Misellina* sp. subzone. The *Neoschwagerina craticulifera* subzone yields *Huangia izuruhensis* (SAKAGUCHI and YAMAGIWA) and *Huangia?* sp. indet. The *Waagenophyllum indicum* subzone includes a typical form of *Waagenophyllum indicum* (WAEGEN and WENTZEL). *Waagenophyllum tambense* SAKAGUCHI and YAMAGIWA, n. sp., is found in a limestone immediate below this subzone. There is another rugose coral, *Huangia* sp. indet., which was found by the late Shintaro NAKAMURA of the Kyoto University in the Western Hills of Kyoto, but unknown to what horizon to belong.

The writers wish to express their hearty thanks to the following gentlemen: to Professor Susumu MATSUSHITA of the Kyoto University of Kyoto, who permitted them to study the materials in his institute, and also to Mr. Teruo SHIMIZU, the president of the Nippon Chikagakusha of Kyoto, for his kind offer of corals in his collection.

### Description of Coral Species

**Genus *Styli-dophyllum***

FROMENTAL, 1861

**Styli-dophyllum kinkiense** SAKAGUCHI and YAMAGIWA n. sp.

Pl. 2, figs. 1a, 1b, 2.

Corallum compound, massive; composed of prismatic corallites, polygonal, usually five-sided in transverse section. Corallite usually 7-9 mm in diameter of transverse section in mature stage. External wall thick and prominent, bearing coarse denticles on all sides, which correspond to septa in number. Axial structure less than 2 mm in diameter; composed of a few septal lamellae and axial tabellae. Median plate relatively distinct. Septa of two orders, major and minor alternating. Major ones moderately thick, 17 to 22 in number and almost reach axial structure; counter septum connecting with median plate. Minor ones thinner, usually one-half to two-thirds length of major. Septa slightly sinuous, thick in medial area, being gradually thinner towards axis, and most of them disappearing into meshes of vesicles towards periphery, but some connecting with denticles of external wall. Dissepiments arranged in londaleoid pattern showing rather regular cysts, all convex towards axis.

In longitudinal section, tabularium almost occupied by axial structure, but sometimes short horizontal tabulæ observed. Tabellae more steeply ascending to axis. Dissepiments relatively long, slightly curved, their convex sides facing inwards and upwards.

**Comparison:**—This species has been reported as *Styli-dophyllum* sp. indet. in the previous paper (SAKAGUCHI and YA-
Late Palaeozoic Corals

Genus *Waagenophyllum*

**HAYASAKA, 1924**

*Waagenophyllum tambense* **SAKAGUCHI and YAMAGIWA, n. sp.**

Pl. 2, figs. 3a, 3b.

Corallum fasciculate, composed of cylindrical corallites. Corallites usually 4 to 7 mm in diameter in transverse section. External wall relatively thin. Septa of two orders, major and minor in alternation. Sometimes tertiary septa present. Numbering 22 to 28 for major septa and as many for minor ones, both being more or less sinuous. Major septa very thick at proximal ends and thin distally, mostly reaching near axial structure. Minor ones usually half to two-thirds length of major and relatively thinner. Dissepiments mostly arranged concentrically. Axial structure small in size, with a width of about one-fourth to one-sixth diameter of corallites, composed of axial tabellae and septal lamellae. Median plate relatively distinct.

In longitudinal section, tabularium entirely occupied by axial structure; tabula absent. External part of dissepimentarium composed of small vesicles, facing upwards and inwards. Internal part of dissepimentarium composed of elongate, slightly curved vesicles facing inwards or inwards as well as upwards. Axial structure composed of steeply ascending tabellae and a distinct median plate. Tabularium about one-fourth width of corallites.

**Comparison:** This new species is closely related to *Waagenophyllum akasakensis* (YABE, 1909, p. 4, text-fig. 1; YABE and HAYASAKA, 1915, p. 100; OZAWA, 1925, p. 75, pl. 14, figs. 5, 6; SMITH, 1935, p. 36; MINATO, 1955, pp. 104, 105, pl. 37, figs. 6, 7) described from the Middle...
Shigeo SAKAGUCHI and Nobuo YAMAGIWA

Permian at many places of Japan in size of corallites and number of septa. It differs, however, from the latter in having shorter minor septa, tertiary septa and no tabula in longitudinal section. It closely resembles Waagenophyllum indicum (WAAGEN and WENTZEL, 1866, pp. 897-900, pl. CI, figs. 1-3, pl. CXV, figs. 3, 4; YABE and HAYASAKA, 1915, pp. 97, 98; SMITH, 1935, p. 32, pl. 8, figs. 1-6; MINATO, 1943, pp. 52-54, pl. 1, figs. 1-4; MINATO, 1955, pp. 102, 103, pl. 21, figs. 1, 2; pl. 26, figs. 2, 4-6, 8; SAKAGUCHI and YAMAGIWA, 1958, pp. 175, 176, pl. 5, figs. 4-7), but differs from the latter in having tertiary septa. It also resembles Waagenophyllum nogamie YAMAGIWA (MS) from the Atetsu Limestone, Oka-yama Prefecture, Japan. The difference between the above two species is shown by smaller corallites and smaller axial structure of the Tamba form. and moreover it has tent-shaped axial tabellae instead of dome-like ones of the Atetsu specimen. It is distinguished from Waagenophyllum polyseptata MINATO (1955, pp. 105-107, pl. 21, fig. 3) found in the Middle Permian of the Kitakami Mountainland, Northeast Japan in the following respects; the present species has smaller corallites, less numerous septa in transverse section, and has no tabula in longitudinal section.

Locality and Horizon:—Specimens were collected by Professor Susumu MATSUSHITA of the Kyoto University in a limestone quarry east of Ogonjo, Oharano, Ukyo-ku, Kyoto City. This limestone occurs immediate below a limestone yielding Waagenophyllum indicum (WAAGEN and WENTZEL) of the Yabeina zone in the upper part of the Izuruha Formation. Middle Permian.

Repository.—Deposited in Geological and Mineralogical Institute, University of Kyoto. Reg. nos. JPC 10030a (holotype), 40030b (holotype).

Genus Heritschioides YABE, 1950

Heritschioides sp. indet.

Pl. 2, figs. 4a, 4b.

Corallum fasciculate, composed of cylindrical corallites. Corallites usually 11 to 13 mm in diameter in transverse section. Septa of two orders, major and minor in alternation. Numbering 20 to 23 for major and as many for minor ones, both being straight or slightly sinuous. Major ones mostly reach axial structure, thick in medial area and thinner towards both ends: some of them connecting with septal lamellae. Minor ones thin, usually one-half to two-thirds length of major. Dissepiments arranged in concentric or angulo-concentric pattern. Axial structure occupies a space of about one-third diameter of corallite. Median plate indistinct.

In longitudinal section, dissepimentarium composed of small vesicles with their convex sides inwards. Tabulae incomplete, composed of small vesicles with their convex sides upwards and outwards, steeply ascending to axial structure. Tabellae composed of small vesicles with their convex sides outwards as well as upwards, steeply ascending to axis. Median plate indistinct. Tabularium occupies two-thirds of entire space of corallite. Axial structure about one-half width of tabularium.

Comparison:—The present species resembles Heritschioides ojensis SAKAGUCHI and YAMAGIWA (1958, pp. 170, 171, pl. 1, figs. 4-6) from Oji and Heritschioides ozakii SAKAGUCHI and YAMAGIWA (1958, pp. 171, 172, pl. 1, figs. 7-9; pl. 3, figs. 1, 2) from Inukanno, both at Kameoka City, Kyoto Prefecture. It seems to indicate an intermediate form
between the above two species in transverse section, but can be distinctly discriminated from them in longitudinal section. Therefore, if better preserved material is obtained in future, the present species will be able to be proposed as a new species.

As far as the general structure of corallite in transverse section concerned, the present species and *Heritschioides ojensis* are almost nearly indistinguishable. In longitudinal section, however, it has more steeply ascending tabulae than those of the Oji form. It also differs from *Heritschioides ozakii* in larger axial structure of the former and in having steeply ascending tabellae instead of rather dome-like ones of the latter in longitudinal section.

**Locality and Horizon:** Specimen was found by Naoya NASHIKI of the Higashi Middle School, Ibaragi City in an old quarry near Konzoji, Oharano, Ukyo-ku, Kyoto City. The limestone of this quarry is referred to the *Triticites montiparus* subzonc in the lower part of the Tano Formation in the Western Hills of Kyoto (Kyoto-Nishiyama). Lower Permian.

**Repository:** Deposited in Geological Institute, Osaka Gakugei University. Reg. nos. IGOG 62004a, 62004b.

**Genus Huangia YABE, 1950**

*Huangia* sp. indet.

Pl. 2, figs. 5a, 5b.

Corallum fasciculate, composed of cylindrical corallites, usually 7 to 10 mm in diameter of transverse section in mature stage. Major septa 17 to 22 in number, alternating with an equal number of minor ones. Major ones slightly thick in medial area, thinning both ends, reaching axial structure: some of them connecting with septal lamellae. Minor ones thinner, less than half length of major. Septa almost connected with external wall, but sometimes disappearing into meshes of vesicles of peripheral area. Axial structure loose, composed of septal lamellae and axial tabellae. Median plate usually lacking; it resembles that of the genus *Siphonodendron* in younger stage. Dissepiments arranged concentrically in younger stage, but becoming pseudo-herring bone pattern in mature stage.

In longitudinal section, dissepimentarium composed of vesicles with their convex sides facing upwards as well as inwards. Outer tabularium broad, composed of complete or incomplete horizontal tabulae. Tabellae show dome-like structure. Tabularium occupies three-fifths of entire space of corallite. Axial structure one-third width of tabularium.

**Comparison:** It is reported that this specimen was collected by the late Shintaro NAKAMURA near Izuruha, Takatsuki City, Osaka Prefecture. However, the writers' recent studies show that there is absent such a black limestone contained the present specimen near Izuruha but present near Kurama in the Northern Hills of Kyoto. For this reason, if it were to be obtained in any other places than Izuruha, it would be found in a black limestone belonging to the *Misellina* sp. subzone at Kurama.

This species closely resembles *Huangia hashimotoi* (NAGAO and MINATO, 1941, pp. 102-105, pl. 27, figs. 1-5; MINATO, 1955, pp. 123-125, pl. 2, figs. 1-3; pl. 22, figs. 3, 4, 6) in the general structure of the transverse section, but the former is smaller in size and fewer in number of septa.

**Locality and Horizon:** According to Susumu MATSUSHITA of the Kyoto University, this specimen was collected by
Shintaro Nakamura near Izuruha, Takatsuki City, Osaka Prefecture but the exact locality remains unknown. Probably Middle Permian.

Repository:—Deposited in Geological and Mineralogical Institute, University of Kyoto Reg. nos. JPC 40031a, 40031b.

References


Nagao, T. and Minato, M. (1943) : Covreonia hashimotoi, a new Tetracoral from the Upper Palaeozoic of Sikoku. Ibid., Vol. 6, No. 2, pp. 101-105, pl. 27.


— and Yamagiwa, N. (1958) : The Late Palaeozoic Corals from the Southern Part of the Tanba District. Ibid., No. 7, pp. 163-178, pls. 1-5.


Explanation of Plate 2

Stylidophyllum kinkiense Sakaguchi and Yamagiwa, n. sp.
Figs. 1a-b...x3.5
1a. Transverse section of the holotype (Reg. no. IGOG 62002a)
1b. Longitudinal section of the holotype (Reg. no. IGOG 62002b)
2. Transverse section (Reg. no. IGOG 62003)
Locality : Kannontoge, Sonobe-cho, Funai-gun, Kyoto Prefecture.

Waagenophyllum tambense Sakaguchi and Yamagiwa, n. sp.
Figs. 3a-b...x4.0
3a. Transverse section of the holotype (Reg. no. JPC 40030a)
3b. Longitudinal section of the holotype (Reg. no. JPC 40030b)
Locality : Ogonjo, Oharano. Ukyo-ku, Kyoto City.

Heritschoides sp. indet.
Figs. 4a-b...x3.5
4a. Transverse section (Reg. no. IGOG 62004a)
4b. Longitudinal section (Reg. no. IGOG 62006b)

Huangia sp. indet.
Figs. 5a-b...x3.5
5a. Transverse section (Reg. no. JPC 40031a)
5b. Longitudinal section (Reg. no. JPC 40031b)
Locality : ? Izuruha, Takatsuki City, Osaka Prefecture.
SAKAGUCHI and YAMAGIWA: Late Palaeozoic Corals

Plate 2

Ishii and Aoki photo.