

## Appendix online 2. Measurements of studied forelimb bones of *Stagonolepis olenkae*

Letters in brackets refer to supplementary Figure 9

**Table 1.** Measurements of humeri

catalog no.	entire length (a) [cm]	width of the proximal head (b) [cm]	width of the shaft in the middle section (c) [cm]	width of the distal head (d) [cm]	thickness of the proximal head measured on top of articulation surface (e) [cm]	thickness of the shaft in the middle section (f) [cm]	thickness of the medial condyle (r) [cm]	thickness of the lateral condyle (s) [cm]	length of the deltopectoral crest (t) [cm]	perimeter of the shaft in the middle section [cm]
ZPAL AbIII/257	—	—	—	7.9	—	—	3.5	3.7	—	—
ZPAL AbIII/1175	24.0	12.7	3.1	7.9	3.7	2.3	3.3	4.0	7.5	8.7
ZPAL AbIII/2627	21.6	10.6	2.7	—	2.0	1.8	—	2.8	6.4	7.8

**Table 2.** Measurements of ulnae

catalog no.	entire length (a) [cm]	length to narrowing measured at the lateral side (h) [cm]	length to narrowing measured at the medial side (i) [cm]	length between coronoid process and the distal end of ulna (j) [cm]	width of the shaft in the proximal view (b) [cm]	width of the shaft in the middle section (c) [cm]	width of the shaft in the distal view (d) [cm]	thickness of the shaft in the proximal view (e) [cm]	thickness of the shaft in the middle section (f) [cm]	thickness of the shaft in the distal view (g) [cm]	length between the tip of olecranon process and the tip of coronoid process (k) [cm]	perimeter of the shaft in the middle section [cm]
ZPAL AbIII/1100/1	16.7	13.5	11.3	13.9	5.7	2.8	3.3	3.2	1.1	1.7	—	7.0
ZPAL AbIII/1179	18.2	13.2	11.3	15.0	6.0	3.0	3.3	3.9	1.3	1.7	—	7.5
ZPAL AbIII/2014	—	13.0	11.4	—	6.2	2.8	—	3.1	1.2	—	6.0	7.0
ZPAL AbIII/2407	17.5	—	—	14.4	5.2	—	3.1	3.1	1.2	1.8	5.7	—
ZPAL AbIII/3349/1	—	—	—	—	—	—	3.8	—	—	2.1	—	—
ZPAL AbIII/3349/2	—	—	—	—	—	—	3.8	—	—	1.9	—	—
ZPAL AbIII/3351	17.0	13.2	11.6	13.6	5.6	2.6	3.2	3.0	1.1	1.9	4.9	6.5

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**Table 3.** Measurements of radii

catalog no.	entire length (a) [cm]	width of the shaft in the proximal view (b) [cm]	width of the shaft in the middle section (c) [cm]	width of the shaft in the distal view (d) [cm]	thickness of the shaft in the proximal view (e) [cm]	thickness of the shaft in the middle section (f) [cm]	thickness of the shaft in the distal view (g) [cm]	perimeter of the shaft in the middle section [cm]
ZPAL AbIII/1628	_____	4.2	1.1	_____	_____	1.3	_____	4.9
ZPAL AbIII/2106/2	_____	_____	_____	3.0	_____	_____	1.7	_____
ZPAL AbIII/2106/4	_____	4.1	1.5	_____	_____	1.4	_____	5.0
ZPAL AbIII/2407	14.8	4.2	_____	3.3	_____	1.6	1.6	4.7
ZPAL AbIII/3322	13.4	3.4	1.5	3.0	2.7	1.4	2.0	_____
ZPAL AbIII/3349/1	_____	_____	_____	_____	_____	_____	1.9	_____
ZPAL AbIII/3349/2	_____	_____	_____	3.1	_____	_____	_____	_____

**Table 4.** Measurements of fused radiale and intermedium bones

catalog no.	entire width in proximal view (b) [cm]	length of the medial "radiale" side (l) [cm]	length of the lateral "intermedium" side (m) [cm]	thickness from the "radiale" side (n) [cm]	thickness from the "intermedium" side (p) [cm]
ZPAL AbIII/2071 left	3.6	1.6	1.8	2.9	1.8
ZPAL AbIII/2071 right	4.2	1.5	1.5	2.7	1.6
ZPAL AbIII/2407	4.3	1.6	_____	2.6	_____
ZPAL AbIII/3349/1	5.4	_____	2.2	3.0	2.1
ZPAL AbIII/3349/2	5.2	2.0	_____	3.0	_____

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**Table 5.** Measurements of ulnares

catalog no.	length [cm]	width [cm]	thickness [cm]
ZPAL AbIII/2071 right	0.8	2.1	1.7
ZPAL AbIII/2407	0.8	—————	—————
ZPAL AbIII/3349/1	1.0	2.3	2.0

**Table 6.** Measurements of other carpals

catalog no.	name	length [cm]	width [cm]	thickness [cm]
ZPAL AbIII/2071 right	distal carpal IV (larger, lunar shaped)	1.2	2.2	1.0
	distal carpal III (smaller, pea shaped)	0.8	1.4	0.8
ZPAL AbIII/2071 left	distal carpal IV (larger, lunar shaped)	1.5	2.1	1.1
ZPAL AbIII/3349/1	distal carpal IV (larger, lunar shaped)	1.2	2	1.8
	distal carpal III (smaller, pea shaped)	1.1	1.3	0.7

**Table 7.** Measurements of metacarpals

catalog no.	name	entire length (a) [cm]	width of the base in the proximal view (b) [cm]	width of the shaft in middle section (c) [cm]	width of the head in the distal view (d) [cm]	Thickness of the base in the proximal view (e) [cm]	thickness of the shaft in middle section (f) [cm]	thickness of the head in the distal view (g) [cm]
ZPAL AbIII/2071 right	metacarpal I	2.8	2.5	—————	1.6	1.2	0.5	1.1
	metacarpal II	4.0	2.4	—————	1.6	1.5	1.0	—————
	metacarpal III	4.1	2.6	1.1	1.6	1.1	0.7	1.0
	metacarpal IV	3.9	2.0	1.0	1.5	—————	0.7	1.0
	metacarpal V	2.9	1.8	0.9	1.4	1.2	0.7	0.7

**Table 7** (cont.). Measurements of metacarpals

catalog no.	name	entire length (a) [cm]	width of the base in the proximal view (b) [cm]	width of the shaft in middle section (c) [cm]	width of the head in the distal view (d) [cm]	Thickness of the base in the proximal view (e) [cm]	thickness of the shaft in middle section (f) [cm]	thickness of the head in the distal view (g) [cm]
ZPAL AbIII/2071 left	metacarpal I	2.9	————	1.2	1.6	1.2	0.5	1.1
	metacarpal II	3.6	————	————	1.8	————	0.8	1.2
	metacarpal IV	3.9	2.2	1.1	1.4	1.9	0.7	1.0
ZPAL AbIII/2102	metacarpal IV	4.2	2.3	1.0	1.7	1.4	0.8	1.0
ZPAL AbIII/2407	metacarpal I	2.7	2.1	————	————	————	0.6	1.1
	metacarpal II	3.9	2.2	————	1.7	————	————	1.3
	metacarpal III	4.1	2.4	1.1	1.8	————	————	0.9
	metacarpal IV	3.9	————	1.1	1.9	————	————	1.0
	metacarpal V	2.8	1.9	1.0	————	1.0	0.7	0.7
ZPAL AbIII/3349/1	metacarpal I	3.2	2.8	————	2.1	1.3	————	0.9
	metacarpal II	4.6	3.2	————	2.0	1.2	————	1.1
	metacarpal III	4.4	2.2	1.7	2.3	1.4	1.4	0.9
	metacarpal IV	4.8	2.4	1.3	1.4	1.2	1.1	1.0
	metacarpal V	3.3	2.1	1.3	3.3	1.0	0.5	0.8
ZPAL AbIII/3349/2	metacarpal I	3.2	————	————	1.9	————	0.6	1.0
	metacarpal II	————	————	————	2.1	————	————	1.2
	metacarpal III	4.4	————	————	2.0	————	0.7	1.0
	metacarpal IV	————	————	1.1	1.8	————	0.7	1.0
	metacarpal V	3.0	————	————	————	————	0.5	0.7

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**Table 9.** Measurements of phalanges

catalog no.	name	entire length (a) [cm]	width of the base in the proximal view (b) [cm]	width of the shaft in the middle section (c) [cm]	width of the head in the distal view (d) [cm]	thickness of the base in the proximal view (e) [cm]	thickness of the shaft in the middle section (f) [cm]	thickness of the head in the distal view (g) [cm]
ZPAL AbIII/267	2 <sup>nd</sup> phalanx, digit III	1.4	1.3	1.0	1.2	0.9	0.5	0.7
ZPAL AbIII/2071 right	1 <sup>st</sup> phalanx, digit I	1.4	1.4	————	1.2	————	————	1.0
	1 <sup>st</sup> phalanx, digit II	1.8	————	1.0	1.3	————	0.7	1.0
	1 <sup>st</sup> phalanx, digit III	1.7	1.5	————	1.4	1.5	————	0.8
	2 <sup>nd</sup> phalanx, digit II	1.1	1.3	0.9	1.0	1.1	0.8	0.8
	2 <sup>nd</sup> phalanx, digit III	1.5	1.3	0.8	1.2	1.1	0.6	0.6
	3 <sup>rd</sup> phalanx, digit III	0.6	1.1	0.8	1.0	0.7	0.5	0.6
	Ungual, digit I	————	0.9	————	————	1.1	————	————
	Ungual, digit II	2.3	0.7	————	————	0.8	————	————
Ungual, digit III	1.7	0.5	————	————	0.6	————	————	
ZPAL AbIII/2071 left	1 <sup>st</sup> phalanx, digit I	1.4	1.3	1.0	1.2	————	————	1.0
	1 <sup>st</sup> phalanx, digit II	2.0	1.7	1.0	1.4	1.4	0.7	0.9
	2 <sup>nd</sup> phalanx, digit II	1.2	1.2	0.9	1.0	1.0	0.6	0.8
	Ungual, digit I	————	0.8	————	————	1.2	————	————
	Ungual, digit II	2.3	0.7	————	————	0.8	————	————
ZPAL AbIII/2407	1 <sup>st</sup> phalanx, digit I	1.5	1.5	1.1	1.4	1.2	0.7	1.1
	1 <sup>st</sup> phalanx, digit II	2.2	1.9	1.1	1.5	1.2	0.6	0.7
	1 <sup>st</sup> phalanx, digit III	1.8	1.7	1.1	————	1.0	1.7	0.9
	1 <sup>st</sup> phalanx, digit IV	1.8	1.4	1.1	1.4	1.1	————	0.8
	1 <sup>st</sup> phalanx, digit V	1.5	————	————	1.0	0.8	0.5	0.6

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**Table 9** (cont.). Measurements of phalanges

catalog no.	name	entire length (a) [cm]	width of the base in the proximal view (b) [cm]	width of the shaft in the middle section (c) [cm]	width of the head in the distal view (d) [cm]	thickness of the base in the proximal view (e) [cm]	thickness of the shaft in the middle section (f) [cm]	thickness of the head in the distal view (g) [cm]
ZPAL AbIII/3349/1	1st phalanx, digit I	1.7	1.7	1.3	1.4	1.2	0.9	1.0
	1 <sup>st</sup> phalanx, digit II	2.2	1.7	1.1	1.5	1.4	0.7	0.9
	1 <sup>st</sup> phalanx, digit III	————	2.0	————	————	1.5	————	————
	1 <sup>st</sup> phalanx, digit IV	1.9	1.7	1.0	1.4	1.2	0.6	0.7
	1 <sup>st</sup> phalanx, digit V	1.4	1.4	————	1.2	0.9	0.4	0.5
	2 <sup>nd</sup> phalanx, digit II	1.1	1.1	0.8	1.0	0.8	0.5	0.6
	2 <sup>nd</sup> phalanx, digit IV	1.1	1.2	0.9	1.0	0.7	0.5	0.6
	3 <sup>rd</sup> phalanx, digit IV	0.7	0.9	0.6	0.7	0.6	0.4	<0.5
	4 <sup>th</sup> phalanx, digit IV	0.6	0.6	<0.6	0.5	<0.6	0.4	0.3
	Ungual, digit I	3.3	1.0	————	————	1.4	————	————
Ungual, digit II	2.0	————	————	————	1.1	————	————	
ZPAL AbIII/3349/2	1 <sup>st</sup> phalanx, digit III	2.4	————	————	1.6	————	————	0.8
	1 <sup>st</sup> phalanx, digit IV	————	————	————	1.4	————	————	0.7
	1 <sup>st</sup> phalanx, digit V	1.7	1.2	————	1.2	————	————	————
	2 <sup>nd</sup> phalanx, digit V	0.9	————	————	0.8	0.6	<0.4	0.4
ZPAL AbIII/3352	2 <sup>nd</sup> phalanx, digit II	1.2	1.4	1.0	1.1	1.1	<0.6	<0.7
ZPAL AbIII/3353	3 <sup>rd</sup> phalanx, digit III	0.6	0.8	<0.7	0.7	>0.5	0.5	<0.5