

SUPPLEMENTARY DATA

Appendicular osteology of *Concavenator corcovatus* (Theropoda:
Carcharodontosauridae) from the Lower Cretaceous of Spain

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TABLE S1. Material revised first-hand of elements of the pectoral girdle and forelimb of allosauroids.

Taxa	Material
<i>Allosaurus fragilis</i>	BYU-8895 (right scapulacoracoid); BYU-4964 (left scapula); UMNH-VP 10127 (right scapula); UMNH-VP 10131 (right scapula); UMNH-VP 10206 (left partial scapulacoracoid); BYU-17488 (left coracoid); BYU-17124 (right coracoid); UMNH-VP 5411 (right coracoid); UMNH-VP 9822 (right coracoid); UUVP 5753 (furcula); UUVP 11690 (furcula); UMNH-VP 10779 (left humerus); UMNH-VP 11768 (right humerus); BYU-13260 (left humerus); BYU 5098 (left humerus); UMNH-VP 8149 (right ulna); UMNH-VP 11463 (left ulna); UMNH-VP 8146 (right ulna); BUY-5097 (juvenile right humerus); UMNH-VP 13832 (juvenile left humerus)
<i>Acrocanthosaurus atokensis</i>	NCSM 14345 (partial complete skeleton)
<i>Neovenator salerii</i>	MIWG 6348 (left scapulacoracoid)
<i>Fukuiraptor kitadaniensis</i>	FPDM-V-8383 (right humerus); FPDM-V-8384 (left ulna); FPDM-V-8386 (right phalanx II-1); FPDM-V-8385, 9130 (ungula phalanges); FPDM-V-9712243 (left coracoid); FPDM-V-9712244 (left humerus)
<i>Mapusaurus roseae</i>	MCF-PVPH 108.50 (right scapula); MCF-PVPH 108.45 (right partial humerus); MCF-PVPH 108.46 (right radius); MCF-PVPH 108.48 (Mc II, III); MCF-PVPH 108.109,14 (manual phalanges)
<i>Tyrannotitan chubutensis</i>	MPEF-PV 1156 (partial complete skeleton)
<i>Giganotosaurus carolinii</i>	MUCPv-CH-1 (partial complete skeleton)
<i>Megaraptor namunhuaiquii</i>	MCF-PVPH 79 (partial complete forelimb)
<i>Saurophaganax maximus</i>	OMNH 4171, 2154, 4016, 1965 (scapulae); OMNH 1935, 1693 (humerus); OMNH 1415 (radius); OMNH 1434 (left ulna); OMNH 1928, 1929, 1124 (metacarpals); OMNH 1920, 1921, 1128, 780 (manual phalanges)

TABLE S2. Material revised first-hand of elements of the pelvic girdle and hind limb of allosauroids.

Taxa	Material
<i>Allosaurus fragilis</i>	UMNH-VP 24321 (left ilium); UMNH-VP 24404 (left ilium); UMNH-VP 8119 (juvenile right ilium); BYU-17281 (right ilium); UMNH-VP 3031 (juvenile right pubis); UMNH-VP 8100 (left and right pubis); UMNH-VP 24863 (left pubis); UMNH-VP 20726 (left ischium); UMNH-VP 8038 (right ischium); BYU-13097 (right femur); UMNH-VP 7889 (left femur); UMNH-VP 7930 (right tibia); UMNH-VP 7929 (right tibia); UMNH-VP 7928 (left tibia); BYU-13028 (left fibula); UMNH-VP 21432 (left fibula); BYU-17474 (right astragalus); UMNH-VP 9402 (left astragalus); UMNH-VP 9912 (right Mt I); UMNH-VP 10133 (left Mt II); UMNH-VP 10376 (left Mt III); UMNH-VP 9401 (right Mt IV); UMNH-VP 9934 (right Mt IV).
<i>Acrocanthosaurus atokensis</i>	NCSM 14345 (partial complete skeleton)
<i>Neovenator salerii</i>	MIWG 6352 (left ischium); BMNH R10001 (left ischium boot); MIWG 6348 (right femur); MIWG 6348 (left tibia)
<i>Fukuiraptor kitadaniensis</i>	FPDM-V-8393 (right femur); FPDM-V-8394 (right tibia); FPDM-V-8394 (right astragalus); FPDM-V-8395 (right astragalus); FPDM-V-8396 (right Mt I); FPDM-V-8397 (right Mt II); FPDM-V-8326 (right Mt III); FPDM-V-8329, 8401 (pedal phalanges).
<i>Mapusaurus roseae</i>	MCF-PVPH 108.128 (left ilium); MCF-PVPH 108.165 (right ischium); MCF-PVPH 108.96 (left ischium); MCF-PVPH 108.203 (left femur); MCF-PVPH 108.68 (left tibia); MCF-PVPH 108.202 (left fibula); MCF-PVPH 108.70 (right astragalus); MCF-PVPH 108.246 (Mt I); MCF-PVPH 108.35 (Mt II); MCF-PVPH 108.32 (Mt III); MCF-PVPH 108.34 (Mt IV); MCF-PVPH 108.18, 25, 198, 23, 24, 18, 19, 22, 40, 27, 26, 199, 10, 197, 21 (pedal phalanges).
<i>Giganotosaurus carolinii</i>	MUCPv-CH-1 (partial complete skeleton)
<i>Sinraptor dongi</i>	IVPP-10600 (cast) (partial complete skeleton)

TABLE S2. (Continued).

Taxa	Material
<i>Saurophaganax maximus</i>	OMNH 1338 (left ilium); OMNH 1425 (distal pubis); OMNH 1707 (proximal pubis); OMNH 2114 (left femur); OMNH 10382 (right tibia); OMNH 1695 (right fibula); OMNH 1681 (Mt I); OMNH 1561 (Mt II); OMNH 1191 (Mt III); OMNH 1193 (Mt IV); OMNH 1126, 1911, 1912, 1914, 1915, 1916, 1918, 1919, 1925, 10373, 10375, 10376, 10377, 10732 (pedal phalanges)

TABLE S3. Measurements (in mm) of the pectoral girdle and forelimb of *Concavenator corcovatus*, MCCM-LH 6666. An asterix indicates incomplete bones; double asterix are calculated measurements.

	Length	Prox. Width	Min Width	Distal Width	Proximodistal Height	Olecranon P. Height
Scapulacoracoid						
Left Scapula	400*	115	31	49	—	—
Right Scapula	525	20	2	2	—	—
Coracoid	170	—	—	—	95	—
Forelimb						
Humerus	245	120	39	75	—	—
Ulna	170	67	21	25	—	15
Radius	150	34	17	37	—	—
Metacarpals						
Metacarpal I	43	21	—	—	—	—
Metacarpal II	87	30*	—	—	—	—
Metacarpal III	70	—	—	—	—	—
Phalanges						
Ph I-1	57*	35	—	—	—	—
Ph I-2	—	—	—	—	—	—
Ph II-1	64.5	—	—	—	—	—
Ph II-2	67	30	20	22	—	—
Ph II-3	75*	41	12	—	—	—
Ph III-1	23**	—	—	—	—	—
Ph III-2	23**	—	—	—	—	—
Ph III-3	46	12	8	—	—	—
Ph III-4	44	25	8	—	—	—

TABLE S4. Ratios of measurements of forelimb elements of Allosauroidae.

	<i>Concavenator</i>	<i>Allosaurus</i>	<i>Acrocanthosaurus</i>
Pectoral Girdle:			
Min. width/Scapular blade length	0.059	0.083	0.070
Forelimb:			
Forelimb length/Femoral length	0.118	0.124	0.90
Manus length/Forelimb length	0.42	0.44	0.44
Humeral length/Femoral length	0.42	0.44	0.33
Humeral length/Scapula length	0.46	0.64	0.38
Ant. projection of Deltopectoral crest/Humeral length	0.08	0.13	0.13
Ulnar length/Humeral length	0.69	0.73	0.67
Ulnar min. width/Length	0.10	0.11	0.14
Olecranon height/Ulnar length	0.09	0.18	0.23
Digit II length/Humeral length	0.84	0.86	0.91

TABLE S5. Measurements (in mm) of the pelvic girdle and the hind limb of *Concavenator corcovatus*, MCCM-LH 6666.

	Length	Prox. Width	Middle Width	Distal Width
Pelvic Girdle				
Ilium	442	188	141	95
Pubis	445	125	46	–
Ischium	415	120	25	95
Hind limb				
Right Femur	506	125	68	–
Left Femur	582	63	35	86
Tibia	492	–	52	105
Fibula	513	53	18.5	51
Metatarsals				
Metatarsal II	257	35	27	42
Metatarsal III	286	48	30	50
Metatarsal IV	255	43	33	48
Metatarsal V	100	18	8	9
Phalanges				
Ph II-1	86	45	32	–
Ph III-1	73	60	33	47
Ph III-2	48	39	27	37
Ph III-3	50	–	–	–
Ph III-4	57	–	–	–
Ph IV-1	70	45	30	36
Ph IV-2	50	–	–	38
Ph IV-3	45	36	26	32
Ph IV-4	38	29	19	18
Ph IV-5	45	–	–	–

TABLE S6. Ratios of measurements of the hind limb of *Concavenator corcovatus*, MCCM-LH 6666, versus *Allosaurus* and *Acrocanthosaurus*.

	<i>Concavenator</i>	<i>Allosaurus</i>	<i>Acrocanthosaurus</i>
Tibia length/Femoral length	0.85	0.83	0.83
Metatarsal III length/Min. width	9.5	–	7.54
Digit III length/Mt III length	0.8	1.03	0.9
Digit III length/Femoral length	0.39	0.44	0.41
Mt V/Mt IV	0.39	–	–