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Palaeoenvironmental reconstruction of the Sarmatian (Middle Miocene) Central Paratethys based on palaeontological and geochemical analyses of foraminifera, ostracods, gastropods and rodents

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Table A1. Stratigraphical distribution of the ostracod species from the Zsámbék Basin. The species used for geochemical analyses are highlighted.

Ostracod species	<i>Elphidium reginum</i> Zone	<i>Elphidium hauerinum</i> Zone	<i>Spirolina austriaca</i> Zone
<i>Cnestocythere</i> aff. <i>truncata</i> (Reuss)			x
<i>Amnicythere</i> sp.		x	x
<i>Amnicythere tenuis</i> (Reuss)	x	x	x
<i>Euxinocythere diafana</i> (Stancheva)	x	x	x
<i>Euxinocythere naca</i> (Méhes)			x
<i>Euxinocythere praebosqueti</i> (Suzin)			x
<i>Callistocythere egregia</i> (Méhes)	x	x	x
<i>Callistocythere incostata</i> Pietrzeniuk	x		
<i>Callistocythere postvallata</i> Pietrzeniuk	x		
<i>Cyamocytheridea dérii</i> (Zalányi)			x
<i>Cyamocytheridea leptostigma</i> (Reuss)			x
<i>Hemicyprideis dacica dacica</i> (Héjjas)	x	x?	x
<i>Cytheridea hungarica</i> Zalányi	x		
<i>Miocyprideis janoscheki</i> Kollmann			x
<i>Miocyprideis sarmatica</i> (Zalányi)	x		
<i>Hemicytheria omphalodes</i> (Reuss)	x	x	x
<i>Aurila mehesi</i> (Zalányi)	x		
<i>Aurila merita</i> (Zalányi)	x		
<i>Aurila notata</i> (Reuss)		x	x
<i>Senesia vadaszi</i> (Zalányi)	x		
<i>Loxoconcha kochi</i> Méhes			x
<i>Loxoconcha porosa</i> Méhes		x	x
<i>Loxoconcha</i> ex gr. <i>punctatella</i> (Reuss)	x		
<i>Loxocorniculum hastatum</i> (Reuss)	x	x	x
<i>Xestoleberis fuscata</i> Schneider	x	x	x

Table A2. Stratigraphical distribution of the foraminifer species from the Zsámbék Basin. The species used for geochemical analyses are highlighted.

Foraminifer species	<i>Elphidium reginum</i> Zone	<i>Elphidium hauerinum</i> Zone	<i>Spirolina austriaca</i> Zone
<i>Spiroloculina okrojantzi</i> Bogdanowich	x		
<i>Nodophthalmidium</i> aff. <i>prima</i> (Bogdanowich)	x		
<i>Nodophthalmidium asperum</i> n. sp.	x		
<i>Nodophthalmidium rugosum</i> n. sp.	x		x
<i>Nodobacularella didkowskii</i> Bogdanowich	x	x	
<i>Nodobacularella ovalis</i> Vengliniski	x		
<i>Nodobacularella sulcata</i> (Reuss)	x	x	
<i>Schlumbergerina fabularoides</i> (Karrer)			x
<i>Siphonaperta longidentata</i> n. sp.	x		
<i>Cycloforina badenensis</i> d'Orbigny	x	x	x
<i>Cycloforina contorta</i> (d'Orbigny)		x	x
<i>Cycloforina fluviata</i> (Vengliniski)	x	x	x
<i>Cycloforina predkarpatica</i> (Serova)	x	x	x
<i>Cycloforina stomata</i> Luczkowska			x
<i>Cycloforina toreuma</i> (Serova)	x		
<i>Cycloforina vermicularis</i> (Karrer)	x		x
<i>Hauerina irschavensis</i> Vengliniski et Burindina			x
<i>Hauerina podolica</i> Serova			x
<i>Quinqueloculina anagallis</i> Luczkowska			x
<i>Quinqueloculina buchiana</i> d'Orbigny	x		
<i>Affinetrina cubanica</i> (Bogdanowich)	x		x
<i>Affinetrina ucrainica</i> (Serova)	x		x
<i>Miliolinella banatiana</i> Luczkowska			x
<i>Miliolinella selene</i> (Karrer)			x
<i>Pseudotriloculina consobrina</i> (d'Orbigny)	x	x	x
<i>Pseudotriloculina inflata</i> (d'Orbigny)			x
<i>Triloculina gibba</i> d'Orbigny			x
<i>Triloculina intermedia</i> Karrer	x		x
<i>Varidentella latelacunata</i> (Vengliniski)		x	x
<i>Varidentella pseudocostata</i> (Vengliniski)	x	x	
<i>Varidentella reussi</i> (Bogdanowich)		x	x
<i>Varidentella rotunda</i> (Gerke)	x	x	x
<i>Articularia articulinooides</i> (Gerke et Issaeva)			x
<i>Articulina</i> aff. <i>nitida</i> d'Orbigny	x		
<i>Articulina problema</i> Bogdanowich	x	x	x
<i>Spirolina austriaca</i> d'Orbigny			x
<i>Guttulina communis</i> d'Orbigny		x	
<i>Oolina mironovi</i> (Bogdanowich)		x	
<i>Bolivina antiqua</i> d'Orbigny		x	
<i>Bolivina moldavica</i> Didkowski	x	x	x
<i>Bolivina moravica</i> Cicha et Zapletalova	x	x	
<i>Bolivina sagittula</i> Didkowski			x
<i>Bolivina sarmatica</i> Didkowski	x	x	x
<i>Cassidulina margareta</i> Karrer	x		
<i>Bulimina elongata</i> d'Orbigny	x	x	x
<i>Buliminella elegantissima</i> (d'Orbigny)	x	x	
<i>Fursenkoina acuta</i> (d'Orbigny)	x		
<i>Caucasina schischkinskye</i> (Samoylova)	x	x	x
<i>Rosalina obtusa</i> d'Orbigny			
<i>Schackoinella imperatoria</i> (d'Orbigny)	x		
<i>Cibicides lobatulus</i> (Walker et Jacob)	x	x	x
<i>Nonion bogdanowiczi</i> Voloshinova	x	x	x
<i>Porosonion granosum</i> (d'Orbigny)	x	x	x

Foraminifer species	<i>Elphidium reginum</i> Zone	<i>Elphidium hauerinum</i> Zone	<i>Spirolina austriaca</i> Zone
<i>Aubignyna simplex</i> (d'Orbigny)	x		x
<i>Ammonia beccarii</i> (Linné)	x	x	x
<i>Elphidium aculeatum</i> (d'Orbigny)	x	x	x
<i>Elphidium crispum</i> (Linné)	x		x
<i>Elphidium fichtelianum</i> (d'Orbigny)	x	x	
<i>Elphidium flexuosum reussi</i> Marks	x	x	x
<i>Elphidium hauerinum</i> (d'Orbigny)	x	x	x
<i>Elphidium macellum</i> (Fichtel et Moll)	x	x	x
<i>Elphidium obtusum</i> (d'Orbigny)	x	x	x
<i>Elphidium reginum</i> (d'Orbigny)	x		

Table A3. $\delta^{18}\text{O}$, $\delta^{13}\text{C}$ and Mg/Ca values of gastropod species from the Zsámberk Basin. Variations in compositions are indicated by the standard deviations (SD).

Gastropod species	Borehole	Depth (m)	$\delta^{18}\text{O}$ (‰, V-PDB)	SD	$\delta^{13}\text{C}$ (‰, V-PDB)	SD	Mg/Ca (molar)
<i>Mohrensternia angulata</i>	Mány-22	168.8	-1.21	0.07	1.38	0.003	
		147.2	-1.32	0.06	1.45	0.04	
<i>Granulolabium bicinctum</i>	Mány-17	142	0.38	0.14	0.53	0.08	0.00034
		147.3	-0.06	0.28	0.48	0.08	0.00031
		145.5	-0.31	0.14	-0.18	0.06	0.00034
<i>Cerithium rubiginosum</i>	Mány-17	157.6	-1.02	0.14	3.11	0.03	0.00017
		145.5	-1.35	0.41	3.04	0.15	0.00019
<i>Potamides</i> sp. <i>Hydrobia hoernesii</i>	Mány-22	129.3	-1.86	0.07	2.6	0.03	0.00025
		96.3	-0.75	0.09	1.5	0.05	0.00022
		83.4	-1.92	0.23	1.85	0.02	0.00030
		90.4	-2.05	0.05	2.52	0.02	0.00016
		84.9	-2.21	0.11	1.37	0.06	
		73.7	-2.01	0.007	2.52	0.08	0.00050
		71	-1.56	0.06	2.86	0.03	0.00025
<i>Potamides</i> sp. <i>Hydrobia hoernesii</i>	Mány-17	48.7	-1.69	0.04	1.89	0.08	0.00013
		42.2	-1.21	0.03	0.90	0.02	0.00016
<i>Potamides</i> sp. <i>Hydrobia hoernesii</i>	Mány-22	40.4	-1.54	0.009	2.34	0.011	0.00022
		111.1	-0.91	0.06	2.43	0.06	0.00017
<i>Potamides</i> sp. <i>Hydrobia hoernesii</i>	Mány-17	107.8	-1.74	0.09	2.62	0.01	0.00020
		92.7	-1.73	0.03	2.51	0.05	0.00028
<i>Potamides</i> sp. <i>Hydrobia hoernesii</i>	Mány-22	186.1	0.34	0.22	3.32	0.04	0.00030
		48.7	-0.4	0.03	1.28	0.05	0.00064
<i>Potamides</i> sp. <i>Hydrobia hoernesii</i>	Mány-17	42.2	-1.36	0.05	0.68	0.03	
		110.6	0.69	0.07	1.56	0.03	0.00091
<i>Potamides</i> sp. <i>Hydrobia hoernesii</i>	Mány-22	105.2	-0.23	0.13	1.13	0.1	0.00049
		83.4	-0.08	0.26	1.28	0.04	0.00094

Table A4. $\delta^{18}\text{O}$ and $\delta^{13}\text{C}$ values of foraminifer and ostracod species from the Zsámberk Basin. Variations in compositions are indicated by the standard deviations (SD).

Species	Borehole	Depth	n	$\delta^{18}\text{O}$ (‰, V-PDB)	SD	$\delta^{13}\text{C}$ (‰, V-PDB)	SD	n	$\delta^{18}\text{O}$ (‰, V-PDB)	SD	$\delta^{13}\text{C}$ (‰, V-PDB)	SD		
Foraminifera														
<i>Ammonia beccarii</i>	Mány-22	156.5	28	-2.77	0.2	-0.13	0.07	157.6	11	-2.66	0.17	1.09	0.03	
		154.2	32	-2.15	0.08	-0.33	0.08	156	31	-0.99	0.003	0.51	0.12	
		152.4	18	-2.9	0.11	0.91	0.06	153.2	22	-2.09	0.53	0.91	0.05	
		150.1	40	-2.05	0.12	0.93	0.09	129.3	36	-1.91	0.04	0.47	0.27	
		148	42	-1.09	0.05	-0.84	0.1							
		142.6	24	-1.98	0.08	0.67	0.07							
		110	51	-2.46	0.01	-0.94	0.01							
		48.7	17	-2.46	0.04	1.14	0.08							
<i>Elphidium aculeatum</i>														
<i>Elphidium aculeatum</i>	Mány-22	154.2	12	-2.34	0.08	0.58	0.1	157.6	10	-1.43	0.12	1.35	0.14	
		148	6	-0.45	0.03	1.8	0.04	156	10	-1.00	0.12	2.45	0.43	
		142	14	-0.13	0.17	0.48	0.07	147.3	12	-0.59	0.18	1.13	0.13	
								145.5	15	-0.73	0.39	0.88	0.04	
								110.2	19	-1.13	0.07	-0.12	0.07	
						99.8	18	-1.76	0.24	1.52	0.06			
<i>Elphidium macellum</i>														
<i>Elphidium macellum</i>	Mány-22	174.5	8	-2.93	0.16	0.77	0.11	170.4	20	-2.47	0.14	0.75	0.03	
		172.3	5	-2.53	0.005	0.91	0.44	164.7	15	-1.00	0.05	0.59	0.32	
		166.5	13	-2.93	0.22	1.10	0.07	153.2	18	-1.09	0.11	1.53	0.07	
		162.5	13	-2.35	0.04	1.29	0.05	138.6	48	-1.09	0.09	-0.08	0.03	
		156.5	7	-2.3	0.04	0.55	0.26	135.4	22	-1.52	0.03	1.38	0.26	
		152.4	6	-2.13	0.08	1.54	0.04	133.6	17	-1.2	0.14	-0.37	0.3	
		150.1	8	-1.68	0.29	1.5	0.08	129.3	15	-2.22	0.04	0.27	0.1	
		142.6	11	-1.73	0.14	1.82	0.005	127.4	17	-1.32	0.04	-0.59	0.03	
		116.2	24	-1.92	0.02	-0.69	?	126.5	26	-2.24	0.28	-0.09	0.005	
		110	35	-1.87	0.03	-0.55	0.06	119.4	22	-1.7	0.19	-0.4	0.04	
		96	16	-2.58	0.1	-0.62	0.08	110.9	9	-1.46	0.14	1.08	0.03	
		81.6	21	-1.59	0.2	-0.36	0.11	110.6	26	-0.84	0.08	0.38	0.04	
		77.1	8	-1.35	0.01	0.13	0.12	105.2	21	-1.48	0.15	0.98	0.1	
		71	22	-1.62	0.18	0.88	0.06	102.2	17	-3.21	0.09	1.3	0.48	
		48.7	29	-0.53	0.12	-0.2	0.004	98	9	-2.83	0.07	1.86	0.09	
						97.3	14	-1.18	0.03	-0.98	0.14			

Species	Borehole	Depth	n	$\delta^{18}\text{O}$ (‰, V-PDB)	SD	$\delta^{13}\text{C}$ (‰, V-PDB)	SD	Borehole	Depth	n	$\delta^{18}\text{O}$ (‰, V-PDB)	SD	$\delta^{13}\text{C}$ (‰, V-PDB)	SD	
<i>Elphidium hauerinum</i>	Mány-22	140	42	-0.77	0.06	-0.16	0.02		94.5	11	-1.19	0.12	1.92	0.006	
									92.7	16	-2.28	0.42	0.58	0.21	
Ostracod <i>Aurila mehesi</i>	Mány-22	174.5	7	-2.65	0.31	-2.76	0.32	Mány-17	170.4	12	-1.82	0.03	-2.75	0.28	
		166.5	6	-1.81	0.03	-2.45	0.08		164.7	10	-2.23	0.22	-2.65	0.08	
		162.5	5	-2.23	0.24	-0.5	0.01		157.6	9	-1.27	0.3	-2.96	0.23	
		154.2	7	-2.21	0.17	-2.37	0.39		156	14	-0.85	0.18	-2.91	0.3	
		152.4	6	-2.63	0.01	-2.23	0.22		153.2	12	-1.79	0.13	-1.71	0.01	
		150.1	8	-0.89	0.16	-1.93	0.11								
		142.6	9	-2.58	0.15	-1.79	0.11								
		110	12	-1.44	0.43	-5.21	0.07	Mány-17	135.4	5	-0.4	0.01	0.01	-4.97	0.45
	<i>Aurila notata</i>	Mány-22	81.6	6	-0.7	0.53	-4.36	0.03		133.6	4	-0.43	0.004	-4.11	0.31
		77.1	8	-1.52	0.24	-3.57	0.18		127.4	9	-0.57	0.17	-5.03	0.02	
		71	8	-1.42	0.15	-3.84	0.05		119.4	8	-1.45	0.08	-3.55	0.36	
		48.7	7	-2.44	0.15	-3.39	0.44		110.9	15	-2.11	0.3	-3.38	0.04	
									105.2	15	-1.81	0.1	-4.2	0.43	
									92.7	7	-2.31	0.31	-3.61	0.22	
									92.1	8	-2.7	0.07	-3.14	0.16	
									90.5	12	-1.25	0.01	-4.2	0.1	
									83.4	10	-2.03	0.2	-3.19	0.85	