312. **MESOSCHUBERTELLA, A NEW PERMIAN FUSULINID GENUS FROM JAPAN**

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Schubertella ? shimadaniensis reported by KANUMA, from Shimadani, Hachiman-chô, Gifu Prefecture, Mino massif, and Schubertella ? thompsoni recorded by SAKAGAMI in the limestone pebbles of the Tamanouchi limestone conglomerate from Hinode-mura, Nishitama-gun, Tokyo-to, Kwantô massif, are two species which differ from the true Schubertella in their spirothecal structure. A restudy of the internal structures of these two species have led the writers to the conclusion that for them a new genus must be established because they cannot be referred to Schubertella, even if it were possible to extend the limits of that genus.

In describing the subgenus Eoschubertella THOMPSON (1937) pointed out that it is distinguished from Schubertella by the spirothecal structure, namely, the spirotheca of Schubertella is composed of a tectum and a lighter inner layer "diaphanotheca" and that of Eoschubertella of a tectum and upper and lower tectoria; diaphanotheca typically very thin and cannot be recognized in most sections. Later, DUNBAR and SKINNER (1937) proposed to raise the subgenus to generic rank. Since, the spirothecal structure of the present specimens is composed of a tectum, a diaphanotheca and a lower tectorium, it becomes necessary to establish a new genus, and here we propose the name Mesoschubertella with M. thompsoni SAKAGAMI, n. sp. as the type species.

Neofusulinella praecursor var. pusilla described and illustrated by COLANI (1924) from China may be referable to Mesoschubertella. In China, Neofusulinella praecursor var. pusilla

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occurs in association with *Fusulina chamchitensis* Colani which seems to include some specimens of *Pseudofusulina vulgaris* (Schellwién), therefore its geological age may correspond to the middle to upper Wolfcampian in recent sense. *Neofusulinella precursum* Deprat (1913) which was first described from the Moscovian of Cammon (Laos) and subsequently from Ban-Tac, San-Xa and so forth by Colani (1924) belongs to the genus *Fusulinella*, as already pointed out by Thompson (1934).

In the Mino massif, *Mesoschubertella shimadaniensis* Kanuma, n. sp. occurs in association with Staffella sp., *Minoja-panella elongata* Fujimoto and Kanuma, *Pseudofusulina vulgaris* var. fusiformis (Schellwién) and *Pseudofusulina* sp. and in the Kwanto massif, *Mesoschubertella thompsoni* Sakagami, n. sp. occurs in association with *Nankinella* sp., Staffella mulleri Ozawa, *Pseudostaffella tamanouchiensis* Sakagami, *Pseudofusulina vulgaris* (Schellwién), *Pseudofusulina vulgaris* var. globosa (Schellwién) and *Pseudofusulina* sp. From their faunal assemblages, the geological range of the present new genus may be from the middle to the upper Wolfcampian.

*Mesoschubertella* apparently is closely related to *Eoschubertella*, a genus which has the spirotheca composed of a tectum and thin upper and lower tectoria. *Mesoschubertella* has the spirotheca composed of a tectum, a diaphanotheca and a lower tectorium and the spirotheca of *Schubertella* is composed of a tectum and lower clear layer or a single layer. The evolutionary trend of the subfamily *Schubertellinae* somewhat resembles that of the *Fusulininae* as shown in the text figure.

The writers wish to express their thanks to Prof. Haruyoshi Fujimoto of the Geological and Mineralogical Institute, Tokyo University of Education, for his kind guidance and kind loan of the necessary literatures.

*Mesoschubertella* Kanuma and Sakagami, n. gen.

**Type species:** *Mesoschubertella thompsoni* Sakagami, n. sp.

**Diagnosis:** Shell minute, inflated to elongate fusiform, having slightly concave or somewhat convex lateral slopes. Mature specimens measure 1 to 2 mm in length and less than 1 mm in width, and consist of four to five volutions. The form ratios are 1:1.4 to 1:2.5. The first two to three volutions are coiled
at a large angle to the axis of the outer volutions. The spirotheca is composed of a tectum, a diaphanotheca and a lower tectorium. Septa are numerous and unfluted. The tunnel is singular. Chomata are developed and asymmetrical.

**Remarks:**—Mesoschubertella resembles *Eoschubertella* and *Schubertella* in its shape and size. However, it can be distinguished from those genera by the spirothecal structure, as already mentioned.

The genus *Neofusulinella* which was proposed by Deprat (1912), is considered by Thompson (1948) to include such forms as *N. occidentalis* Thompson and Wheeler, *N. montis* Thompson and Wheeler, *N. lantenoisi* Deprat and *Fusulinella* *itai* Ozawa. However, in a later paper, Thompson (1951) stated that the first two mentioned species should be referred to the new genus *Pseudofusulinella*. In the same paper, he stated with regard to "*Neofusulinella* (Yangchienia) *itai* (Ozawa)" that "Professor R. Toriyama is now restudying this form (N. *itai*) at Wisconsin and finds that it is referable to *Fusulinella* Möller and is associated with a typical Middle Pennsylvanian (Moscovian) fauna." Accordingly, *N. lantenoisi* is the only species referable to the genus *Neofusulinella*. Colani (1924) described one form from the "Uralian" of China as *N. praeccursor* var. *pusilla* Colani, which occurs in association with *Fusulina* *chamchitensis* Colani. However, this variety is distinctly different from *Neofusulinella* and seems to belong to *Mesoschubertella*.

**Geological range:**—From the associated fusulinid species, the geological age of the type species and of a newly described species is from the middle to upper Wolfcampian.

**Mesoschubertella thompsoni**

*Sakagami, n. sp.*

Pl. 9, Figs. 1—10.

Shell minute and bulged fusiform. The lateral slopes are slightly convex. The first one to two volutions are coiled at a large angle to the axis of the outer volutions. The length and width in the fifth volution measure about 1 mm and 0.7 to 0.9 mm, respectively, with a form ratio of 1: 1.2 to 1: 1.5.

Proloculus is minute. Its average outside diameter is about 0.05 mm for eight specimens. Septa are numerous and are slightly fluted. Spirotheca relatively thick, and composed of a tectum, a diaphanotheca and a lower tectorium.

The tunnel is low and narrow, its height being about one-third that of the chamber. The tunnel angle varies from 20° to 29° in the fourth volution. The chomata is developed and asymmetrical.

**Remarks:**—The present new species resembles *Neofusulinella praeccursor* var. *pusilla* Colani, which was reported from China and may be referable to the genus *Mesoschubertella*. However, the present species can be distinguished from *N. praeccursor* var. *pusilla* by the larger shell, thicker spirotheca and more distinct chomata. This new species is named in honour of Dr. M.L. Thompson.

**Geological age and occurrence:**—The present new species occurs in association with *Nankinella* sp., *Staffella mölleri* Ozawa, *Pseudostaffella* ? *tamanouchiensis* Sakagami, *Pseudofusulina vulgaris* (Schellwien), *Pseudofusulina vulgaris* var. *globosa* (Schellwien) and *Pseudofusulina* sp. in a limestone pebble of the Tamanouchi limestone conglomerate in the Yagooki Valley, Tamanouchi, Hinode-mura, Nishitama-gun, Tokyo-to,
Measurements of *Mesoschubertella thompsoni* Sakagami, n. sp. (in mm).

<table>
<thead>
<tr>
<th>Specimen</th>
<th>L</th>
<th>W</th>
<th>R</th>
<th>P</th>
<th>Rate of Growth</th>
</tr>
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<td></td>
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<td>2521-C</td>
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<td>0.12</td>
<td>0.19</td>
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Thickness of Spirotheca

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<th>3</th>
<th>4</th>
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<th>6</th>
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<tr>
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<td>0.21</td>
<td>0.25</td>
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<td>0.031</td>
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<td>0.25</td>
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<td>0.025</td>
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<td>16</td>
<td>18</td>
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<tr>
<td>2527-D</td>
<td>0.17</td>
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<td>0.21</td>
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<td>0.024</td>
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<tr>
<td>2521-A</td>
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<td>0.09</td>
<td>0.21</td>
<td>0.042</td>
<td>0.088</td>
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<td>20</td>
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<tr>
<td>2611-B</td>
<td>0.09</td>
<td>0.13</td>
<td>0.30</td>
<td>0.031</td>
<td>0.042</td>
<td>7</td>
<td>13</td>
<td>17</td>
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Repository:—All of the specimens treated in this paper are preserved in the collection of the Department of Geology, Hakodate school, Hokkaido Gakugei University. Reg. No. 2611-A (Holotype), 2521-C, 2525-E, 2525-F, 2525-G, 2526-I, 2527-D, 2611-B, 2611-C (Paratypes).

*Mesoschubertella shimadaniensis*

Kanuma, n. sp.

Pl. 9, Figs. 11—19.

Shell minute and typical to elongate fusiform with slightly convex lateral slopes and narrowly rounded poles. The first one to two volutions are coiled at a large angle to the axis of the outer volutions. The length and width in the fifth volution measure 1.26 to 1.53 mm and 0.64 to 0.82 mm, respectively, with a form ratio of 1: 1.4 to 1: 2.1.

Proloculus is minute. Its average outside diameter is about 0.05 mm for eight specimens. Septa are numerous and slightly fluted. The spirotheca of endothyroid juvenarium is thin, but that of outer volutions is relatively thick. The spirotheca is irregular laterally and the septal furrow is deep. It is composed of a tectum, a diaphanotheca and a lower tectorium.

The tunnel is narrow and its height is about one half that of the chamber. The chomata is developed and asymmetrical.

Remarks:—The present new species can be distinguished from *Mesoschubertella thompsoni* Sakagami, n. sp. by the rugose spirotheca, larger form ratio and more narrowly rounded poles.
Measurements of *Mesoschubertella shimadaniensis* KANUMA, n. sp. (in mm).

<table>
<thead>
<tr>
<th>Specimen</th>
<th>L (mm)</th>
<th>W (mm)</th>
<th>R (mm)</th>
<th>P (mm)</th>
<th>Rate of Growth</th>
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<td>23912-A</td>
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<td>0.57</td>
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<td>23916-B</td>
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<td>0.92</td>
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<td>0.11 0.20 0.29 0.45 0.78 0.92</td>
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<td>0.80</td>
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<td>0.10 0.19 0.29 0.45 0.68 0.80</td>
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<td>23917-A</td>
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<td>0.09 0.16 0.24 0.49 0.59 0.74</td>
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<td>23918-B</td>
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<td>0.83</td>
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Geological age and occurrence: — The present species occurs in association with *Staffella* sp., *Minajapanella elongata* FUJIMOTO and KANUMA, *Pseudofusulina vulgaris* var. *fusiformis* (SCHIELWEN) and *Pseudofusulina* sp. in the limestone of Shimadani, Hachiman-cho, Gifu Prefecture. The geological age may correspond to the upper Wolfcampian.


References


Explanation of Plate 8.

Figs. 1-10. Mesoschubertella thompsoni Sakagami, n. sp.
   Figs. 1, 3, 10. Cross sections of paratypes, x30. Reg. no. 2521-C, 2525-F, 2611-C, respectively.
   Figs. 2, 5. Axial sections of paratypes, x30. Reg. no. 2525-E, 2526-I, respectively.
   Fig. 4. Tangential section, x30. Reg. no. 2525-G.
   Fig. 6. Axial section of holotype, x30. Reg. no. 2611-A.
   Fig. 7. Enlarged part of the holotype, showing the structure of the spirotheca, x100.
   Figs. 8, 9. Centered oblique sections of paratypes, x30. Reg. no. 2527-D, 2611-B, respectively.

Figs. 11-19. Mesoschubertella shimadaniensis Kanuma, n. sp.
   Figs. 11, 13, 14. Cross sections of paratypes, x30. Reg. no. 23912-A, 23916-B, 23916-C, respectively.
   Figs. 12, 15, 18, 19. Axial sections of paratypes, x30. Reg. no. 23916-A, 23917-A, 23918-B, 23918-C, respectively.
   Fig. 16. Axial section of holotype, x30. Reg. no. 23918-A.
   Fig. 17. Enlarged part of the holotype, showing the structure of the spirotheca, x100.