MEMOIRS OF THE COLLEGE OF SCIENCE, UNIVERSITY OF KYOTO, SERIES B,
Vol. XXVI, No. 2 Geology and Mineralogy, Article 1, 1959

Dedicated to Professor Jiro Makiyama in Commemoration
of his Retirement on the 16th Octover of 1959

Fusulinids from the Maizuru Zone, Southwest Japan

Part 2*. Derived Fusulinids

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(Received Aug. 14, 1959)

Abstract

This short paper is the second of the series of reports, and deals with the derived fusulinids obtained from the limestone-pebbles of the conglomerates. The fusulinids, divided into six assemblages of different ages, are correlated with those of the plateau-limestones in the other regions of southwest Japan.

Introduction

The upper Permian Maizuru group in the Maizuru zone is composed mainly of shales intercalating with discontinuous conglomerates at two or three horizons. The conglomerates yield not only *Yabeina-Lepidolina* faunule in the matrices, but also derived fusulinids in the limestone-pebbles. The pebbles measure generally 1 to 10 cm, rarely 20 cm, in diameter, and although rather rarely, contain such fossils as fusulinids, corals, crinoid-stem and others. One of the corals was already described as *Siphonodendron nakazawai* by MINATO and KATO (1957). In the derived fusulinids 11 genera and about 20 species are discriminated, several species of which are described in the present paper.

Geological Consideration

In the "Inner Side of Southwest Japan" intermittently distributed thick limestones, such as Akasaka, Ibukiyama, Atetsu, Taishaku and Akiyoshi, form an east-west line. The Maizuru zone cuts obliquely their trend and divides them into two groups; the former two limestones belong to the east group, the latter three to the west one (see Textfig. 1). The region adjacent to the northwest of the Maizuru zone, which is now occuppied by later granites or other igneous rocks and the Tertiary deposits, corresponds to the eastern extension of the west group of the

* In the first report, the derived fusulinids were scheduled to be treated in part 3, but they are transferred to part 2 for some reasons.

Textfig. 1. Distribution of the Maizuru Zone and Limestone-masses.

limestones mentioned above. On the other hand, the region adjacent to the southeast of the Maizuru zone is composed chiefly of the non-calcareous upper Palaeozoic rocks which include only small lenses as for limestone. The limestone-pebbles of the Maizuru zone are so exceeding in quantity and in size that they seem to have been transported from near land. From the accounts mentioned above it is probable that

Table 1. Fusulinid Zone and Correlation.

	West Group		East Group		
	Akiyoshi	Atetsu	Ibukiyama	Akasaka	Maizuru Zone
	TORIYAMA (1954, 1958)	NOGAMI (unpublished)	KOBAYASHI (1957)	MORIKAWA & others (1956)	
Pm 3	*Yabeina shiraiwensis*	*Y. shiraiwensis* zone	*Y.* cf. *katoi*	*Y. globosa* ~*Y. katoi* z.	
Pm 2	*Neoschwagerina douvillei*	*N. douvillei* ~*N. margaritae*	*N. margaritae* subzone	*N. margaritae* zone	*N. douvillei* ~*N. margaritae*
Pm 1	*Neoschwagerina craticulifera*	*N. craticulif.* ~*N. haydeni* z.	*N. craticulifera* subzone	*N. wakimizui* ~*N. craticuli.*	*N.* aff. *simplex*
Pl 4	*Parafusulina kaerimizensis*	*Pseudofusulina kraffti magna*	*Parafusulina sapperi* sz.	*Schwagerina japonica* z.	*Pseudofusulina* sp. A
Pl 3	*Pseudofusulina ambigua* sz.	~*Parafusulina kaerimizensis*	*Pseudofusulina ambigua* sz.		
Pl 2	*Pseudofusulina vulgaris* sz.	*Pseudofusulina vulgaris* zone	*Acervoschwagerina* spp. sz.		*Pseudofusulina yobarensis*
Pl 1	*Triticites simplex* subz.	*T.* spp. ~*Schwagerina alpina* z.			*Triticites* sp. A
Cm	*Fusulinella biconica* sz.	*Fusulinella* cf. *bocki* z.			*Fusulinella itoi*
	——	——			

the source area of the pebbles was situated to the northwest of the Maizuru zone, although the area is now replaced by the younger rocks. The palaeontological study on the derived fusulinids will lead the same estimation.

The above-stated limestone-masses have been studied by many geologists, and the results are summarized as shown in the Table 1. The derived fusulinids are divided into six assemblages of different ages as follows in descending order.

6. *Neoschwagerina douvillei—N. margaritae* Assemblage
   N. douvillei, N. margaritae, Sumatrina sp.
   Verbeekina sp., *Pseudodoliolina* sp.,
   Schwagerina sp. **A,** *S.* sp., *Schubertella* sp.,
5. *Neoschwagerina* aff. *simplex* Assemblage
   N. aff. *simplex, Schwagerina* sp.
4. *Pseudofusulina* sp. **A** Assemblage
   P. sp. **A,** *Schwagerina* sp., *Schubertella* sp.
3. *Pseudofusulina yobarensis* Assemblage
   P. yobarensis, P cf. *vulgaris, Schwagerina* sp. **B**
   S. sp. **C,** *Nankinella* sp., *Schubertella* sp.
2. *Triticites* sp. **A** Assemblage
   T. sp. **A,** *T.* spp., *Pseudofusulina* sp.,
   Pseudoschwagerina sp., *Nankinella* sp.,
   Schubertella sp.
1. *Fusulinella itoi* Assemblage
   F. itoi, F. sp

The 1st assemblage characterized by *Fusulinella itoi* is safely correlative with the fauna of *Fusulinella biconica* subzone in Akiyoshi and of *F.* cf. *bocki* zone in Atetsu. The assemblage is Moscovian in age and indicates the lowest horizon among the six. *Triticites* spp. and *Pseudoschwagerina* sp. of the 2nd assemblage are similar to the fauna of the lowest Permian zone in Atetsu. The 3rd assemblage, being represented by *Pseudofusulina yobarensis* and *P.* cf *vulgaris,* is compared with the fauna of *Pseudofusulina vulgaris* subzone in Akiyoshi, and of the similarly named zone in Atetsu and furthermore of *Acervoschwagerina* spp. subzone in Ibukiyama. *Pseudofusulina* sp. **A** is much allied to *P. kraffti magna* in many important characters, and it is highly probable that the former is conspecific to the latter. So the 4th assemblage of *P.* sp. **A** may be correlated to the fauna of *P. kraffti magna —Parafusulina kaerimizensis* zone in Atetsu and also to that of *Pseudofusulina ambigua* subzone in Akiyoshi and Ibukiyama. In the degree of the evolutionary development *Neoschwagerina* aff. *simplex* is almost identical with *N. simplex* which is abundantly found from the lowest part of *N. wakimizui—N. craticulifera* zone in Akasaka. The 6th assemblage of *N. douvillei—N. margaritae* is safely compared with the fauna of the similarly named zone in Atetsu, and consequently correlative with the fauna of *N. douvillei* subzone in Akiyoshi and also with that of *N. margaritae* in Akasaka and Ibukiyama.

In the limestone-masses throughout the "Inner Side of Southwest Japan" the Pm1 zone is characterized by a fauna which is mainly composed of *Neoschwagerina craticulifera* and *N. haydeni*. The Pm2 and Pm3 zone, however, are not represented by such a single fauna. The faunal character of the Pm2 zone is given by *N. douvillei* in Akiyoshi, firstly by *N. douvillei* and secondarily by *N. margaritae* in Atetsu, and by *N. margaritae* in Akasaka and Ibukiyama. Namely the fauna in the west group is in contrast with that in the east one. The Pm3 zone shows a remarkable faunal contrast between the two groups: the east group is represented by *Yabeina globosa—Y. katoi* fauna, while the west by *Yabeina shiraiwensis* fauna. The details concerning the faunal contrast will be treated in the near future. Judging from the above-mentioned correlation, the derived fusulinids of the Maizuru zone are considered to be closely related to those in the west group of the limestone-masses, and they suggest the presence of the similar plateau-limestone in the area now represented by igneous rocks and the Tertiary deposits to the northwest of the Maizuru zone.

Description of Species

Family FUSULINIDAE MÖLLER, 1878

Subfamily FUSULININAE RHUMBLER, 1895

Genus **Fusulinella** MÖLLER, 1877

Fusulinella itoi OZAWA

pl. 1, figs. 1–4.

Fusulinella itoi OZAWA, 1925, Jour. Coll. Sci., Imp. Univ. Tokyo, vol. 45, art. 6, p. 19, pl. 3 figs. 6–8.

Fusulinella itoi, TORIYAMA, 1958, Mem. Fac. Sci., Kyushu Univ., Ser. D, vol. 7, pp. 48–52, pl. 4, figs. 3–6.

Shell is small, bulged fusiform, with inflated median parts, bluntly pointed poles and almost straight to broadly curving axis of coiling. Most specimens of 6 1/4 to 7 1/2 volutions are 3.7 to 4.1 mm long and 1.2 to 2.0 mm. wide, with form ratio of 1.9 to 2.1.

Proloculus is small, spherical, with outside diameter of 70–105 microns. Shell expands rather slowly and uniformly. The first two volutions are almost spherical, the following three volutions are highly inflated fusiform and beyond the sixth volution shell becomes almost like the mature shape.

Spirotheca is thin, composed of four layers. Diaphanotheca is clearly observed in every volutions except in the last volution where it is obscure. Thickness of diaphanotheca and tectum measures 5–20 microns in the inner five volutions and 15–30 microns beyond the fifth volution.

Septa are almost plain except in the polar region where they are very weakly fluted. Septal counts do not exceed 20 in the inner five volutions and 30 in the last two volutions.

Tunnel path is almost straight. Tunnel angles are 8–20 in the inner volutions and 15–25 in the outer volution. Chomata are characteristic and so well developed that they extend to the polar ends except in the last volution where they are relatively weak and not remarkably extended.

Remarks: The present form is closely allied to OZAWA's type-specimens and TORIYAMA's specimens. In order to identify it accurately, this form is examined in comparison with the specimens from Akiyoshi where they are in a good state of preservation and associated with *Beediena akiyoshiensis* (TORIYAMA). The two forms are almost identical with each other in shape, size of shell, radius vector, thickness of spirotheca, angle of tunnel, septal count and other characters.

Occurrences: Several specimens of this form have been gathered from Tadewara, Ōe-cho, Kyoto Prefect.. They are associated with a specimen of *Fusulinella* sp. (shown in pl. 1, fig. 6).

Specimens: Deposited in Geol. & Mineral. Institute, Univ. Kyoto. Reg. No. JPF-10044 to JPF-10047.

Fusulinella sp. indet.

pl. 1, figs. 5, 6.

Shell is small. Specimens at the sixth volution are 1.9 to 2.2 mm. long and 1.2 to 1.3 mm. wide, with form ratio of 1.5 to 1.7.

Proloculus is small, with outside diameter of 70–120 microns. The inner three volutions are highly inflated fusiform, and beyond the fourth volution shell is inflated fusiform with weakly pointed polar ends.

Spirotheca is thin, composed of four layers. Diaphanotheca is clearly observed beyond the second volution. Septa are almost plain throughout the length of shell.

Tunnel path is slightly irregular. Tunnel angle increases gradually toward the outer volutions. Chomata are rather strongly developed in the inner volutions but somewhat weakly in the outer volutions.

Remarks: The present species is represented by only three specimens, and further are in a bad state of preservation, so the detailed characters are not determined with accuracy.

This form resembles rather well *Fusulinella itoi* in many features, but the former differs from the latter in having thinner spirotheca, smaller tunnel angle and less extended chomata.

Occurrences: The specimens have been obtained from Tadewara, and from Nabae, Takahama-cho, Ōigun, Fukui Prefect. This form occurs together with *Fusulinella itoi* at the former locality.

Specimens: Deposited in Geol. & Mineral. Institute, Univ. Kyoto. Reg. No. JPF-10048 and JPF-10049.

Subfamily SCHWAGERININAE DUNBAR et HENBEST, 1930

Genus **Triticites** GIRTY, 1904

Triticites sp. **A** indet.

pl. 1, figs. 7–10.

Shell is small, elongate fusiform, with weakly pointed poles, slightly convex lateral slopes and almost straight axis of coiling. Most specimens of 5 to 5 3/4 volutions are 3.6 to 4.4 mm. long and 1.4 to 1.7 mm. wide, with form ratio of 2.6 to 2.9.

Proloculus is small, with outside diameter of 110 to 170 microns. The inner two or three volutions are ellipsoidal, and beyond the third volution shell is elongate fusiform.

Spirotheca is thin, composed of tectum and keriotheca. Thickness of both layers from the first to fifth volution is 5–10, 10–20, 25–30, 35–45 and 45–55 microns, respectively.

Septa are relatively numerous. Septal counts of the first to fifth volution are 7–9, 12–14, 16–19, 19–22 and 20–24, respectively. Septa are moderately fluted in the outer volutions, but in the inner volutions they are weakly fluted even in polar regions.

Tunnel angle increases slightly toward the outer volutions. Chomata are developed relatively well in the inner two or three volutions, but weakly in the outer volutions.

Remarks: This is the peculiar form of the genus in having the somewhat highly fluted septa and weakly developed chomata. With respect to two features pointed out, this form is rather allied to *Schwagerina alpina* which is dominant in the lowest zone of Permian.

Occurrences: Only five specimens of the present form have been found with *Triticites* spp. from Tadewara.

Specimens: Deposited in Geol. & Mineral. Institute, Univ. Kyoto. Reg. No. JPF-10050 and JPF-10051.

Genus **Pseudofusulina** DUNBAR et SKINNER, 1936

Pseudofusulina yobarensis (OZAWA)

pl. 1, figs. 11–14.

Schellwienia yobarensis OZAWA, 1925, Jour. Coll. Sci., Imp. Univ. Tokyo, vol. 45, art. 6, pp. 27, 28. pl. 7, figs. 7, 8.

Pseudofusulina cf. *yobarensis*, TORIYAMA, 1958, Mem. Fac. Sci., Kyushu Univ. Ser. D, vol. 7, pp. 181–184, pl. 27, figs. 1–13.

Shell is small, globular to subglobular, with highly inflated median parts, broadly rounded polar ends, convex lateral slopes and almost straight axis of coiling. Most

specimens of five volutions are 2.9 to 4.1 mm. long and 2.1 to 3.4 mm. wide, with form ratio of 1.1 to 1.4.

Proloculus is large in proportion to the size of shell, with outside diameter of 320-550 microns. Shell expands rapidly. Chambers are nearly of the same height throughout the length of shell.

Spirotheca is thick and thickens rather rapidly. Thickness of spirotheca from the fisrt to fourth volution is 25-70, 65-120, 100-155 and 110-200 microns, respectively.

Septa are relatively widely spaced. Septal counts of the first to fourth volution are 8-11, 16-20, 21-26 and 25-29, respectively. Septa are moderately fluted.

Tunnel path is narrow and irregular. Tunnel angle increases slightly toward the outer volutions. Chomata occur in the inner three volutions, but beyond the third volution pseudochomata take the place of chomata.

Remarks: The specimens at hand differ from the type-specimens from Akiyoshi in having more inflated shape of shell, but the former are almost identical with the latter in many important features, such as the size of shell, septal count, degree of septal fluting, thickness of spirotheca and others.

As stated already by OZAWA and TORIYAMA, *Pseudofusulina yobarensis* is almost in the same state as the juvenile stage of *P. vulgaris* and its allies, so it is highly probable that these species are conspecific with one another. In the present paper, however, *P. yobarensis* is temporarily treated as a species, and this problem will be treated in the forthcoming palaeontological study on the Atetsu limestone-plateau.

Occurrences: This species occurs almost exclusively, but rarely together with *Schwagerina* sp. **B** and *S.* sp. **C.** The specimens have been gathered from Tadewara and Yonnotani, Ōe-cho, Kasa-gun, Kyoto Prefect..

Specimens: Deposited in Geol. & Mineral. Institute, Univ. Kyoto. Reg. No. JPF-10052 to JPF-10055.

Geuns **Schwagerina** MÖLLER, 1877

Schwagerina sp. **A** indet.

pl. 1, fig. 15.

Shell is moderate in size, fusiform, with weakly pointed polar ends, gently inflated median parts and convex lateral slopes.

Spirotheca is relatively thin and thickens gradually toward the outer volutions. Septa are rather weakly and irregularly fluted.

Remarks: This species is represented by a single ill-oriented specimen, so it is impossible to compare the species with any other species.

Occurrences: The specimen has been obtained together with *Neoschwagerina margaritae* from Yonnotani.

Specimen: Deposited in Geol. & Mineral. Institute, Univ. Kyoto. Reg. No. JPF-10056.

Schwagerina sp. **B** indet.

pl. 1, fig. 16.

Shell is subcylindrical, with rounded polar ends, slightly convex lateral slopes and almost straight axis of coiling. Specimens of 4 to 4 1/2 volutions are 3.9 to 5.0 mm. long and 1.7 to 2.1 mm wide, with form ratio of 2.0 to 2.4.

Proloculus is large in proportion to the size of shell, with outside diameter of 280–520 microns. Spirotheca is thin and measures in thickness 25–35, 50–75, 75–85 and 90–110 microns, respectively, from the first to fourth volution. Septa are fluted weakly except in polar regions where they are fluted moderately.

Tunnel path is wide. Chomata are developed slightly in the inner volutions.

Occurrences: Several specimens have been gathered from Tadewara; associated with *Pseudofusulina yobarensis* and *Schwagerina* sp. **C.**

Specimen: Deposited in Geol. & Mineral. Institute, Univ. Kyoto. Reg. No. JPF-10052.

Schwagerina sp. **C** indet.

pl. 1, fig. 17.

Shell is elongate fusiform, with narrowly rounded polar ends, slightly inflated median parts and gently convex lateral slopes.

Spirotheca is thin and does non exceed 110 microns even in the thickest portion. Septa are fluted moderately. Chomata occur less massively in the inner volutions.

Occurrences: A single specimen has bee found with *Pseudofusulina yobarensis* and *Schwagerina* sp. **B** from Tadewara.

Specimen: Deposited in Geol. & Mineral. Institute, Univ. Kyoto Reg. No. JPF-10054.

Subfamily NEOSCHWAGERININAE DUNBAR et CONDRA, 1928,
emend. KANMERA, 1957

Genus **Neoschwagerina** YABE, 1903

Neoschwagerina douvillei OZAWA

pl. 1, figs. 18–20.

Neoschwagerina globosa, DOUVILLE, 1906, Bull. Soc. Géol. France, p. 182, pl. 18. figs. 1, 2.

Neoschwagerina globosa, DEPRAT, 1912, Mém. Serv. Géol. l'Indochine, vol. 1, fasc. 3, p. 51, pl. 4, figs. 1–4.

Neoschwagerina douvillei OZAWA, 1925, Jour. Coll. Sci., Imp. Univ. Tokyo, vol. 45 art. 6, pp. 55–57, pl. 9, figs. 5–7.

Neoschwagerina douvillei, TORIYAMA, 1958, Mem. Fac. Sci. Kyushu Univ., Ser. D, vol. 7, pp. 223–227, pl. 41, figs. 9–13; pl. 42, figs. 1–6.

Neoschwagerina douvillei, SAKAGAMI, 1958, Jour. Hokkaido Gakugei Univ., vol. 9, no. 2, pp. 92, 93, pl. 4, figs. 7–10.

For further references see TORIYAMA, 1. c.

Shell is rather large, inflated fusiform, with slightly convex lateral slopes, somewhat rounded polar ends and almost straight axis of coiling. Several outer volutions are missing or replaced by secondary mineralization, so the length and width of mature shell are not measured. Most specimens are 4.3 to 4.7 mm. long and 2.5 to 3.1 mm. wide, with form ratio of 1.5 to 1.7 at the tenth volution.

Proloculus is moderate, with outside diameter of 210–490 microns, averaging 300 microns with ten specimens. Shell expands rather rapidly and uniformly. Average height of the first to tenth volution of seven specimens is 68, 86, 109, 117, 124, 135, 144, 150, 169 and 176 microns, respectively. Chambers increase slowly in height from median parts to polar ends.

Spirotheca is very thin for the genus. Thickness of spirotheca increases gradually in the inner four or five volutions, but is almost of the same degree in the outer volutions where it does not exceed 35 microns even at the thickest portion.

Septa and primary transverse septula occur throughout the length of shell. Axial septula are observable even in the first volution; 1–2 septula occur between adjacent septa in the inner volutions and 2–5 septula in the outer volutions. Secondary transverse septula are extremely rarely observed in the outer volutions.

Remarks: On the basis of DOUVILLÉ's and DEPRAT's specimens of "*Neoschwagerina globosa*" and his own collections from Akiyoshi, OZAWA described *Neoschwagerina douvillei*. The specimens at hand are identical with parts of these and quite agree with TORIYAMA's in almost all important characters.

N. douvillei and *N. megaspherica* have been described and reported from many localities. Indeed the former differs from the latter in having smaller values of radius vector and proloculus, but these two forms are almost of the same degree in the evolutionary development and closely resemble each other in other characters. Therefore, when many good specimens of the two forms are carefully examined, it is highly probable that the two forms will be linked up without any gap in the size of proloculus and radius vector. The present specimens, however, are insufficient to discuss further such a problem.

Occurrences: About 15 specimens have been obtained from Urayamadani, Ōro, Fukuchiyama-shi, Kyoto Prefect., and from Yonnotani. They are associated with *Verbeekina* sp., *Schwagerina* sp. and others.

Specimens: Deposited in Geol. & Mineral. Institute, Univ. Kyoto. Rep. No. JPF-10057 to JPF-10059.

Neoschwagerina margaritae DEPRAT

pl. 1, fig. 21.

Neoschwagerina margaritae DEPRAT, 1913, Mém. Serv. Géol. l'Indochine, vol. 2, fasc. 1, mem. 2, p. 58, pl. 8, fig. 10; pl. 9, figs. 1–3.

Neoschwagerina margaritae, SAKAGAMI, 1958, Jour. Hokkaido Gakugei Univ., vol. 9, no. 2, pp. 93, 94, pl. 4, figs. 11–13.

Yabeina ozawai HONJO, 1959, Jour. Fac. Sci. Hokkaido Univ., Ser. 4, vol. 10, no. 1, pl. 11, figs. 1–4; pl. 12.

For further references see HONJO, l. c.

Shell is large, inflated fusiform to subellipsoidal, with highly convex lateral slopes, rounded polar ends and almost straight axis of coiling. Most specimens are 5.0 to 5.2 mm. long and 3.0 to 4.0 mm. wide, with form ration of 1.2 to 1.4 at the fifteenth volution.

Proloculus is minute, with outside diameter of 25–45 microns. The inner one or two volutions are evolute. Shell is tightly coiled and increses slowly and uniformly in width.

Spirotheca is thin and in thickness does not exceed 10 microns in the inner three volutions, 20 microns in the fourth to fifth volution and 35 microns beyond the fifth volution.

Septa and primary transverse septula occur throughout the length of shell. Axial septula are present; one septulum between adjacent septa in the inner volutions and 2–3, rarely 4, septula in the outer volutions. Secondary transverse septula rarely occur beyond the tenth volution.

Remarks: Recently HONJO (1959) reported that OZAWA's specimens of *Neoschwagerina margaritae* from Akasaka should be distinguished from DEPRAT's type-specimens for having secondary transverse septula and more numerous axial septula. The specimens which have been described as *Neoschwagerina margaritae* from many localities in Japan differ undoubtedly from the holotype-specimen in the strict sense. But Deprat's description was neither based on many good specimens nor showed the individual variation of the species, so the detailed features are not clearly understood from his description. Under these circumstances OZAWA's specimens should not be separated from *N. margaritae* without examining carefully the topotype-specimens. Therefore the present specimen will be treated as *N. margaritae* for a while.

Occurrences: The specimens at hand have been gathered with *Schwagerina* sp. **A** from Yonnotani.

Specimen: Deposited in Geol. & Mineral. Institute, Univ. Kyoto. Reg. No. JPF-10060.

Subfamily SUMATRININAE KAHLER et KAHLER, 1946,
emend. KANMERA, 1957

Genus **Sumatrina** VOLZ, 1904

Sumatrina sp. indet.

pl. 1, figs. 22–24.

Shell is small, subcylindrical, with rounded polar ends and gently convex lateral

slopes. Specimens are 2.7 to 4.0 mm. long and 1.0 to 1.2 mm. wide, with form ratio of 2.7 to 3.4 at the sixth volution.

Proloculus is small, with outside diameter of 100–195 microns. The inner two volutions are highly elongate fusiform with weakly pointed polar ends and beyond the third volution shell is subcylindrical. Average height of the first to sixth volution of four specimens is 36, 50, 62, 93, 109 and 114 microns, respectively.

Spirotheca is thin, composed of tectum and keriotheca. Thickness of spirotheca does not exceed 15 microns even at the thickest portion.

Septa and primary transverse septula are present throughout the length of shell. Septal counts of the first to seventh volution are 6–7, 10–12, 12–16, 13–16, 15–17, 16–17 and 18–20, respectively. Axial septula occur; there are 0–1 septulum in the inner two volutions, 1–2 septa in the third to fifth volution and 2–3, rarely 4, septula beyond the fifth volution. Secondary transverse septula are present; there are 0–1 septulum between adjacent primary ones in the inner volutions and 1–2 septula in the outer volutions.

Remarks: The present form is rather allied to the juvenile stage of *Sumatrina annae* VOLZ. Because of the insufficiency of specimens, the writer hesitates to correspond them definitely to *S. annae*.

Occurrences: The present specimens have been obtained with *Schubertella* sp. from Tadewara.

Specimens: Deposited in Geol. & Mineral. Institute, Univ. Kyoto. Reg. No. JPF-10061 to JPF-10063.

MEASUREMENTS (in micron)

Fusulinella itoi OZAWA

Sp.	Fig.	Reg. No.	L.	W.	P.	Radius Vector							
						1	2	3	4	5	6	7	8
1	1	JPF-10044	3657	1943	74	79	119	210	322	466	627	831	1042
2	2	JPF-10045	3886	1938	88	68	117	203	305	441	630	881	1102
3	3	JPF-10046		1213	102	85	152	208	314	449	644		
4	4	JPF-10047		1322	86	83	132	186	297	458	678		

Sp.	Thick. of Diaph. & Tect.								Tun. Angle & Septal Count						
	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7
1	10	10	10	13	15	18	20	20	13	13	13	15	15	15	23
2			10	13	15	20	30	25	10	10	13	15	13	18	20
3	8	10	13	13	18	25			6	11	12	20	21	23	
4				10	15	28			6	12	16	19	21	25	

Fusulinella sp. indet.

Sp.	Fig.	Reg. No.	L.	W.	P.	Radius Vector						
						1	2	3	4	5	6	7
1	5	JPF-10048		1802	119	102	169	241	355	491	644	831
2	6	JPF-10049	2247	1339	71	76	134	237	339	542	763	

Sp.	Thickness of Diaph. & Tect.							Tunnel Angle						
	1	2	3	4	5	6	7	1	2	3	4	5	6	7
1	5,	10	15	18	23	30	28	5	8	10	13	13	18	23
2	5	10	13	18	20	30		8	8	15	15	20		

Triticites sp. A indet.

Sp.	Fig.	Reg. No.	L.	W.	P.	Radius Vector					
						1	2	3	4	5	6
1	7	JPF-10050	3600	1373	114	120	186	288	491	763	
2	8	JPF-10050		1695	186	119	169	313	525	831	
3	9	JPF-10051		1176	119	88	135	203	347	593	781

Sp.	Thickness of Spirotheca						Tun. Angle & Septal C.					
	1	2	3	4	5	6	1	2	3	4	5	6
1	10	18	30	40	50		20	25	30	25		
2	8	15	30	35	45		20	28	28	30		
3	8	10	25	35	50	45	7	12	17	19	20	?

Pseudofusulina yobarensis (OZAWA)

Sp.	Fig.	Reg. No.	W.	P.	Radius Vector				
					1	2	3	4	5
1	11	JPF-10052	3371	542	418	743	1115	1588	
2	12	JPF-10053	2686	389	394	686	1029	1429	
3	13	JPF-10054	2857	407	343	514	743	1143	1600
4	14	JPF-10055	2571	452	351	618	852	1358	

Sp.	Thickness of Spirotheda				T. Angl. & Sept. C.			
	1	2	3	4	1	2	3	4
1	35–60	6ç–80	120–155	145–170	13	18	18	
2	40–70	85–120	120–140	135–175	15	20	25	
3	25–40	85–105	110–130	150–180	9	17	21	26
4	30–40	65–100	100–140	110–180	8	20	25	28?

Schwagerina sp. **A**, *S.* sp. **B** and *S.* sp. **C**

Species	Fig.	Reg. No.	half L.	half W.	P.	Radius Vector					
						1	2	3	4	5	6
S. sp. **A**	15	JPF-10056	2914	1572	220	203	356	559	848	1220	1572
S. sp. **B**	16	JPF-10052	2514	1155	407	288	381	576	814	1153	
S. sp. **C**	17	JPF-10054	1857	1085	240	194	358	542	763	1085	

Species	Thickness of Spirotheca						Tunnel Angle				
	1	2	3	4	5	6	1	2	3	4	5
S. sp. **A**	30	38	55	70	120	105	30	33	35	38	38
S. sp. **B**	30	55	80	85	100		28	35	35	43	
S. sp. **C**	20	35	55	70	95		25	30	25	?	

Neoschwagerina douvillei OZAWA

Sp.	Fig.	Reg. No.	P.	Radius Vector									
				1	2	3	4	5	6	7	8	9	10
1	18	JPF-10057	339	254	356	458	559	695	839	974	1119	1322	
2	19	JPF-10058	228	186	271	372	501	640	791	959	1129	1290	1459
3	20	JPF-10059	296	233	327	395	488	604	746	915	1096	1282	1438

Sp.				Thickness of Spirotheca												
	11	12	13	1	2	3	4	5	6	7	8	9	10	11	12	13
1				10	13	13	15	15	15	15	15	18				
2	1627	1797	1969	10	10	18	18	15	15	20	18	20	30	20	25	25
3	1610	1813		8	10	13	15	15	15	18	18	20	20	20	18	

Neoschwagerina margaritae DEPRAT

			Number of Volution	1	2	3	4	5	6	7
Sp. 1	Fig. 21	P. 25	Radius Vector	45	76	110	161	229	256	485
Reg. No. JPF-10060			Thickness of Spirotheca	5	5	10	13	18	22	25

8	9	10	11	12	13	14	15	16	17
604	743	915	1114	1314	1525	1715	1948	2201	2486
25	20	30	35	30	35	30	30	35	35

Sumatrina sp. indet.

Sp.	Fig.	Reg. No.	P.	Radius Vector							Septal Count						
				1	2	3	4	5	6	7	1	2	3	4	5	6	7
1	22	JPF-10061	119	111	162	230	315	417	553	689	6	11	15	14	15	16	
2	23	JPF-10062	102	93	135	186	259	335	428	537	6	10	12	14	15	16	18
3	24	JPF-10063	132	100	149	205	281	371	498								

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Plate 1

Explanation of Plate 1

All Figures×10

Figs. **1–4.** *Fusulinella itoi* OZAWA ..... Page 4
1. axial section, Reg. No. JPF–10044; **2.** slightly oblique axial section, Reg. No. JPF–10045; **3.** sagittal section, Reg. No. JPF–10046; **4.** oblique section, Reg. No. JPF–10047; all specimens from Tadewara, Ōe-cho, Kasa-gun, Kyoto Prefect..

Figs. **5, 6** *Fusulinella* sp. indet. ..... Page 5
5. slightly oblique axial section, from Nabae, Takaham-machi, Ōi-gun, Fukui Prefect., Reg. No. JPF–10048; **6.** slightly excentric axial section, from Tadewara, Reg. No. JPF–10049.

Figs. **7–10.** *Triticites* sp. **A** indet. ..... Page 6
7, 8. axial sections, Reg. No. JPF–10050; **9, 10.** sagittal sections, Reg. No. JPF–10051; all specimens from Tadewara.

Figs. **11–14.** *Pseudafusulina yobarensis* (OZAWA) ..... Page 6
11, 12. axial sections, Reg. No. JPF–10052 and JPF–10053; **13, 14.** sagittal sections, Reg. No. JPF–10054, and JPF–10055; all specimens from Tadewara.

Figs. **15.** *Schwagerina* sp. **A** indet. ..... Page 7
slighty oblique axial section, from Yonnotani, Ōe-cho, Kasa-gun, Kyoto Prefect., Reg. No. JPF–10056.

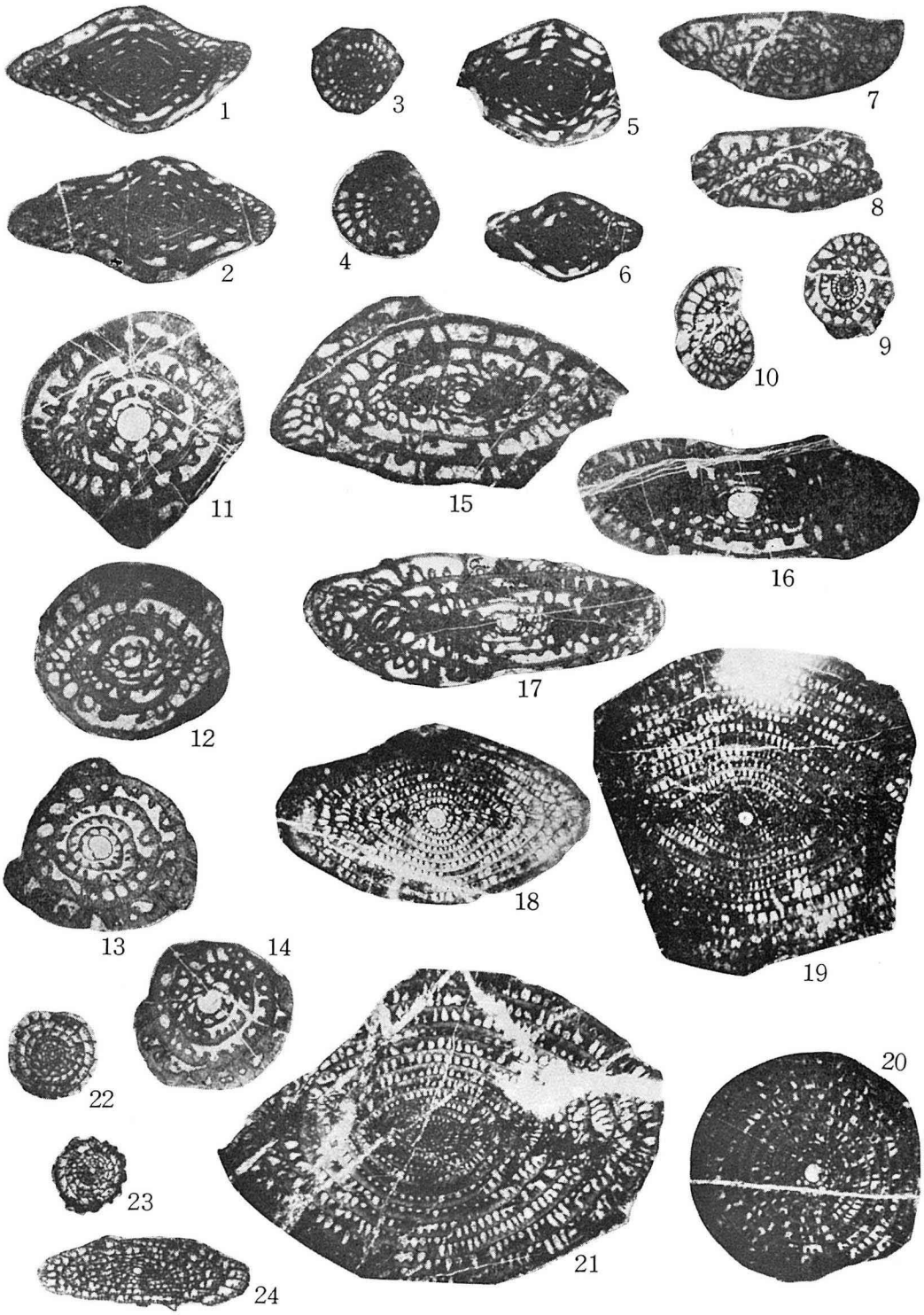
Fig. **16.** *Schwagerina* sp. **B** indet. ..... Page 8
axial section, from Tadewara, Reg. No. JPF–10052.

Fig. **17.** *Schwagerina* sp. **C** indet. ..... Page 8
axial section, from Tadewara, Reg. No. JPF–10054.

Figs. **18–20.** *Neoschwagerina douvillei* OZAWA ..... Page 8
18. axial section, from Yonnotani, Reg. No. JPF–10057; **19.** axial section, from Urayamadani, Ōro, Fukuchiyama-shi, Kyoto Prefect., Reg. No. JPF–10058; **20.** sagittal section, from Urayamadani, Reg. No. JPF–10059.

Eig. **21.** *Neoschwagerima margaritae* DEPRAT ..... Page 9
slightly excentric axial section, from Tadewara, Reg. No. JPF–10060.

Figs. **22–24.** *Sumatrina* sp. indet. ..... Page 10
22, 23. sagittal sections, Reg. No. JPF–10061 and JPF–10062; **24.** oblique section, Reg. No. JPF–10063; all specimens from Tadewara.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