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DIPLOPORA BORZAI NOV. SPEC. (DASYCLADACEAE) OF THE UPPER TRIASSIC OF THE MURÁŇ PLATEAU. (THE WEST CARPATHIANS MOUNTAINS, SLOVAKIA)

(PL. I, II)

Abstract: This article describes a new endospore species of the genus *Diplopora* Schafhäult, 1963, which is characterized mainly by tiny round cysts gathered in a great amount into an irregulary thick layer at the circumference of the axial stem.

Резюме: В статье описан новый вид рода *Diplopora* Schafhäuti 1863, для которого характерны главным образом маленькие круггре цисты накопленные в большом количестве в неправильном мощном слое на окружности аксиального стебеля.

Up to now, in the region of the West Carpathians mountains, there endospore species of the genus *Diplopora* Schafhäutl, 1863 [*Diplopora muranica* Bystrický, 1967 (= *D. tubispora* Ott, 1967), *Diplopora* aff. *phanerospora* Pia, 1920] were found only in the reef complex of the Norian stage, in the Slovak Karst and the Muráň plateau. In 1975 Dr. Karol Borza, CSc., found an association of dasycladaceae which was represented by only one, up to now undescribed endospore species of the genus *Diplopora* in light-coloured massive limestones belonging most probably to the Carnian stage (the substage Tuval).

The species i am going to describe, was found in light-coloured massive limestones in the lowest curve of the tourist footpath leading from the town Tisovec to the Hradová hill, a bit higher on the slope above the faule sepparating the light-coloured massive limestones from Gutenstein limestones of the Anisian stage. The stratigraphic position of the finding of the dasycladaceae is not known exactly enough at present. According to the position in the bed sequence it is the Tisovec limestone of the Carhian stage turning probably gradually and without any facial change into the Furmanec limestone (the Lower—Middle Norian) in the direction of the Hradová hill and the latter turns into the bedded Dachstein limestone (the Sevatian?). The species *Andrusoporella duplicata* (Pia) Bystrický[1] occuring mainly round the P. 851,5 and amonites in the Tisovec quarry (V. Kollárová-Andrusovová — J. Bystrický, 1974, p. 129) also indicate the Carnian stage. The Tisovec limestone of the quarry mentioned is only the Eastern part of the limestone of the Hradová hill area

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[1] The correct name of the species is *Andrusoporella duplicata* (Pia) Bystrický, according to the letter sent to me by Mr P. C. Silva (March 1977) dealing with revision of the genera *Poikiloporella* Pia and *Andrusoporella* Bystrický. I quote the letter:..." it will be seen that the earlier of the two competing generic names would be *Andrusoporella*, while the earlier of the two competing specific epithets would be *duplicata*, so that you should make the new combination *Andrusoporella duplicata* (Pia) Bystrický."
I thank to Mr. P. C. Silva (University of California, Berkeley) for his kind informing me of the fact also this way.

Diplopora borzai nov. spec.

Derivatio nominis: A tribute to the finder Dr. Karol Borza, CSc Geological Institute of the Slovak Academy of Sciences, Bratislava, who kindly provided me the material to work at.

Holotype: The specimen illustrated in the Pl. 1, fig. 1, thin section No 5507.

Locus et stratum typicum: The Muráň plateau, the ESE slope of the Hradová hill, westwards from the town Tisovec. The Tisovec limestone (Carnian, the substage Tuval?).

Material: 50 different cuts of the specimens in the thin sections number 5506–5508, 5517–5519 deposited at Geological Institute of The Slovak Academy of Sciences in Bratislava (collections J. Bystrický).

Diagnosis: The calcareous sleeve is of a simple, not articulated cylindrical shape with a completely smooth inner side. Fertile specimens (22 i. e. 44,00 % of the whole number 50) are of the axial stem with tiny round cysts which are in a greater amount and irregularly gathered round the circumference of the axial stem thus forming an irregularly thick layer of a cylindrical shape. The branches are spindle-haped with the maximum thickness closely before or at getting off the calcareous sleeve. They number into clusters at 4–5 (rarely 6) and those into whorls.

Description: The general Shape of the Calcification of the Thallus: An absolute majority of the studied cuts either through fertile or sterile specimens has the calcareous sleeve of a simple, not articulated cylindrical shape with a completely smooth inner side. A slightly club-shaped sleeve occured only once (Pl. 2, Fig. 4) and it belongs probably to the top part of the sleeve. The thickness of the cylindrical sleeve wall is considerably variable even within one specimen, which is due to a secondary abrasion of the surface. The surface of the sleeve is penitrated by mostly irregularly arranged mouths of pores of original branches. The prominences of the sleeve forming the hem round the distal edges of the branches are preserved only very rarely (Pl. 2, Fig. 1- the upper part).

The branches: The branches are spindle-shaped, with a sharp tip at both edges, in the transversal cut they are round with the maximum thickness closely before the mouth (Pl. 1, Fig. 3) or -which is the most common – at the mouth leading out of the sleeve. In the latter case the pores of the branches are open outside and resemble the pores of the branches of the phloiophorus type (Pl. 2, Fig. 1). Basal parts of the branches adhering to the axial stem are thickened. Numbering of the branches into clusters is clearly visible only in suitable oblique cuts and very close to the inner side of the cylindrical sleeve. The branches in the clusters divert considerably, due to which their numbering into clusters gets invisible further from the axial stem. 4–5 branches are most common in a cluster, rarely there are 6. The clusters of the branches are arranged in whorls. The distance between the whorls is little. It reaches the values of 0,250–0,382 mm in 4 well-preserved cuts, which is 24,68–45,40 % of the axial stem diameter (st) and 14,14–21,81 % of the diameter D. A whorl is composed from about 16 clusters of branches, according to the calculation of the distance between neighbouring clusters.

The axial stem: From the completely smooth inner side of the cylindri-

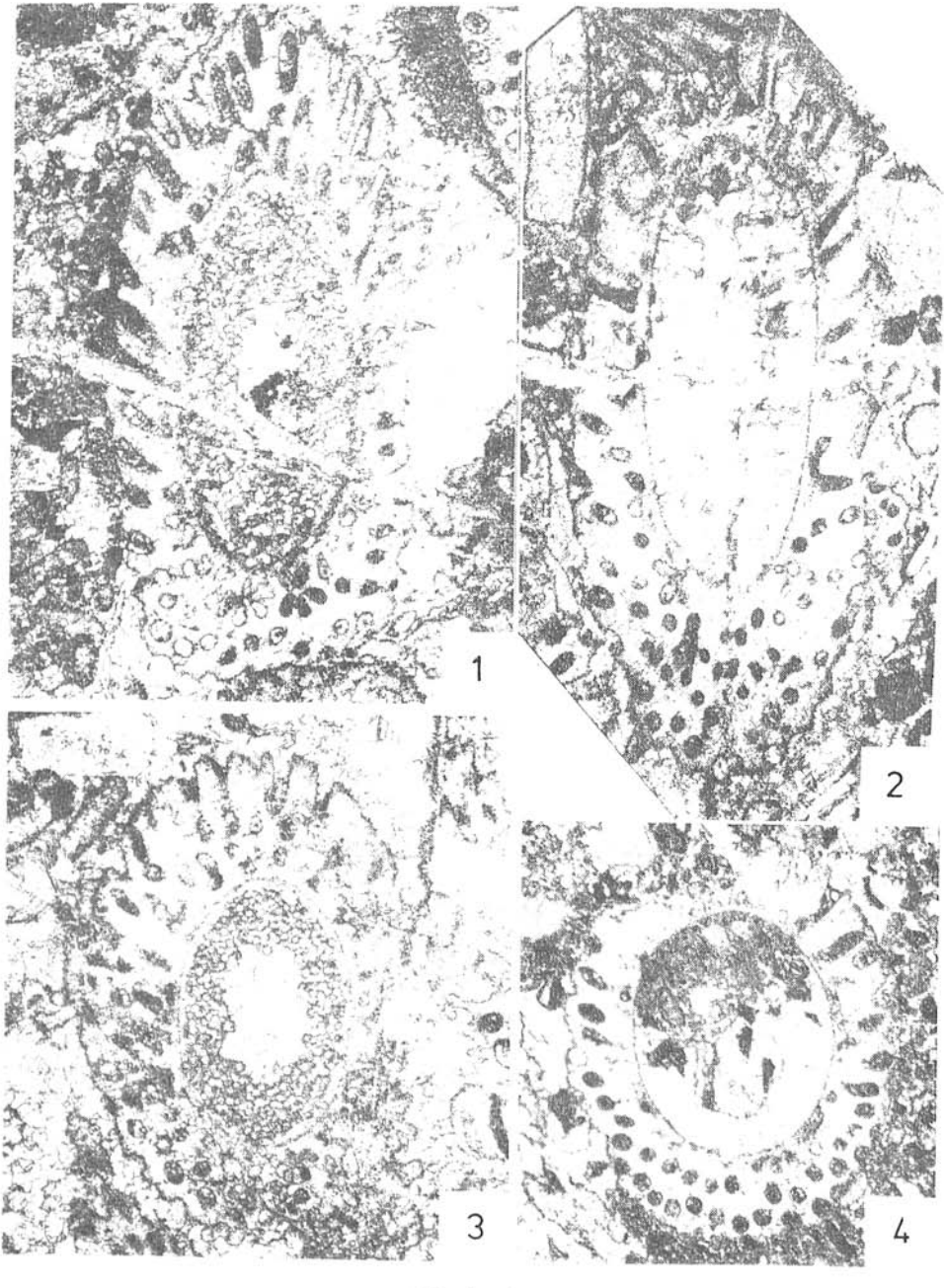

Plate 1

Fig. 1. Diplopora borzai nov. spec., Holotype, The thin section 5507, Fig. 2. The thin section 5517. Fig. 3. The thin section 5518. Fig. 4. The thin section 5507. Magn. about 25 x.

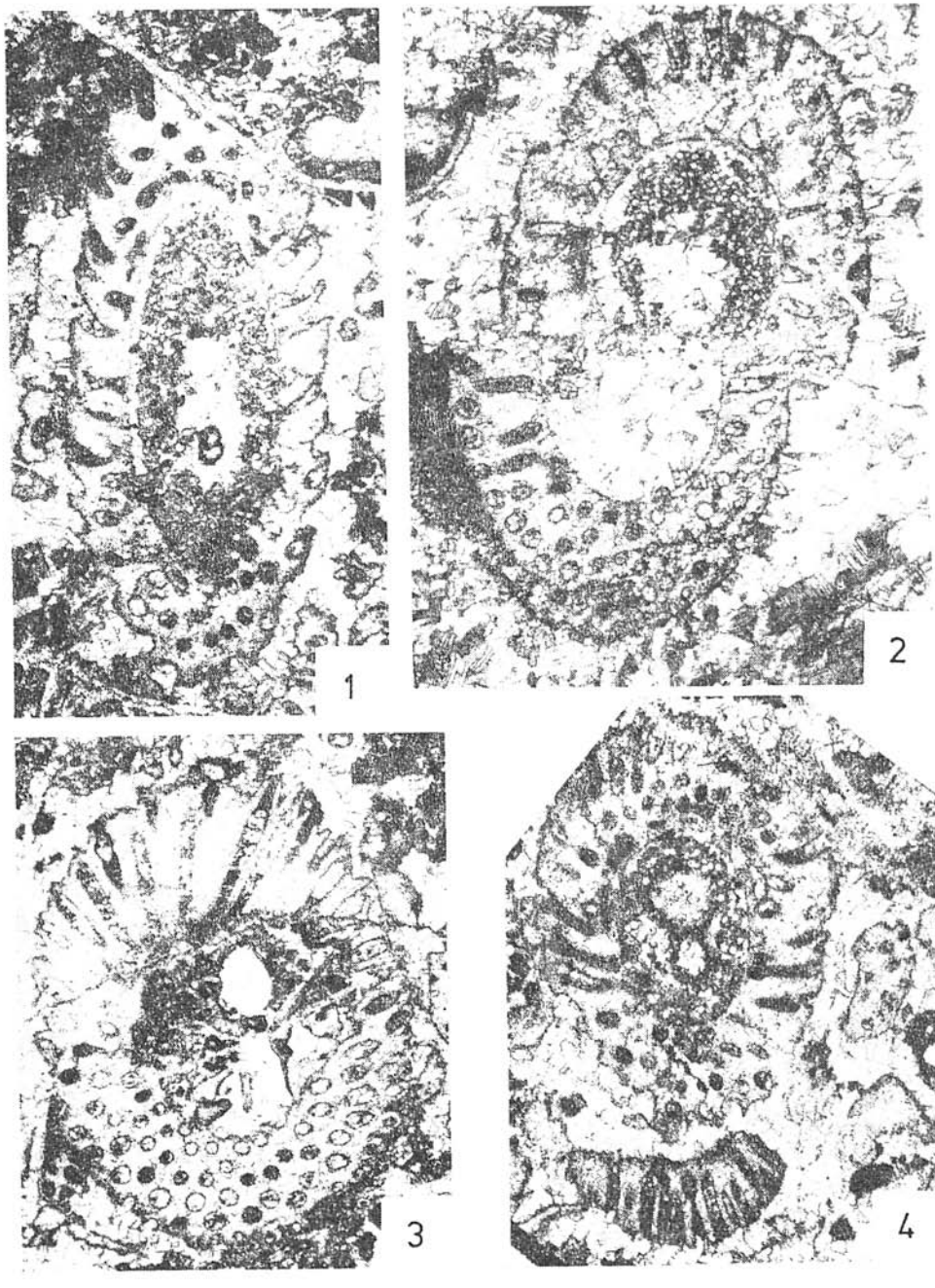

Plate 2

Fig. 1. The thin section 5506. Fig. 2. The thin section 5507. Fig. 3. The thin section 5506. Fig. 4. The thin section 5518. Magn. about 25 x. For the measurements of the specimens illustrated see the page 331.

cal sleeve it is obvious that the axial stem adheres closely to its inner side. In fertile specimens, a calcified membrane of the axial stem preserved as a white clacite hem between the axial stem stuff and the inner side of the sleeve is clearly visible (Pl. 1, Fig. 1, 3, Pl. 2, Fig. 1). Its thickness ranges from 0,036 mm to 0,052 mm.

The reproductive organs: The presence of the cysts in the axial stem indicates the function of the axial stem as that of "the gametangium". There are tiny round bodies from the white calcite in the axial stem and they are most probably calcified cysts. The cysts are arranged irregularly into a considerably thick layer along the surface of the axial stem, there forming an independent cylindre with an irregularly shaped "central cavity". The cysts fill the axial stem completely, leaving no room there, only rarely they do. At present it is not known how long part of the whole lenght of the axial stem the cysts filled. It is sure they occurred in its top part (Pl. 2, Fig. 2, 4).

Comparison: The species described belongs to the endospore species of the genus *Diplopora Schafhäutl* according to the metaspondylity and the presence of the cysts in the axial stem. At the first sight, it differs from up to now described endospore species of the genus mentioned (*D. muranica* Bystr., *D. interiecta* Fenninger, *D. phanerospora* Pia) in its size and the arrangement of the cysts in the axial stem. From this point of view, it resembles the species *Diplopora praecursor* Pia emend. Hurka et Schmidt, 1971, the most, from which it differs essentially in all other evidence. The cysts of the species here described are round and considerably smaller in the difference from the cysts of the species *D. praecursor* which are oval: 0,036–0,066 mm to about 0,357–0,238 mm in *D. praecursor* [the thickness of the cysts of *D. praecursor* was not mentioned by H. Hurka et Schmidt (1971), it was counted out from the illustration, p. 512, Fig. 3. E].

The measurements of the specimens illustrated (in mm):

Thin sec.	D	st	st % D	p_m	h		
5506	1,519	0,852	56,12	0,122	0,308		Pl. 2, Fig. 1
5506	2,236	1,100	49,19	0,125			Pl. 2, Fig. 3
5507	1,769	1,013	57,29	0,127	0,250		Pl. 1, Fig. 1
5507	2,147	1,111	51,74	0,111			Pl. 2, Fig. 2
5517	1,766	0,958	54,24	0,102	0,382		Pl. 1, Fig. 2
5518	2,283	0,983	43,06	0,111			Pl. 1, Fig. 3
5518	1,741	0,772	44,33	0,097			Pl. 2, Fig. 4
5507	1,902	1,166	58,63	0,111			Pl. 1, Fig. 4

Table 1

Statistical characterization specimens

	fertile	sterile
The number of specimens N	22	28
The mean of the outer diameter ($\bar{D}$)	1,6939 mm	1,6787 mm
The mean of the axial stem ($\bar{st}$)	0,8674	0,7820
The mean of the branches ($\bar{p_m}$)	0,1100	0,1028
The sum of D (Σ D)	37,2666	47,0055
The sum of st (Σ st)	19,0833	21,7533
The sum of p_m (Σ p_m)	2,2000	2,8805
$\Sigma\ (D-\bar{D})^2$	3,7711	4,4202
$\Sigma\ (st-\bar{st})^2$	1,1724	0,9498
$\Sigma\ (p_m-\bar{p_m})^2$	0,0096	0,0098
$\Sigma\ (D-\bar{D})\ .\ (st-\bar{st})$	1,4835	1,7580
Standart deviation of D (s_x)	0,4237	0,4046
Standart deviation of st (s_y)	0,2362	0,1875
Standart deviation of p_m	0,0225	0,0190
Covarinace (s_{xy})	0,0706	0,06511
Initial growth index (a)	-0,0769	0,0039
Growth ratio ($b = \sqrt{\frac{\Sigma\ (y-\bar{y})^2}{\Sigma\ (x-\bar{x})^2}}$)	0,5575	0,4635
Correlation coefficient (r)	0,7055	0,8580
Dispersion around reduced major axis (S_d)	0,3723	0,2376

I am providing the measurements more detaily for possible biometric correlation in the text table No. 1. The relation of the elements D, st, p_m, c (Table No. 2–6) is given in the relation to the axial stem (st) because the axial stem of the material studied is well-preserved while the outer diameter (D) of the sleeve is considerably influenced by a secondary abrasion.

Observed range (in mm):

The outer diameter of the sleeve (D)	:1,075–2,575, mean 1,684
The axial stem diameter (st)	:0,458–1,272, mean 0,819
The max. thickness of the branches (p_m)	:0,058–0,145, mean 0,105
The cysts diameter (c)	:0,036–0,066, mean 0,048
The number of the branches in a cluster (b)	: 4–5 (max. 6)
The number of the clusters in a whorl	: about 16

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Table 2

The outer diameter (D) — dimensions in mm

		Specimens fertile				Specimens sterile				Both types together			
		N	range	$\bar{D}$	%	N	range	$\bar{D}$	%	N	range	$\bar{D}$	%
0,9–1,09	1,0	1	1,075		2,0	0			0,0	1	1,075		2,0
1,1–1,29	1,2	5	1,141–1,263	1,223	10,0	5	1,144–1,277	1,236	10,0	10	1,141–1,277	1,230	20,0
1,3–1,49	1,4	2	1,466–1,497	1,481	4,0	7	1,308–1,497	1,415	14,0	9	1,308–1,497	1,452	18,0
1,5–1,69	1,6	3	1,519–1,583	1,541	6,0	5	1,522–1,680	1,591	10,0	8	1,519–1,680	1,572	16,0
1,7–1,89	1,8	4	1,719–1,819	1,762	8,0	4	1,752–1,894	1,797	8,0	8	1,719–1,894	1,780	16,0
1,9–2,09	2,0	2	1,925–1,955	1,940	4,0	3	1,902–2,022	1,972	6,0	5	1,902–2,022	1,959	10,0
2,1–2,29	2,2	3	2,147–2,283	2,230	6,0	1	2,236		2,0	4	2,147–2,283	2,231	8,0
2,3–2,49	2,4	2	2,383–2,477	2,430	4,0	1	2,480		2,0	3	2,383–2,480	2,447	6,0
2,5–2,69	2,6	0			0,0	2	2,552–2,575	2,263	4,0	2	2,522–2,575	2,563	4,0
Summary		22	1,075–2,477	1,693	44,0	28	1,144–2,575	1,678	56,0	50	1,075–2,575	1,684	100,0

Table 3 The diameter of the axial stem (st) -dimensions in mm

		Specimens fertile				Specimens sterile				Both types together			
		N	range	$\bar{st}$	%	N	range	$\bar{st}$	%	N	range	st	%
0,3–0,49	0,4	1	0,458		2,0	0			0,0	1	0,458		2,0
0,5–0,69	0,6	5	0,513–0,647	0,589	10,0	12	0,511–0,672	0,619	24,0	17	0,511–0,672	0,610	34,0
0,7–0,89	0,8	5	0,700–0,852	0,768	10,0	8	0,713–0,858	0,765	16,0	13	0,700–0,858	0,766	26,0
0,9–1,09	1,0	6	0,983–1,036	1,016	12,0	5	0,930–1,058	1,000	10,0	11	0,930–1,058	1,009	22,0
1,1–1,29	1,2	5	1,111–1,272	1,146	10,0	3	1,100–1,119	1,112	6,0	8	1,100–1,272	1,133	16,0
Summary		22	0,458–1,272	0,867	44,0	28	0,511–1,119	0,782	56,0	50	0,458–1,272	0,819	100,00

Table 4 The relation between st and D (in mm).

Axial stem st	Specimens fertile			Specimens sterile			Both types together		
	N	range	$\bar{D}$	N	range	$\bar{D}$	N	range	$\bar{D}$
0,4	1	1,141		0			1	1,141	
0,6	5	1,075–1,497	1,302	12	1,144–1,680	1,363	17	1,075–1,680	1,345
0,8	5	1,238–1,741	1,457	8	1,452–1,991	1,684	13	1,238–1,991	1,596
1,0	6	1,583–2,477	1,981	5	1,638–2,575	2,111	11	1,583–2,575	2,040
1,2	5	1,719–2,383	2,087	3	1,902–2,480	2,206	8	1,719–2,480	2,131
Summary	22	1,075–2,477	1,693	28	1,144–2,575	1,678	50	1,075–2,575	1,684

Table 5

The relation between st and p_m (= maximal diameter of branches)

Axial stem st	Specimens fertile			Specimens sterile			Both types together		
	N	range	$\overline{p_m}$	N	range	$\overline{p_m}$	N	range	$\overline{p_m}$
0,4	1	0,072		0			1	0,072	
0,6	3	0,066—0,116	0,095	11	0,058—0,105	0,086	14	0,058—0,116	0,088
0,8	4	0,086—0,111	0,097	6	0,091—0,145	0,110	10	0,086—0,145	0,105
1,0	6	0,088—0,152	0,119	5	0,088—0,144	0,117	11	0,088—0,152	0,118
1,2	5	0,111—0,152	0,126	3	0,111—0,125	0,119	8	0,111—0,152	0,119
Summary	19	0,066—0,152	0,110	25	0,058—0,145	0,102	44	0,058—0,152	0,105

Table 6

The relation between st and c (= diameter of cysts)

Axial stem st	cysts		
	N	range	$\bar{c}$
0,4	1	0,041	
0,6	5	0,038—0,055	0,046
0,8	5	0,036—0,066	0,051
1,0	6	0,036—0,055	0,048
1,2	5	0,041—0,055	0,048
Summary	22	0,036—0,066	0,048

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