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SUPPLEMENTARY ONLINE MATERIAL FOR

Geometric morphometric analysis and taxonomic revision of the Gzhelian (Late Pennsylvanian) conodont *Idiognathodus simulator* from North America

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Supplementary Online Material

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Table 2. Conodont abundance at the Sedan locality. Stratigraphic column from Fig. 2B (Hogancamp et al 2016).

Lithology	Sample thickness (cm)	Sample number	Weight of sample (kg)	<i>Idiognathodus lugancius</i>	<i>I Idiognathodus lateris</i> sp. nov.	<i>Idiognathodus praeunitus</i>	<i>Idiognathodus simulator</i>	<i>Idiognathodus auritus</i>	<i>Idiognathodus tersus</i> group	<i>Idiognathodus pictus</i> group	<i>Streptognathodus</i> sp.	<i>Streptognathodus</i> and <i>Idiognathodus</i> ramiform	<i>Streptognathodus</i> and <i>Idiognathodus</i> Pb	Juvenile <i>Idiognathodus</i>	<i>Idioproniodus</i> sp.	<i>Hindeodus</i> sp. Pa	<i>Hindeodus</i> sp. ramiform	<i>Gondolella</i>	<i>Adetognathus</i>
	10	41	0,65							14	23		8	26	4	5	7		
	10	40	1		2			1		50	41	1	3	18	7	4	4		1
	10	39	1		2				2	23	37	1	11	29	12	23	25		
	10	38	1	4	9	1	2	1	12	7	39	6	9	59	24	26	38		1
	5	37	1	19	22		4	5	5	1	34	7	2	84	31	15	12		2
	5	36	0,7	11	17		3	5	6		1		3	61	5		2		
	5	35	0,2	6	8			1	1		4		4	40	8				
	5	34	0,2	3	5			1			6	2		9	2				
	5	33	0,2	2	3			1			2	2	4	12	1				
	5	32	0,2	11	49		2	6	2		8	9	12	125	25				
	5	31	0,2	1	8						4	1	4	11	1				
	5	30	0,2	3	10		1	2			3	2		14	8				
	5	29	0,2	5	14	1	3	4			7	3	9	20	22				
	5	28	0,2	15	24	3	6	2			15	6	11	51	32				
	5	27	0,2		3									5	5				
	5	26	0,2	1	2						2		4	2	6				
	5	25	0,2	1	2						3	1	2	9	19				
	5	24	0,2	2	15	2	2	2			1		2	25	14				
	5	23	0,2	4	18	4	3	4			11	1	14	74	23				
	5	22	0,2	21	33	2		5			14	3	12	67	25				
	5	21	0,2	12	24		2	1			8	4	14	72	52				1
	5	20	0,2	26	44	1	11	2	1		8		9	77	59				
	5	19	0,2	8	42		8					4	13	46	18				
	5	18	0,2	5	15			2			1	1	5	31	16	1			
	5	17	0,2	23	25		3	1			1	7	12	31	19	2			
	5	16	0,2	10	32		4	5			1	3	9	59	9				
	5	15	0,2	27	30	3	4	4				7	5	77	14				
	5	14	0,2	14	43	2	2	4			3	10	20	122	13	13			1
	5	13	0,2	20	42	1	2	4			2	4	18	69	8	1			
	5	12	0,2	33	58	2	15	3			1	19	31	201	10	8			
	5	11	0,2	47	71	13	10	6			10	6	21	170	16	17			
	5	10	0,2	5	34		11	1				2	7	32	3	4	3		
	5	9	0,2	14	27	1	4	4	2			11	36	27	6	54			1
	5	8	0,2	4	14	1	1	1			8	1	13	70	2	5			1
	5	7	0,2	3	9		1	2	1		16	4	1	38	2	6			
	5	6	0,2	2	5		1				26	4	7	21	3				
	5	5	1	10	14	1	9	9	1		25	1	6	24	2	1			
	5	4	0,65								5	2							1

Table 4. Conodont abundance at the Clinton locality. Stratigraphic column is from Fig. 2B (Hogancamp et al 2016).

Lithology	Sample thickness (cm)	Sample number	Weight of sample (kg)	<i>Idiognathodus lugancius</i>	<i>Idiognathodus lateris</i> sp. nov.	<i>Idiognathodus praeninitius</i>	<i>Idiognathodus simulator</i>	<i>Idiognathodus auritus</i>	<i>Idiognathodus tersus</i> group	<i>Idiognathodus pictus</i> group	<i>Sireptognathodus</i> sp.	<i>Sireptognathodus</i> and <i>Idiognathodus</i> ramiform	<i>Sireptognathodus</i> and <i>Idiognathodus</i> Pb	Juvenile <i>Idiognathodus</i>	<i>Idiopriioniodus</i> sp.	<i>Hindeodus</i> sp. Pa	<i>Hindeodus</i> sp. ramiform	<i>Gondolella</i>	<i>Adetognathus</i>
	10	38	0,5	3	4	3	1	1	1		2		2	11	9				
	10	37	0,5	9	8		1	5	1		6	2	8	33	14				
	5	36	0,2		1	1	1	1	1		6	3	1	12	5				
	5	35	0,2	3							1		1	2	3				1
	5	34	0,2								1								
	5	33	0,2								1		1	1	3				
	5	32	0,2								3	1		1					
	5	31	0,2	5	3		1	2	3		15	4	4	13	11				
	5	30	0,2		1									1	2				
	5	29	0,2	12	42		7	8	1		4	3	7	97	65				
	5	28	0,2	7	19		4	2	3		27	7	7	47	33				
	5	27	0,2	22	24	1	2				34	3	9	116	75				1
	5	26	0,2	9	7			1			13		2	18	9				
	5	25	0,2	4	7	1	2	1			6	1	2	16	24				
	5	24	0,2	6	8	1	2	1			5	2	1	21	20				
	5	23	0,2	4	4		2				3		5	9	12				
	5	22	0,2	8	22		9				4	2	5	37	17				
	5	21	0,2	16	18		4	1				5	7	31	6				
	5	20	0,2		6	1	4	2				1	2	7	13				
	5	19	0,2	25	34	2	13	9				10	7	180	18				
	5	18	0,2	58	69		4					4	6	205	1				
	5	17	0,2	57	88	14	14	12				2	6	108	11				
	5	16	0,2	20	34		3	2			4	5	17	153	9				
	5	15	0,2	37	46	7	7	2			15	15	22	205	12	23			
	5	14	0,2	8	30	2	4	1			7		3	68	6				
	5	13	0,2	20	29	1	4	5	3		7	2	7	71	10				
	5	12	0,2	18	21	1	6	5	1		17	11	12	110	22	63			
	5	11	0,2	18	24	1	1				85	18	16	122	11	30			1
	5	10	0,5		4		1	1			2			35	8	1			2
	5	9	0,7																

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Table 5. *Idiognathodus simulator* group P₁ elements tabulated by chirality at the I229 locality.

Sample number	Weight of sample (kg)	<i>I. lugancius</i> (sin.)	<i>I. lateris</i> sp. nov. (sin.)	<i>I. praenunius</i> (sin.)	<i>I. simulator</i> (sin.)	<i>I. auritus</i> (sin.)	<i>I. lugancius</i> (dex.)	<i>I. lateris</i> sp. nov. (dex.)	<i>I. praenunius</i> (dex.)	<i>I. simulator</i> (dex.)	<i>I. auritus</i> (dex.)
106	0,65	1	5		2		3	3			
105	0,5	1	2				2	2			
104	0,5					1	4	1			
103	0,5	3	1		1	1		1			
102	0,5	9	9		1	5	10	9		1	
101	0,5	3	3				1	2			
100	0,5	2	6		1		2	3			1
99	0,2	2	11		2	5	6	15		1	1
98	0,2		14		1	5	2	6			
97	0,2		1					1			
96	0,2										
95	0,2		5		1		2	2		1	
94	0,2	2	2					3			
93	0,2	1									
92	0,2		5		1		2	2		1	
91	0,2	1	10		2	2	4	14			
90	0,2	2	6				1	3		3	
89	0,2	2	6		1	2	3	5		1	
88	0,2	20	15			5	6	12			1
87	0,2	7	26		5	2	8	12		4	
86	0,2	2	8		4		5	7			
85	0,2	1	6		2	1	2	1		2	1
84	0,2	4	15	1	3	4	15	12		4	
83	0,2	15	17	2	1	4	7	14		7	
82	0,5	22	26	2	17	8	18	27		5	1
81	0,65				1						

Table 6. Conodont abundance at the I229 locality. Stratigraphic column is from Figure 2B. (Hogancamp et al 2016).

Lithology	Sample thickness (cm)	Sample Number	kg of sample	<i>Idiognathodus lugancius</i>	<i>Idiognathodus lateris</i> sp. nov.	<i>Idiognathodus praeunitus</i>	<i>Idiognathodus simulator</i>	<i>Idiognathodus auritus</i>	<i>Idiognathodus tersus</i> group	<i>Idiognathodus pictus</i> group	<i>Streptognathodus</i> sp.	<i>Streptognathodus</i> and <i>Idiognathodus</i> ramiform	<i>Streptognathodus</i> and <i>Idiognathodus</i> Pb	Juvenile <i>Idiognathodus</i>	<i>Idioprioniodus</i> sp.	<i>Hindeodus</i> sp. Pa	<i>Hindeodus</i> sp. ramiform	<i>Gondolella</i>	<i>Adetognathus</i>
	10	106	0,65	4	8		2					3	1	31	12	63	23		
	20	105	0,5	3	4						14	1		3	3	16	14		
	10	104	0,5	4	1			1	1		23	4	12	3	18	8			
	10	103	0,5	3	2		1	1	2		17		3	1	12	4			
	10	102	0,5	19	18		2	5	5		3	1	12	41	45				
	10	101	0,5	4	5						1	1	4	9	5				
	10	100	0,5	4	9		1	1	1		1		6	7	9				
	5	99	0,2	8	26		3	6	6			2	8	25	63				
	5	98	0,2	2	20		1	5	2		46	1	6	21	41				
	5	97	0,2		2						1	1	1	1	2				
	5	96	0,2																
	5	95	0,2	2	7		2				13		2	20	19				
	5	94	0,2	2	5							2		2	10				
	5	93	0,2	1							1	1		1	3				
	5	92	0,2	2	7		2						5	15	29				
	5	91	0,2	5	24		2	2			62	2	8	68	54				
	5	90	0,2	3	9		3				14		1	18	13				
	5	89	0,2	5	11		2	2			21			28	27				
	5	88	0,2	26	27			6			30	6	5	73	58	1			
	5	87	0,2	15	38		9	2			2	1	9	80	29				
	5	86	0,2	7	15		4				3	6	5	48	59				
	5	85	0,2	3	7		4	2			1	5	3	31	13	2			
	5	84	0,2	19	27	1	7	4			4	1	9	44	21				
	5	83	0,2	22	31	2	8	4				1	3	93	8				
	5	82	0,5	40	53	2	22	9	1		6	5	13	69	18	2			
	5	81	0,65				1				1	2	2	6		1			

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SOM 3. Conodont P₁ element morphology glossary

Although many of the morphological and structural terms for conodont P₁ (platform) elements can be found in the glossary of Sweet (1981), the features used in this analysis have been redefined to ensure clarity and consistent use of these terms, specifically because of their critical role in defining landmarks for the morphometric analyses (Fig. 1).

Platform: Portion of P₁ element that is constrained laterally by the platform margins, and ventrally by the ventral ends of the adcarinal ridges. Platforms of the *I. simulator* group possess transverse ridges and an eccentric groove.

Transverse ridges: Ridges that grow sub-perpendicular or oblique to the platform margins on the platform surface, also called ribs.

Eccentric groove: The discrete ventral-dorsal running groove that truncates the transverse ridges on the caudal portion of P₁ elements of the *I. simulator* group, and terminates ventrally into one of the adcarinal troughs.

Free blade: Elongate blade ornamented with denticles that extends ventrally from the platform to form the most ventral point of the element, and dorsally joins with the carina on the platform.

Carina: Dorsal portion of the free that is flanked by the platform and the adcarinal ridges and within the *I. simulator* group, it terminates on the ventral half of the platform.

Denticles: Aligned, sub-conical growths that form a serrated surface on the carina.

Caudal platform margin: Caudal edge of the platform surface between the caudal termination of the most ventral transverse ridge and the dorsal tip.

Rostral platform margin: Rostral edge of the platform surface between the rostral termination of the most ventral transverse ridge and the dorsal tip.

Caudal adcarinal trough: Depression formed between the caudal adcarinal ridge and the carina.

Rostral adcarinal trough: Depression formed between the rostral adcarinal ridge and the carina.

Caudal adcarinal ridge: Caudal edge of the platform surface that extends beyond the most ventral transverse rib, often forming a ridge.

Rostral adcarinal ridge: Rostral edge of the platform surface that extends beyond the most ventral transverse rib, often forming a ridge.

Lobe: Modification of the outer sides of the platform margins and or the adcarinal ridges that is ornamented with one or more nodes. During growth of the platform, the lobe may develop before a node appears, but this appears to be a very small window of growth, as almost all lobes are ornamented with nodes.

Node: Growth, primarily domal or conical, that extends orally from a lobe.

Parapet: A short ridge formed by the fusion of two or more nodes above their basal contact with the lobe.

Chirality: a state of left and right-handedness in paired elements, referred to as sinistral (left) or dextral (right).