

Supplementary information for “New polycotyloid plesiosaur skeletons from the Upper Cretaceous of the Southern Urals provide additional diagnostic features of *Polycotylus sopożkoi* and demonstrate its variation” by **Zverkov N.G., Grigoriev D.V. and Nikiforov A.V.**

Supplementary illustrations



Figure S1. *Polycotylus sopożkoi* referred specimen OGMM 537 pectoral girdle, humerus and cervical series in a plaster jacket after preparation. Scale bar = 5 cm.



Figure S2. *Polycotylus sopożkoi* referred specimen OGMM 537 posterior cervical and first ‘pectoral’ (no 29) vertebrae in articulation. Scale bar = 5 cm.



Figure S3. *Polycotylus sopożkoi* referred specimen OGMM 537 caudal series after preparation. Scale bar = 5 cm.



Figure S4. *Polycotylus sopozkoi* referred specimen OGMM 537 dorsal vertebrae and ribs after preparation. Scale bar = 5 cm.



Figure S5. *Polycotylus* sp. OSMM 407 pelvic girdle elements after preparation. Scale bar = 10 cm.



Figure S6. *Polycotylus* sp. OSMM 407 pelvic girdle elements. A – pubis, B – ischium. Scale bar = 5 cm.

Measurements

OSMM 247 nickname “Stěpa” (Styopa), holotype of *Polycotylus sopozkoi*

Humerus 390 mm long, 250 mm distal width, 50 mm distal thickness, 95 mm wide shaft.

Additional measurements of OSMM 247 are available in Efimov et al (2016).

Vertebral centra measurements:

№	L	H	W
C1 at	30	40	(43)
C2 ax	40	(40)	(43)
C x6 247	34	46	50
C x7 235	34	46	54
C x8 235a	34	46	(54)
C x9 236	35	48	56
C x10 237	35	48	55
C x12 248	36	50	57
C x14 257	37	53	64
D x1 437	48	58	64
D x2 229a	48	58	64
D x4 233	46	63	71
D x5 234	46	65	73
D x6 238	51	(60)	70
D x7 239	52	66	70
D x9 240	56	70	75
D 436	50	70	80
D 434	52	62	72

OSMM 337 nickname “Stepan”

Humerus (left):

420 mm long proximodistally

265 mm distal width

54 mm distal thickness

100 x 65 mm shaft width to thickness

136 mm proximal head anteroposterior width

87 mm dorsal tuberosity width

40 mm isthmus width

Coracoid (left):

320 mm mediolateral width at glenoid

205 x 95 mm glenoid portion

123 mm glenoid facet length, and 80 mm scapular facet length

Scapula (left):

Glenoid portion -120 x 78 mm

glenoid facet - 80 mm, coracoid facet - 60 mm

neck ~65 mm wide

dorsal ramus 63 mm wide anteroposteriorly

Pubis (left):

~350 mm mediolateral width

145 x 84 mm acetabular head

51 mm maximum thickness of medial symphysis

Ischium (left):

280 mm mediolateral width

95 mm ischial neck width

135 x 88 mm acetabular head

45 mm maximum thickness of medial symphysis

Ilium (left):

230 mm proximodistal length

101 x 65 mm proximal head

45 x 38 mm diaphysis

52 x 25 mm distal end at expanded part

Femur(left):

415 mm long proximodistally

255 mm distal width

50 mm maximum distal thickness

90 x 65 mm diaphysis

155 mm proximal head maximum width

74 mm dorsal trochanter width, and 30 mm isthmus width

Vertebral centra measurements:

No	L	H	W
C1 at	43	-	-
C2 ax	42	47	50
C3	36	50	56
C4	37	51	57
C5	37	58	62
C6	38	60	64
C7	40	65	70
C7a	41	66	70

C8	42	66	68
C9	44	66	76
C-P 10	45	66	75
P 11	45	66	76
P 12	44	69	77
P 13	46	71	78
D 14	50	78	82
D 15	52	80	86
D 16	53	82	84
D 17	53	82	86
D 18	56	84	86
D 19	58	85	86
D 20	60	90	86
D 21	62	91	86
D 22	62	90	86
D 23	62	91	88
D 24	61	88	86
D 25	62	88	86
D 26	63	89	88
D 27	63	88	88
D 28	62	88	87
D 29	61	83	85
D 30	59	82	82
D 31	58	82	81
D 32	58	82	80
D 33	60	82	80
Ca 38	48	60	70
Ca 34	41	62	66

OSMM 127 nickname “Kira”

Humerus >47 cm long; 83 mm distal thickness; 95 mm shaft width.

Vertebral centra measurements:

№	L	H	W
D 86	70.5	103	106
D 126	74	112	(110)
D 127	68	(100)	(100)
D 128	71	-	-
D 129	72	108	(107)
D 130	72	(110)	(110)
D 131	71	(114)	(>112)
D 132	71	(110)	(110)
D 133	70	112	>108
D 134	71	(110)	108
D 133b	68	-	-
D 129a	71	-	-

OSMM 507 nickname “Gosha”. Estimated total length 2.5 m (192 cm vertebral column with 65.3 cm neck, 78.5 cm pectoral and dorsal, and 47.5 cm caudal series)

Humerus:

298 mm proximodistal length

125 mm preserved distal width (no less than 155 reconstructed)

41 mm distal thickness

57 mm diaphysis width

Radius 60 mm long anteroposteriorly, 33 mm long proximodistally, 20 mm thick dorsoventrally.

Coracoid:

300 mm long anteroposteriorly

120 mm wide in glenoid region

145 mm wide at posterior expansion

Glenoid portion length 75 mm; glenoid facet = 50x37 mm, scapular facet = 34x25 mm.

Articulated coracoids mediolateral width at glenoid – 228 mm

Coracoid medial symphysis maximum thickness 35 mm

Coracoid length of free medial margin of the anteromedial process = 44 mm, thickness = 22 mm

Scapula:

Scapula anteroposterior length ventrally = 135 mm.

Glenoid portion width = 45 mm, thickness = 30 mm.

From posterior end of the dorsal ramus to anterior end of the ventral ramus – 180 mm.

Dorsal ramus 95 mm long, 45 mm wide at the base, 42 mm wide at distal end.

Facet for coracoid = 22 mm, glenoid contribution = 30 mm.

Longest rib – 23 cm, but distally incomplete; reconstructed length – 30 cm.

Complete gastralia 12 cm long

Thus, body width ~60 cm, depth ~30 cm.

Vertebral centra measurements:

№	L	H	W
C1 at	15	22	26
C2 ax	18	23	26
C3	18	24	26
C4	19	24	27
C5	20	25	30
C6	20	25	30
C7	20	26	32

C8	19.5	26	32
C9	20	(26)	33
C10	20.5	(27)	(33)
C11	21	(28)	(34)
C12	21.5	29	(35)
C13	22	30	36
C14	23	31	36
C15	23	32	36
C16	24	(33)	38
C17	24	34	38
C18	24.5	34	39
C19	25	-	-
C20	26	35	-
C21	27	36	43
C22	28	37	43
C23	29	38	45
C24	29	38	46
C25	29	38	47
C26	29	39	47
C27	29	39	48
C28	30	40	50
P(1)29	30	42	51
P(2)30	30	43	52
P(3)30	(32)	-	-
—/—			
D x2	34	(48)	56
D x3	34	(48)	(56)
D x4	34	48	57
D x5	(33)	(48)	(55)
D x6	(33)	(47)	(54)
D x7	33	47	(53)
D x8	(34)	48	53
D x9	33	47	52
D x10	(33)	46	(51)
D x11	33	45	(50)
D x12	32	43	48
D x13	(31)	43	47
—/—			
Cd x1	26	(35)	39
2	25	34	38
3	25	35	38
4	25	34	37
5	25	33	37
6	25	32	35
7	24	31	36
8	23	31	35
9	23	31	34
10	22	31	33
11	22	30	32
12	22	28	30
13	21	27	29
14	20	24	26

—/—			
x15	18	20	22
—/—			
x16	16	16	17

OSMM 407 nickname “Elniño”. Estimated total length 3 m (2.4 m vertebral column)

Humerus 265 mm long; 145 mm distal width, 33 mm distal thickness; 60 mm wide diaphysis.

Vertebral centra measurements:

№ field	L	H	W
C 81	23	27	32
C 79	24	29	34
C 80	26	31	37
C 77	27	33	37
C 162	27	37	45
C 75	30	39	41
C 74	31.5	42	43
C 64	35	46	51
C 65	35	46	52
C 66	37	49	57
P 154	36	(50)	(60)
P 155	36	51	65
P 171	39	54	60
D 73	38	54	58
D 78	38	56	60
D 169	38	48	54
D 170	40	50	55
D 172	36	(47)	(52)
D 174	32	46	(48)
D 175	32	46	51
D 176	34	-	-
D 156	38	46	52
D 159	36	46	52
D 160	37	50	54
S 61	38	49	55
C402	35	(42)	(50)
C 403	(35)	36	38
C 45	27	38	43
C 45a	30	43	47
C 45b	28	39	46
C 45B	28	39	46
C 45Г	29	(40)	(47)
C 405	23	-	-
C 404	>20	~40	~40

Phylogenetic analysis

Revisions for *Plesiopleurodon wellsi*

199.0; 201.1; 203.0; 204.0; 205.2; 206.0; 218.0. Characters 207-216 scored as ‘?’, because coracoid is unknown for the taxon.

Scores for *P. sopozkoi* specimens can be found directly in the dataset