Fusulinacean Fossils from Isla Madre de Dios, Southern Chile, South America

by
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1. Introduction and Acknowledgements

From the lst of October to the 15th of December 1970, "Chiba University's First Paleontological Expendition to the Andes"was carried out. T. Chisaka, one of the writers, participated in the Expedition for the purpose of studying Fusulinacean fossils of Isla Madre de Dios which belongs to the Patagonian Archipelago. Dr. J. Corvalán D. of Departamento de Geologia, Universidad de Chile took the lead in the geological survey of the island. Chisaka, accompanied by Haruo Tazuke of the Chiba Education Center, visited the adjacent small island, Isla Guarello, and stayed there for three days to collect Fusulinaceans in the island's central and northern parts.

The writers are greatly indebted to Dr. Carlos Ruiz Fuller, ex-Director Ejecutivo Instituto de Investigaciones Geologicas, Santiago-Chile, for his kind arrangement of the field trip, to Sr. Atilio Besio of Compañia de Acero del Pacifico S. A., for his help in the study, and to Sr. Rodrigo Bustos Sohst of the Instituto de Investigaciones Geologicas, Santiago-Chile for guiding the writers to Isla Guarello.

Thanks are also due to Dr. Shiro Maeda of Chiba University, who led the Expedition. The writers are grateful to Prof. Dr. Erich Ajalberts Berendt of the Faculty of Education, Chiba University, for reading the manuscript, and to Mr. Jiro Muramatsu, teacher of Kowagama Junior High School, for assisting in the study in many ways.

This study was financed by the Grant in Aid for Overseas Scientific Research, 1970, defrayed from the Ministry of Education, Science and Calture, Japan.

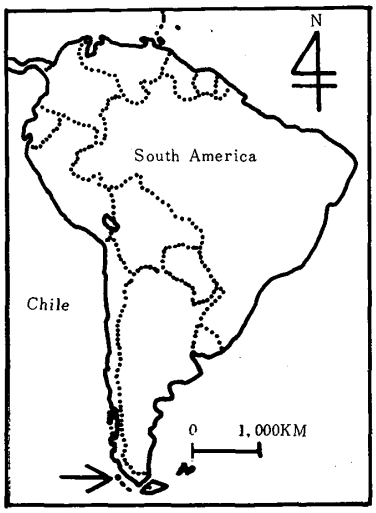

Fig. 1. Map of South America showing the location of Isla Madre de Dios

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2. Previous Work

Fusulinaceans of the South American Continent have been found in Brazil, Venezuela, Colombia, Peru and Chile, and have been studied by many paleontologists. Dr. Raymond C. Douglass of the U. S. National Museum, Washington, D. C., studied the Fusulinacean fossils of Isla Guarello, Isla Tarlton and Isla Doñas, and recorded the following species in 1976:

1. *Millerella* sp.
2. *Schubertella* sp.
3. *Eoschubertella* ? sp.
4. *Triticites prima* DOUGLASS and NESTELL
5. *T. eleuteriensis* DOUGLASS and NESTELL
6. *T.* sp. aff. *T. titicacaensis* DUNBAR and NEWELL
7. *T. chilensis* DOUGLASS and NESTELL
8. *T. berryi* (WILLARD BERRY)
9. *T. australis* DOUGLASS and NESTELL
10. *T. guarellensis* DOUGLASS and NESTELL
11. *T. tarltonensis* DOUGLASS and NESTELL
12. *Schwagerina patagoniensis* DOUGLASS and NESTELL
13. *S.* sp. A
14. *S.* sp. aff. *muñaniensis* DUNBAR and NEWELL
15. *S.* sp. aff. *S.* ? *patensis* DUNBAR and NEWELL
16. *Pseudofusulina chilensis* DOUGLASS and NESTELL
17. *P.* sp. A
18. *Chalaroschwagerina tarltonensis* DOUGLASS and NESTELL

The geological age of these fossils is assigned to the Middle Pennsylvanian (Upper Carboniferous) to Early Permian Periods.

3. General Geology and Fusulinaceans

Under the guidance of Sr. R. Bustos S., Chisaka and Tazuke visted Isla Guarello and collected Fusulinaceans in the central and northern parts of the island. The fossiliferous formation consists of sandstone, shale and limestone, with the general strike N 40° E and the dip 50° E. The species identified by Chisaka are as follows:

1. *Millerella* sp.
2. *Schubertella* sp.
3. *Triticites shimurai* CHISAKA and CORVALAN, n. sp.
4. *T. chilensis* DOUGLASS and NESTELL
5. *Schwagerina patagoniensis* DOUGLASS and NESTELL
6. *Pseudofusulina bustosi* CHISAKA and CORVALAN, n. sp.
7. *P. chilensis* DOUGLASS and NESTELL
8. *P. vulgaris* var. *globosa* (SHELLWIEN)

The sampling localities and the species obtained are as follows:

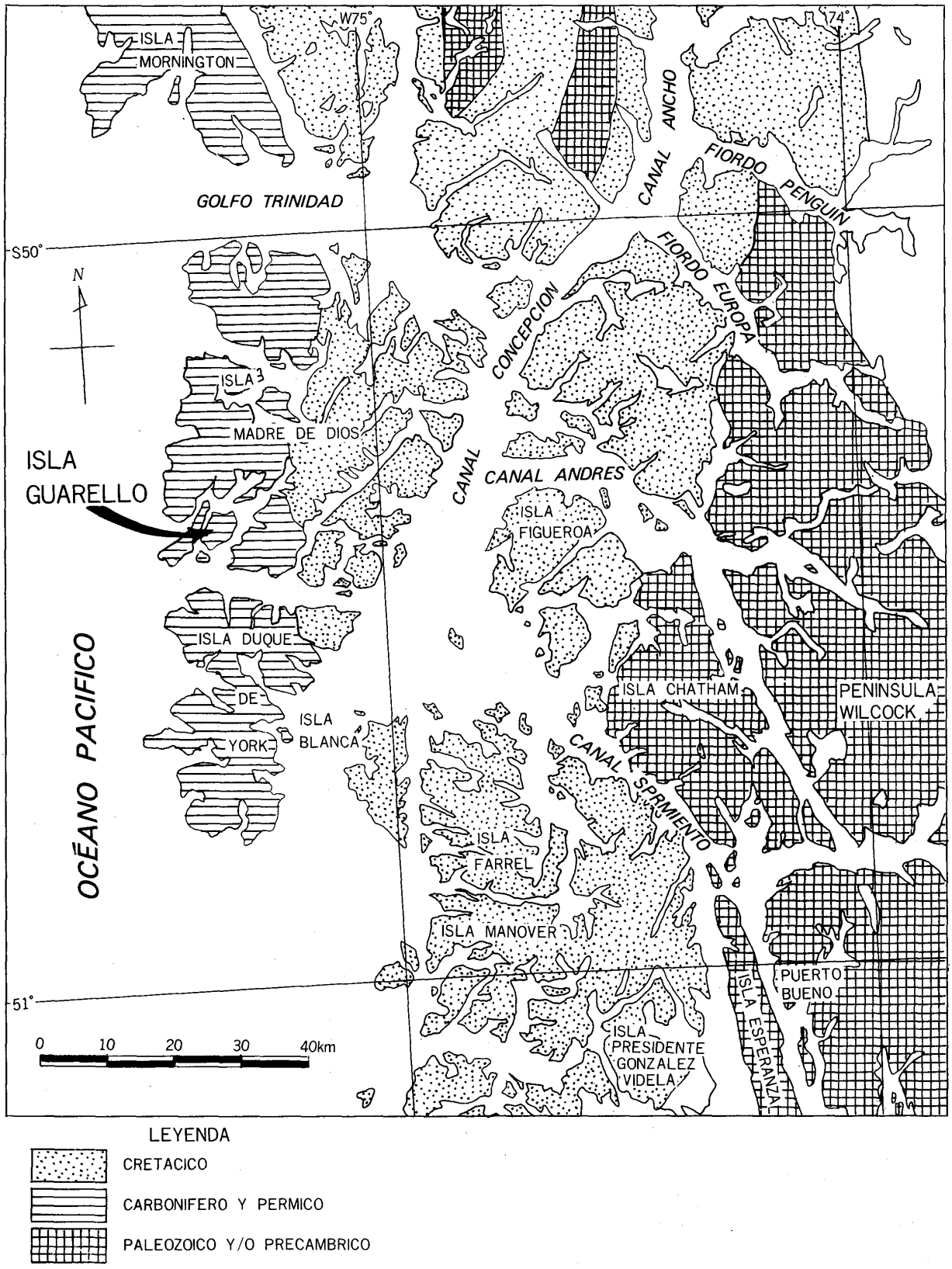

Fig. 2. Geological Map of the Vicinity of Isla Madre de Dios (after Instituto de Investigaciones Geologicas, Santiago-Chile)

Loc. 1. White crystalline limestone (no Fusulinaceans were found).
Loc. 2. Grey limestone, *Triticites chilensis.*
Loc. 3. White limestone, *Pseudofusulina chilensis.*
Loc. 4. White limestone, *Psf. chilensis, Psf. bustosi, Schwagerina patagoniensis.*
Loc. 5. Grey limestone (abounds in fossils), *Triticites chilensis, Psf. bustosi, Schubertella* sp., *Millerella* sp.
Loc. 6. Impure limestone bearing fragments of various kinds of rocks, *Psf. vulgaris* var. *globosa, Psf. bustosi.*
Loc. 7. Impure limestone, *Psf. vulgaris* var. *globosa, Triticites shimurai, Schubertella* sp.
Loc. 8. White crystalline limestone.
Loc. 9. White limestone.
Loc. 10. Dark grey limestone.
Loc. 11. Chert.
Loc. 12. White crystalline limestone.

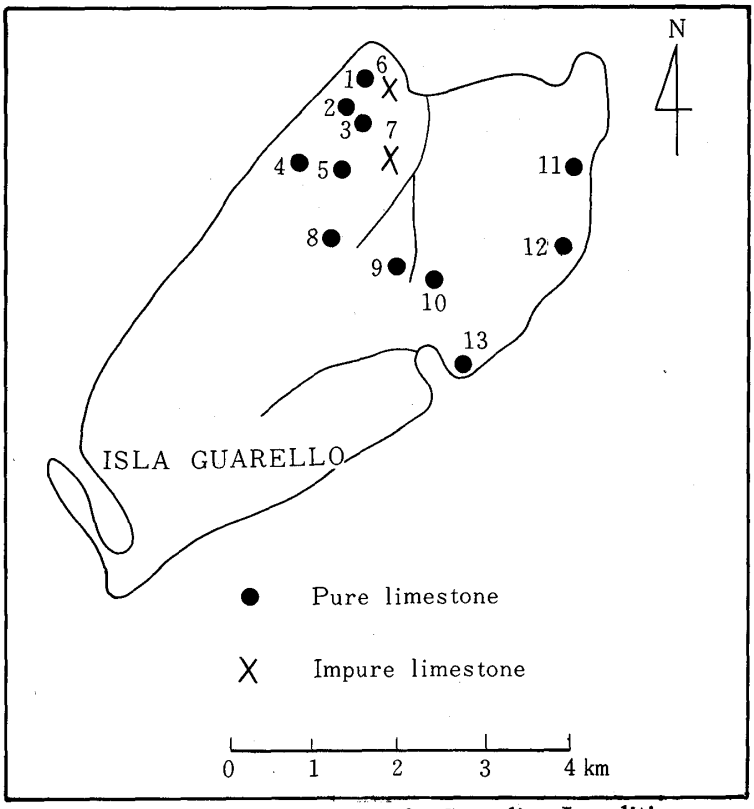

Fig. 3. Sampling Localities

4. Systematic Description

Superfamily Fusulinoidea von MÖLLER, 1878

Family Ozawainellidae THOMPSON and FOSTER, 1937

Genus *Millerella* THOMPSON, 1942

Millerella sp.

Plate 1, figure 1.

Shell small and external form planispiral. The first and second volutions are involute and third volution is evolute. The mature shell with 3 volutions. Axial length measures 0.164 mm, median width 0.492 mm, and form ratio 0.33.

Proloculs small, spherical and outer diameter 0.66. Spirotheca thin, spirothecal structure obscure.

Occurrence:– Locality Nos. 5, 6, 7.

Geological age:– Lower Permian.

The measurements of this species are given in Table 1.

Table 1 Measurements of *Millerella* sp.

Pl.	Fig.	Slide No.	L.	W.	F.R.	N.V.	D.P.	Height of Volutions				Thickness of Spirotheca					
								r	2	3	4	1	2	3	4	5	6
1	1	5-42-8	.164	.492	0.33	3 X	.066	.049	.066	.098		.016	.033	.021			

L – Length W – Width F.R. – Form ratio N.V. – Number of volution D.P. – Diameter of proloculus

Family Schbertellidae SKENNER, 1931
Genus *Schubertella* STAFF and WEDEKIND, 1910

Suhubertella sp.

Plate 1, figures 2–17

Shell small and external form fusiform with slightly rounded poles. The first and second volutions are coiled at large angle to axis of the outer volutions. Mature shells with 3 to 5 volutions. Axial length measures 0.705 to 1.560 mm, median width 0.246 to 0.649 mm and form ratio 2.2 to 4.0. Proloculus very small, spherical, and outer diameter 0.020 to 0.060 mm. Spirothecal structure obscure.

Septal flutings unfluted in axial rigion. Massive chomata well developed.

Occurrence:– Locality Nos. 4, 5, 6.

Geological age:– Lower Permian

The measurements of this species are given in Table 2.

Table 2. Measurements of *Schubertella* sp.

Pl.	Fig.	Slide No.	L.	W.	F.R.	N.V.	D.P.	Height of Volutions						Thickness of Spirotheca				
								r	2	3	4	5	6	1	2	3	4	5
1	2	5–30	.738	.338	2.2	5	.020	.021	.030	.040	.050	.061		.016	.017	.020	.025	.027
1	3	5–40	1.220	.320	3.8	4	–	–	.020	.041	.061			–	.012	.025	.025	
1	4	5–42–13	1.560	.400	3.9	5	–	–	–	.040	.041	.062		–	–	.030	.025	.020
1	5	5–17–6	1.120	.280	4.0	5	–	–	–	.030	.032	.030		–	–	.020	.030	.012
1	6	5–40–8	.886	.320	2.8	4	.025	.022	.023	.023	.041			.017	.019	.021	.025	
1	7	5–42–8	–	.300	–	4	.020	.010	.020	.041	.062			.010	.016	.018	.040	
1	9	5–42–20	.920	.320	2.9	4	–	.020	.020	.040	.062			.010	.020	.032	.032	
1	10	5–7–J	–	.469	–	3	–	.016	.049	.082				.016	.016	.018		
1	11	5–87	.705	.259	2.7	3	–	–	.050	.066				–	.016	.016		
1	12	5–87	.886	.262	3.4	4	–	–	.025	.040	.061			–	.012	.016	.013	
1	13	5–42–8	–	.496	–	4	.040	.016	.033	.036	.045			.013	.016	.020	.016	
1	14	5–42–20	–	.280	–	3	–	.040	.060	.061				.010	.025	.015		
1	15	5–7–J	–	.246	–	3	.030	.008	.016	.033				.008	.012	.018		
1	16	5–10–5	–	.260	–	2	.060	.040	.020					.010	.010			
1	17	5–7–J	–	.469	–	3	.050	.033	.082	.113				.008	.016	.020		

Family Schwagerinidae DUNBAR and HENBEST, 1930

Genus *Triticites* GIRTY, 1904

Triticites shimurai CHISAKA and CORVALAN, n. sp.

Plate 2, figures 1–3, 7.

Description:– Shell small and external form elongated cylindrical. Height of volutions gradually increases outward volutions.

Mature shalls with 4 volutions. Axial length measures 5.40 to 7.60 mm, median with 1.60 to 1.71 mm and form ratio 3.4 to 4.8.

Proloculus medial, spherical, and outer diameter 2.10 to 3.71 mm.

Spirotheca relatively thin, composite of a tectum and a very thin keriotheca with very fine alveoli. Septa numerous, highly composite in polar region. Massive chmata well developed. Tunnel essentially irregular.

Remarks:– The present species is characterized by relatively small and elongated shell. It has complicated seta in axial region. This species resembles *Triticites chilensis* DOUGLASS and NESTELL but has cylindrical form and complicated septa. The specific name is dedicated to Miss Machiko Shimura who studied the Fuselinaceans of this area.

Occurrence:– Locality Nos. 2, 4, 5.

Geological age:– Lower Permian

The measurements of this species are given in TAble 3.

Table 3. Measurements of *Triticites shimurai* CHISAKA and CORVALAN, n. sp.

Pl.	Fig.	Slide No.	L.	W.	F.R.	N.V.	D.P.	Height of Volutions					Thickness of Spirotheca				
								r	2	3	4	5	1	2	3	4	5
2	1	5–2–2	7.60	1.72	4.4	4	.338	.082	.148	.213	.197		.033	.033	.082		
2	2	5–2–14	5.40	1.60	3.4	4	.371	.082	.098	.180	.230		.049	.066	.066	.082	
2	3	3–88–3	7.60	1.60	4.8	4	–	–	.082	.164	.246		.033	.033	.067	.068	
2	7	5–79	–	1.60	–	4	.210	.120	.150	.213	.425		.031	.042	.052	.083	

Genus *Schwagerina* MÖLLER, 1877

Schwagerina patagoniensis DOUGLASS and NESTELL

Plate 2, figures 4–6, 8–10, Plate 4, figures 1–7.

1976 *Schwagerina patagoniensis* DOUGLASS and NESTELL; Geological Survey Professional Paper 858, pp. 33–34, Pl. 12, figs, 1–10.

Description:– Shelle large and cylindrical periophery. Axis of coiling straight, inner volutions fusiform but outer volutions cylindrical. Whorls rather loosely coiled. Height of volutions gradually increases outward.

Mature shells with 4 to 6 volutions. Axial length measures 6. 44 to 8.80 mm, median width 2.00 to 4.80 mm and form ratio 2.4 to 4.4.

Proloculus medial, spherical, and outer diameter 0.25 to 0.420 mm.

Spirotheca relatively thin in inner volutions but relatively thick in outer volutions. It has tectum and very thin keriotheca. Septa complicated in axial region. Chomata weak and disappearing in outer volutions.

Remarks:– The present species resembles *Schwagerina patagoniensis* of DOUGLASS and NESTELL but has thin spirotheca and thin sepa. Also this species resembles *Pseudofusulina chilensis* of DOUGLASS and NESTELL but has smaller proloculus and thin septa.

Occurrence:– Locality Nos. 5, 6.

Geological age:– Lower Permian.

The measurements of this species are given in Table 4.

Table 4. Measurements of *Schwagerina patagoniensis* DOUGLASS and NESTELL

Pl.	Fig.	Slide No.	L.	W.	F.R.	N.V.	D.P.	Height of Volutions						Thickness of Spirotheca					
								r	2	3	4	5	6	1	2	3	4	5	6
2	4	KN–118	8.80	2.48	3.5	5	.262	.164	.230	.246	.295	.295		.066	.069	.082	.085	.131	
2	5	KN–82	8.00	2.00	4.0	5	.312	.148	.180	.246	.249	.277		.049	.082	.098	.131	.131	
2	6	5–46–3	8.80	2.00	4.4	4	.250	.080	.098	.181	.251			.033	.049	.066	.098		
2	8	KM–107	9.10	2.40	3.8	5	.280	.080	.131	.230	.338	.262		.033	.049	.098	.131	.135	
2	9	5–22	–	1.85	–	4	.300	.100	.320	.220	.225			.035	.043	.100	.070		
2	10	3–10	6.44	2.32	2.8	4	.420	.098	.246	.420	.246			.033	.049	.066	.066		
4	1	5–46–6	7.12	2.60	2.7	4	.338	.371	.338	.338	.312			.066	.082	.082	.131		
4	2	5–40–3	8.00	2.16	3.3	5	.262	.164	.164	.246	.246	.213		.049	.066	.098	.131	.098	
4	3	6–7	7.80	3.20	2.4	4	–	.131	.213	.277	.312			.049	.049	.066	.066		
4	4	5–15	–	2.40		4	.330	.140	.170	.210	.220			.049	.060	.082	.098		
4	5	3–6	–	1.51		2	.387	.213	.338					.049	.066				
4	6	7–4	8.32	4.80	1.7	6	.262	.213	.360	.492	.420	.574	.340	.098	.066	.131	.164	.197	.098
4	7	7–1	6.60	2.80	2.4	5	.277	.082	.131	.213	.338	.420	.430	.020	.049	.066	.131	.082	

Genus *Pseudofusulina* DUNBAR and SKINNER, 1931

Pseudofusulina bustosi CHISAKA and CORVALAN, n. sp.

Pl. 3, figs. 1–8, p1.6, figs. 1–10

Description:– Shell large and external form cylindrical fusiform. Axis of coiling straight. Coiling of whorls tight in inner volutions but very loose in the outer ones. Mature shells with 4 to 5 volutions. Axial length measures 7.00 to 10.80 mm, median width 1.76 to 2.80 mm and form ratio 2.9 to 5.2. Proloculus large, sphrical and outer diameter 0.230 to 0.492 mm.

Spirotheca very thin in inner volutions but outer volutions thick. Septa numerous and thin complicatedly fluted throughout shell. Chomata almost rudimentary.

Remarks:– The present species is characterized by large shell and complicated septa throughout shell. This species somewhat resembles *Chalaroschwagrina tarltonensis* DOUGLASS and NESTELL from Isla Tarlton but has complicates septa and thin spirotheca.

Also this species resembles *Schwagerina* (?) *patens* DUNBAR and NEWELL from Yaurichambi de Bolivia but has complicated septa.

The specific name is dedicated to Sr. Rodrigo Bustos Shost who showed the way to Isla Guarello.

Occurence:– Locality Nos. 4, 5, 6, 7.

Geological age:– Lower Permian

The measurements of this species are given in Table 5.

Table 5. Measurements of *Pseudofusulina bustosi* CHISAKA and CORVALAN, n. sp.

Pl.	Fig.	Slide No.	L.	W.	F.R.	N.V.	D.P.	Height of Volutions						Thickness of Spirotheca					
								r	2	3	4	5	6	1	2	3	4	5	6
3	1	5–7	7.20	1.92	3.8	5	.230	.131	.131	.180	.214	.213		.033	.040	.066	.098	.148	
3	2	3–88–2	8.40	1.80	4.7	4	.262	.148	.197	.262	.230			.049	.066	.082	.113		
3	3	3–17	10.00	2.16	4.6	4	.420	.197	.197	.230	.230			.033	.066	.098	.113		
3	4	5–1	9.40	2.16	4.4	4	–	.160	.240	.213	.180			.040	.080	.066	.082		
3	5	3–12	7.60	2.48	3.1	4	.404	.230	.295	.338	.230			.066	.131	.082	.082		
3	6	3–14	7.92	2.12	3.7	5	.492	.082	.180	.312	.164	.213		.049	.049	.066	.082	.082	
3	7	KN–10	–	2.28		4	.338	.230	.246	.295	.197			.049	.066	.098	.070		
3	8	5–3	7.28	2.08	3.5	3	.354	.148	.262	.338				.049	.113	.082			
6	1	5–28–2	7.60	1.76	4.3	4	.262	.082	.180	.197	.246			.033	.066	.098	.082		
6	2	(5–30)	8.30	2.56	3.2	4	.330	.170	.180	.270	.230			.033	.049	.082	.110		
6	3	5–42–1	7.00	2.36	3.0	5	.246	.164	.131	–	–			.049	.049	.098	.098	.113	
6	4	4–2	–	2.60	–	4	.338	.164	.164	.338	.350			.033	.040	.082	.098		
6	5	5–11	10.80	2.80	3.9	5	.420	.098	.197	.277	.420	.277		.033	.049	.082	.098	.098	
6	6	5–17–5	9.20	2.60	3.5	4	.440	.197	.246	.340	.197			.082	.098	.113	.113		
6	7	5–9	8.80	2.80	3.1	4	.480	.164	.230	.246	.338			.082	.066	.098	.131		
6	8	5–17–1	7.60	2.64	2.9	5	.338	.098	.148	.277	.420	.338		.033	.066	.066	.131	.113	
6	9	5–10	11.60	2.24	5.2	5?	–	–	.131	.246	.338	.338		–	.049	.082	.082	.130	
6	10	3–11	–	1.85	–	3	.300	.140	.164	.210				.033	.050	.098			

Pseudofusulina chilensis DOUGLASS and NESTELL

Pl.5, figs. 1–5, 8, 9.

1976 *Pseudofusulina chilensis* DOUGLASS and NESTELL; Geological Survey Professional Paper 858, pp. 35–41, Pl. 15, figs. 1–17, pl. 16, figs. 1–4.

Description:– Shell medium and external form elongated fusiform with pointed poles. Axis coiling straight. Coiling tight in inner volutions but loose in outer volutions.

Mature shells with 4 to 5 volutions. Axial length measures 6.40 to 8.84 mm, median width 2.00 to 4.48 mm and form ratio 3.0 to 3.3.

Spirotheca relatively thin, composit of tectum and very thin keriotheca. Spirotheca thick.

Septa thin, highly complicated in axial region. Chomata weak and disappear in outer volutions.

Remarks:– The present species has elongate fusiform, thick spirotheca and thin complicate septa. This species is similar to *Pseudofusulina chilensis* DOUGLASS and NESTELL but has thinner septa.

Occurrence:– Locality Nos. 2, 3, 4.

Geological age:- Lower Permian

The measurements of this species are given in Table 6.

Table 6. Measurements of *Pseudofusulina chilensis* DOUGLASS and NESTELL

Pl.	Fig.	Slide No.	L.	W.	F.R.	N.V.	D.P.	Height of Volutions					Thickness of Spirotheca				
								r	2	3	4	5	1	2	3	4	5
4	8	7–2	–	4.48		5	.338	.296	.451	.480	.492	.492	.033	.131	.131	.164	.131
4	9	7–a	–	4.00		4	.420	.350	.360	.350	.574		.082	.098	.113	.131	
5	1	5–51	6.40	2.00	3.2	5	.246	.82	.98	.164	.213	.277	.033	.049	.066	.049	.164
5	2	5–34–5	8.32	2.80	3.0	5	.277	.164	.164	.277	.360	.246	.049	.049	.098	.131	.131
5	3	5–17–3	8.40	2.60	3.2	5?	–	–	.246	.246	.340	.197	–	.082	.082	.098	.131
5	4	3–11	8.32	2.56	3.3	5	.295	.131	.197	.360	.197	.262	.049	.049	.082	.049	.098
5	5	KN–125	8.84	2.68	3.3	5	.220	.85	.100	.140	.250	.280	.033	.051	.098	.110	.110

Pseudofusulina vulgaris var. *globosa* (SCHELLWINE)

Pl. 5, figs. 6–9.

1909 *Fusulina vulgaris* var. *globosa* SCHELLWIEN-DYHRENFURTH, Die Fusulinen von Darwas, Paleontographica Vol. LVI, pp. 164, 165, pl. XIV, figs. 3–7.

1936 *Pseudofusulina vulgaris* var. *globosa* HUZIMOTO, Sc. Rep. Tokyo Bunrika Daigaku, Sect. C, pp. 77–78, pl. XII, figs. 1–7, pl. XIV, figs. 1, 2.

Description:- Shell large and external form inflated fusiform with pointed poles. Axis of coiling straight. Coiling loose in inner and outer volutions.

Spirotheca thick, composite of tectum and keriotheca. Septal fluting high and narrow. Chomata rudimentary.

Remarks:– The present species is characterized by bulged fusiform, Hight volutions loose, septal folding high and narrow, thick spirotheca and septa thick. This species resembles *Schwagerina* sp. aff. *muñaniensis* DUNBAR and NEWELL but is loose in inner volutions. Also his species *Psf. vulgaris* var. *globosa* from Kwanto mountainland but has thinner spirotheca and septa than the latter.

Occurence:– Locality Nos. 6, 7.

Geological age:– Lower Permian

The measurements of this species are given in Table 7.

Table 7. Measurements of *Pseudofusulina vulgaris* var. *globosa* (SCHELLWINE)

Pl.	Fig.	Slide No.	L.	W.	F.R.	N.V.	D.P.	Height of Volutions					Thickness of Spirotheca				
								r	2	3	4	5	1	2	3	4	5
5	6	5–46–8	7.00	2.28	3.1	4	.262	.246	.213	.295	.295		.082	.082	.131	.098	
5	7	3–2	7.44	2.20	3.4	4	.262	.164	.197	.246	.262		.049	.049	.066	.082	
5	8	5–28–7	–	2.64		4	.277	.164	.197	.295	.360		.049	.066	.098	.131	
5	9	4–20–2	6.20	2.32	2.7	4	.246	.164	.213	.246	.350		.049	.066	.082	.164	

1970年度の文部省の海外学術調査で「千葉大学南米アンデス山地の地質・古生物学的研究」が実施された。幸いにも私はこれに参加する機会が与えられ，チリ，アルゼンチンの両国に同年の10月から12月まで約3ケ月間出張した。

私は主としてチリ国，南部のマドレ　デ　デオス島（聖母の島という意味）においてフズリナの化石を採集した。ここは米国のワシントン市にある国立博物館に勤務しているレイモンドCダグラス博士によってくわしく調べられている所であるが，筆者が研究したところ新しく3種類を発見した。しかもそのうち2種類は新種であることがわかった。本研究にあたってはカルロス　ルイス　フーレル博士をはじめチリ地質調査所の方々から研究に非常な便宜をはかって下された。本研究で層位学の方の研究は主として，ホセ　コルバラン　デアス博士がなされたフズリナの研究は主として千坂が担当した。ここから産するフズリナの地質時代は下部二畳系を示している。フズリナの形態的な特徴は個体数は多いが種類の数は少く，殻は細長く，隔壁がうすい。

またやせ衰えたような形をしているので，生活環境は非常に悪かったと思う。その原因は寒い気候と関係があるのではないかと思う。

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Takeshi CHISAKA and Jose CORVALAN DIAZ

Fusulinacean Fossils from Isla Madre de dios, Southern Chile, South America

Explanation of Plates

Explanation of Plate 1

All figures X 50

Fig. 1. *Millerella* sp. . . . . 50 Page
1. Axial section

Figs. 2–17. *Schubertella* sp. . . . . 50 Page

2. 3. 6; Axial sections
7, 8, 10, 12–17. Sagittal sections
9, 11, 12. Oblique sections

T. CHISAKA & J. CORVALAN DIAZ: Fusulines from Lsla Madre de Dios Plate 1


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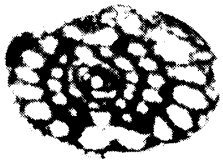
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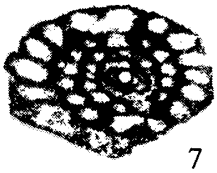
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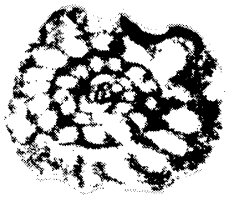
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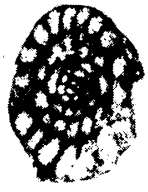
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17

Explanation of Plate 2

All figures X 10

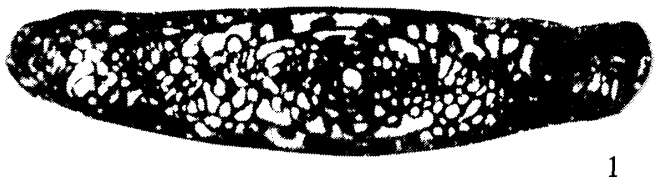
Figs. 1–3, 7. *Triticites shimurai* CHISAKA and CORVALAN . . . . . 52 Page

1. Axial section of the holotype
2. Slightly oblique section of paratype
3. Tangential section
7. Sagittal section of holotype

Figs. 4–6, 8, 9, 10. *Schwagerina patagoniensis* DOUGLASS and NESTELL . . . . . 52 Page

4–6, 8. Axial sections
9. Sagittal section
10. Slightly oblique section

T. CHISAKA & J. CORVALAN DIAZ: Fusulines from Isla Madre de Dios Plate 2



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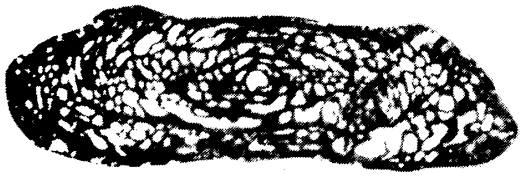

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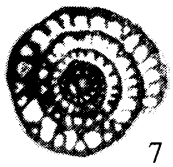

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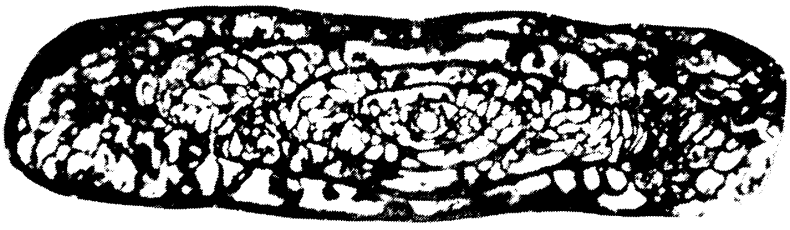

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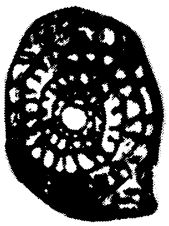

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Explanation of Plate 3

All figures X 10

Figs. 1–8. *Psudofusulina bustosi* CHISAKA and CORVALAN n. sp. . 54 Page

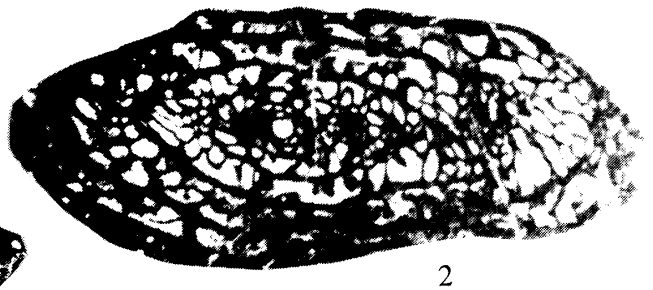
1, 4, 5. Axial sections
2, 7. Slightly oblique sections
8. Sagittal section

Fig. 9, 10. *Triticites chilensis* DOUGLASS and NESTELL . . . . . 54 Page

9. Axial section
10. Oblique section

T. CHISAKA & J. CORVALAN DIAZ: Fusulines from Isla Madre de Dios Plate 3

1



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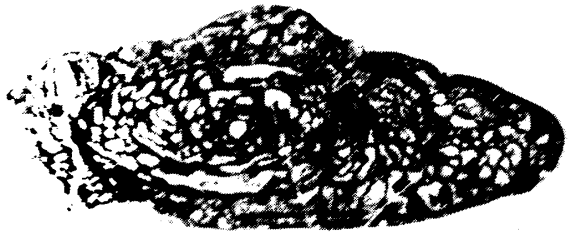

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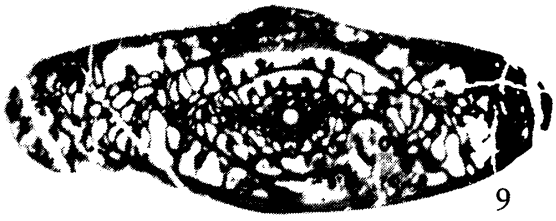

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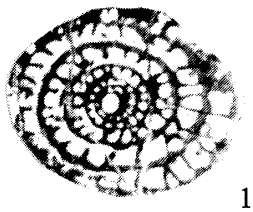

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Explanation of Plate 4

All figures X 10

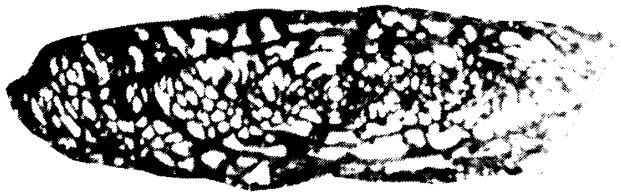
Figs. 1–7. *Schwagerina papagoniensis* DOUGLASS and NESTELL . . . 56 Page

1–6. Axial sections
7. Sagittal section

Figs. 8, 9. *Pseudofusulina chilensis* DOUGLASS and NESTELL . . . . . 56 Page

8. Tangential section
9. Axial section

T. CHISAKA & J. CORVALAN DIAZ: Fusulines from Isla Madre de Dios Plate 4



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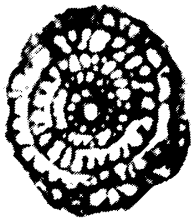

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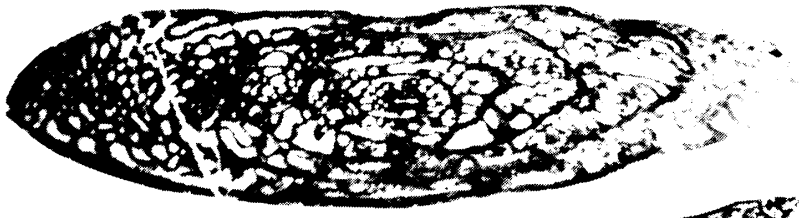

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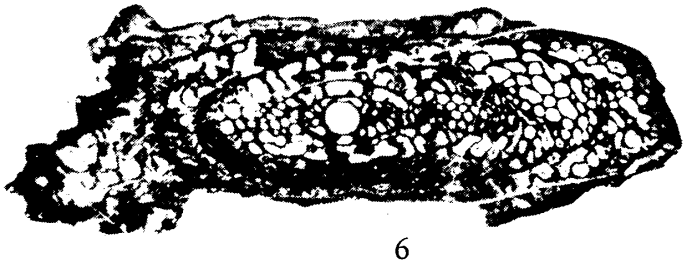

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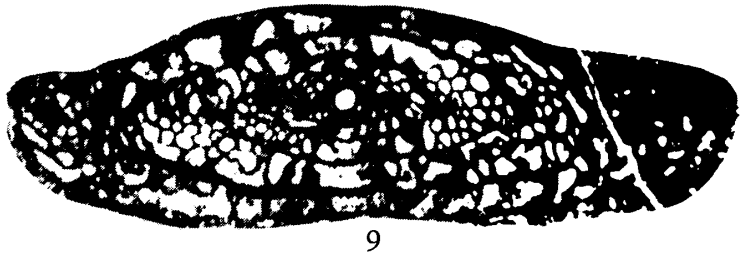

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Explanation of Plate 5

All figures X 10

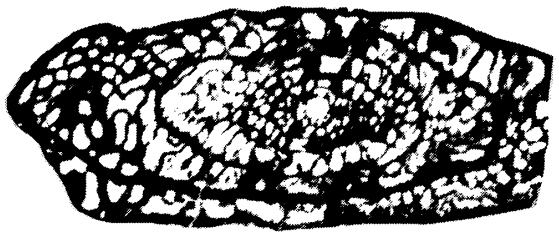
Fig. 1–5. *Pseudofusulina chilensis* DOUGLASS and NESTELL . . . . . 58 Page

1, 3. Slightly oblique sections
2. Axial section
4. 5; Sagittal sections

Figs. 6–9. *Pseudofusulina vulgaris* var. *globosa* (SCHELLWINE) . . . . . 58 Page

6, 7. Axial sections
8. Slightly oblique section
9. Sagittal section

T. CHISAKA & J. CORVALAN DIAZ: Fusulines from Isla Madre de Dios Plate 5



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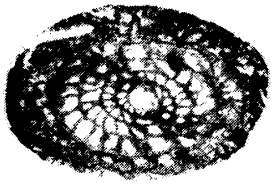

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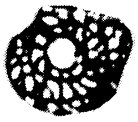

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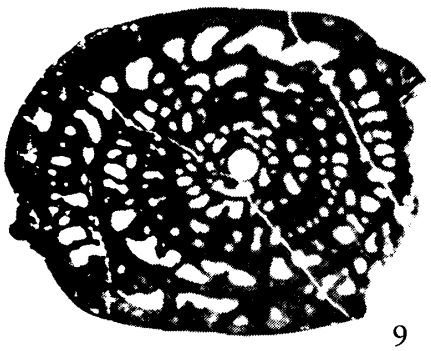

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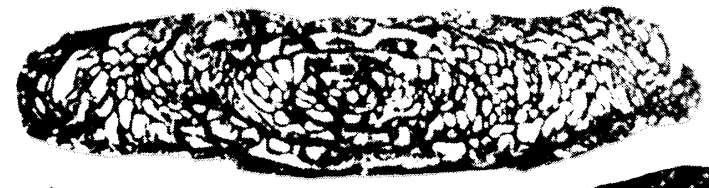
Explanation of Plate 6

All figures x 10

Figs. 1–10. *Pseudofusulina bustosi* CHISAKA and CORVALAN, n. sp. 60 Page

5. Axial section of the holotype
2. Axial section of paratype
4. Sagittal section of holotype
10. Sagittal section of paratype
1, 6. Axial sections
3, 7, 8. Slightly oblique sections
9. Tangential section

T. CHISAKA & J. CORVALAN DIAZ: Fusulines from Isla Madre de Dios Plate 6



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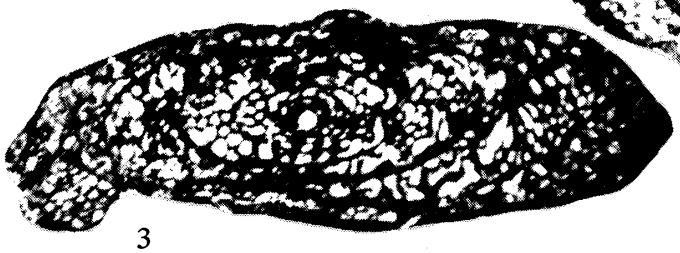

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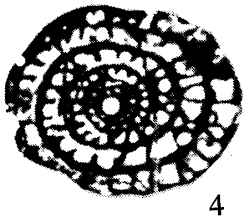

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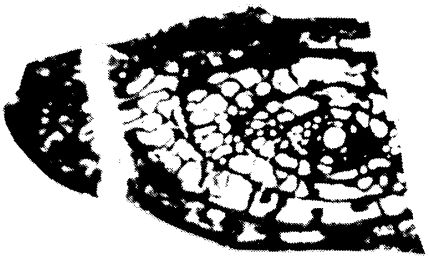

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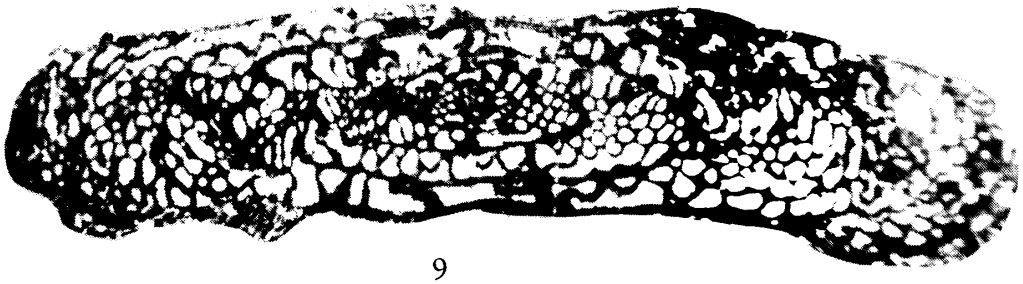

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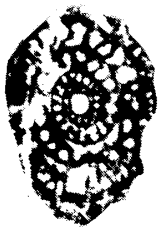

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