The gator grapnel: pedal anchoring in the American alligator (*Alligator mississippiensis*)

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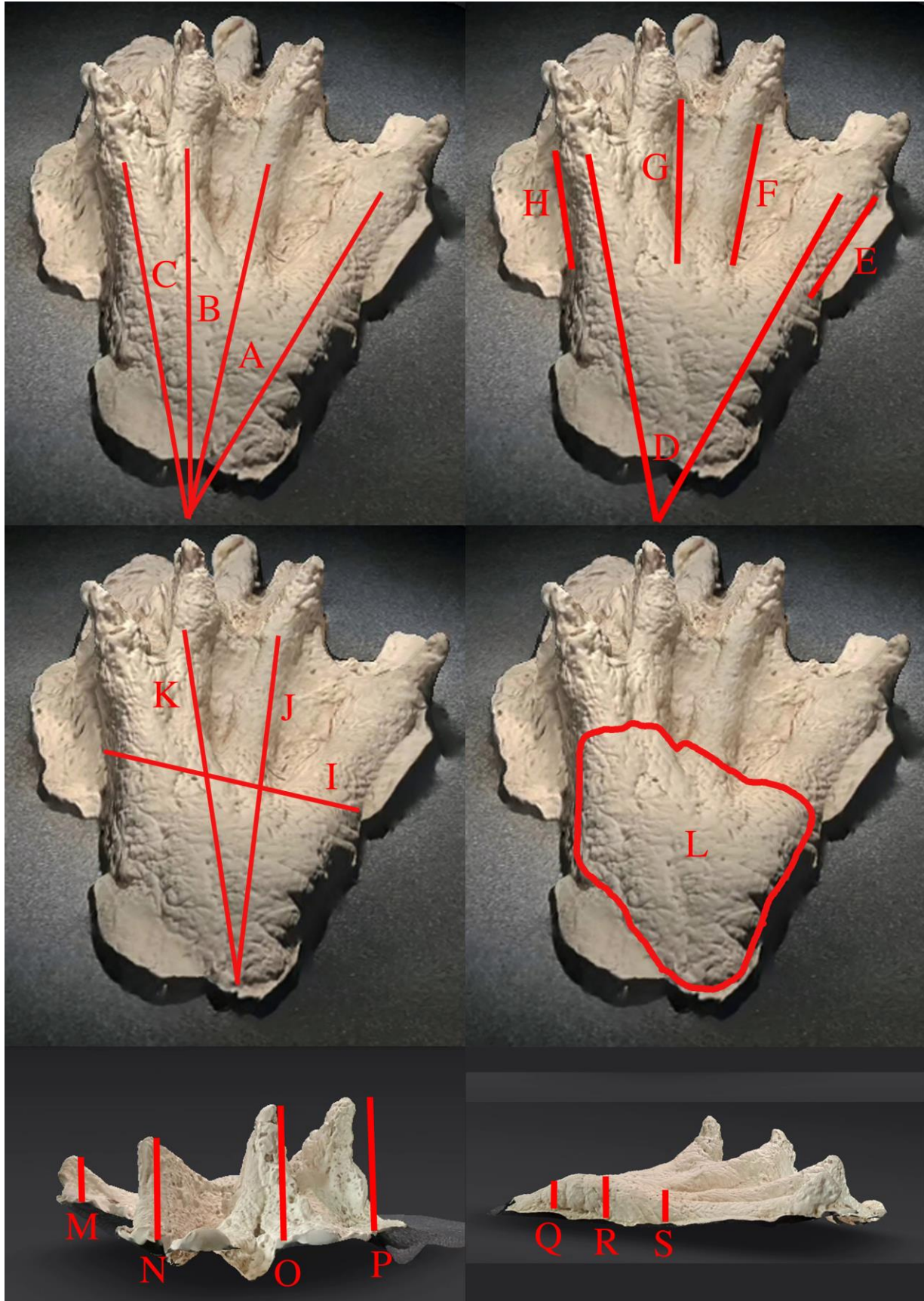ORCID iD: Young: 0000-0002-0988-7731

Supplementary material

Figure S1. Illustration of the measurements taken from each pes cast. A) Angle between digits 1 and 2; B) angle between digits 2 and 3; C) angle between digits 3 and 4; D) angle between the medial and lateral digits; E) horizontal length of digit 1; F) horizontal length of digit 2; G) horizontal length of digit 3; H) horizontal length of digit 4; I) medial to lateral span of digits; J) distance from base of pad to horizontal end of digit 2; K) distance from base of pad to horizontal end of digit 3; L) area of the plantar pad; M) vertical length of digit 1; N) vertical length of digit 2; O) vertical length of digit 3; P) vertical length of digit 4; Q) depth of pad base; R) depth of mid pad; S) depth of pad at base of digit 2.

Video S1. Video clip of a 187 cm total length *Alligator mississippiensis* walking over the mud trackway. You can see the clear tracks behind the alligator.

Table S1. Summary of the MANOVA on the pes locomotor casts. The range of each feature from the casts taken in the wild is presented, as is the mean and

standard deviation (s.d.) from the three data sets. The calculated F-statistic from the MANOVA is given, as is the corresponding probability (p) value. The

features that are significantly different are indicated in bold red; the specific differences identified by post-hoc testing are indicated by red symbols.

Feature	Range	Wild Mean, s.d.	Field Mean, s.d.	Lab Mean, s.d.	Statistics F, p
Angle between digits 1 and 2	2.74–19.98	9.23, 4.78	14.35, 11.42	13.67, 8.40	2.18, 0.125
Angle between digits 2 and 3	6.54–27.78	14.14, 6.24	17.52, 7.57	13.26, 6.01	1.34, 0.271
Angle between digits 3 and 4	6.07–25.84	15.12, 5.37	12.06, 6.23	15.14, 4.98	1.12, 0.335
Angle between the medial and lateral digits	24.0–54.74	37.49, 9.36	42.69, 21.68	42.46, 11.49	0.94, 0.398
Horizontal length of digit 1	24.14–63.89	41.71, 14.01	36.69, 10.23	38.06, 11.87	0.65, 0.524
Horizontal length of digit 2	40.28–102.17	73.49, 20.95*^	45.78, 22.36*	53.24, 14.85^	**7.92, 0.0011**
Horizontal length of digit 3	44.48–108.76	73.94, 18.59*^	55.17, 15.45*	60.36, 17.76^	**7.39, 0.0016**
Horizontal length of digit 4	19.36–71.01	46.40, 14.05	32.70, 13.60	43.99, 15.89	2.54, 0.089
Medial to lateral span of digits	69.42–143.41	97.76, 22.68	74.30, 8.15	93.5, 17.15	4.62, 0.015
Distance from base of pad to horizontal end of digit 2	94.91–215.97	165.32, 27.03*^	99.57, 27.44*	121.27, 17.44^	**30.42, <0.00001**
Distance from base of pad to horizontal end of digit 3	109.12–215.84	164.74, 21.13*^	110.30, 25.80*	130.00, 16.28^	**27.30, <0.00001**
Area of the plantar pad	1586.09–7232.99	4728.34, 1514.27*^	2318.37, 909.74*	3192.22, 1432.88^	**10.73, 0.0001**
Vertical length of digit 1	7.45–67.03	35.43, 17.71	20.16, 5.87*	43.09, 10.13*	**8.96, 0.0005**
Vertical length of digit 2	8.99–95.65	39.72, 22.19	24.62, 8.72	43.74, 10.98	4.18, 0.021
Vertical length of digit 3	2.08–58.43	29.86, 17.85	19.57, 7.47	32.81, 9.19	3.13, 0.053
Vertical length of digit 4	1.07–41.2	21.04, 15.27	10.11, 7.36	17.65, 9.50	2.69, 0.078
Depth of pad base	9.24–50.27	21.90, 10.18*^	4.69, 3.61*	9.93, 5.16^	**21.06, <0.00001**
Depth of mid pad	11.14–51.75	28.28, 11.22*^	7.30, 4.69*	15.40, 6.99^	**20.62, <0.00001**
Depth of pad at base of digit 2	14.14–53.48	24.28, 9.83*	9.41, 3.23*	18.61, 7.84	**9.48, 0.0003**

Table S2. Summary of the t-test performed on the z-transformed data from the manus locomotor casts. The range of each feature from the casts taken in the wild is presented, as is the mean and standard deviation (s.d.) from the wild and laboratory sets. The calculated t-statistic is given, as is the corresponding probability (*p*) value. The features that are significantly different are indicated in bold red.

	Wild		Lab	Statistics
Feature	Range	Mean, s.d.	Mean, s.d.	t, *p*
Angle between digits 1 and 2	21.4–74.75	48.28, 18.39	25.35, 25.67	0.097, 0.924
Angle between digits 2 and 3	8.51–58.09	33.41, 18.01	35.94, 10.10	0.456, 0.652
Angle between digits 3 and 4	17.15–49.37	33.65, 9.45	32.09, 9.95	0.403, 0.691
Angle between digits 4 and 5	19.71–44.13	33.84, 7.48	44.61, 18.26	1.667, 0.108
Angle between the medial and lateral digits	70.78–165.85	116.05, 28.48	119.05, 27.07	0.273, 0.787
Horizontal length of digit 1	11.02–42.37	24.51, 11.66	12.11, 12.37	0.382, 0.709
Horizontal length of digit 2	14.96–45.71	29.91, 10.07	26.5, 7.90	0.968, 0.343
Horizontal length of digit 3	19.96–58.24	35.59, 12.18	31.79, 8.40	0.943, 0.356
Horizontal length of digit 4	15.68–51.19	32.12, 9.99	30.50, 8.30	0.451, 0.656
Horizontal length of digit 5	9.81–41.94	26.0, 11.67	19.45, 6.23	1.854, 0.076
Medial to lateral span of digits	65.05–126.71	99.53, 22.21	78.38, 12.24	3.112, 0.005
Distance from base of pad to horizontal end of digit 2	42.87–92.1	71.38, 17.51	60.12, 10.88	2.021, 0.055
Distance from base of pad to horizontal end of digit 3	54.53–121.99	85.87, 23.36	66.16, 11.63	2.835, 0.009
Area of the plantar pad	1126.98–4539.66	2572.12, 1230.99	1133.22, 303.41	**4.379, 0.0002**
Vertical length of digit 1	20.05–67.76	45.06, 14.95	23.66, 25.16	0.084, 0.935
Vertical length of digit 2	3.96–54.06	25.36, 14.37	38.60, 17.82	2.025, 0.054
Vertical length of digit 3	4.43–79.75	29.46, 19.97	35.81, 19.18	0.820, 0.420
Vertical length of digit 4	10.08–46.24	25.58, 12.62	27.64, 16.56	0.345, 0.733
Vertical length of digit 5	4.2–51.26	24.45, 16.28	23.59, 12.86	0.150, 0.882
Depth of pad base	9.85–57.73	30.22, 14.70	21.65, 16.92	1.346, 0.191
Depth of mid pad	16.46–65.8	35.87, 15.72	26.04, 17.07	1.499, 0.147
Depth of pad at base of digit 2	17.96–67.04	35.40, 14.18	29.07, 14.71	1.101, 0.282

Table 3. Summary of the t-test performed on the z-transformed data from the pes locomotor and pedal anchoring casts. The mean and standard deviation (s.d.) is given for both sets of casts, as is the calculated t-statistic and the corresponding probability (*p*) value. The features that were significantly different are indicated in bold red.

Feature	Walk Mean, s.d.	Pedal Anchor Mean, s.d.	Statistics t, *p*
Angle between digits 1 and 2	13.67, 8.40	5.96, 7.64	2.867, 0.007
Angle between digits 2 and 3	13.26, 6.01	6.49, 5.21	**3.573, 0.001**
Angle between digits 3 and 4	15.14, 4.98	6.54, 5.46	**5.004, <0.0001**
Angle between the medial and lateral digits	42.46, 11.49	18.84, 16.43	**5.224, <0.0001**
Horizontal length of digit 1	38.06, 11.87	40.92, 11.28	0.741, 0.463
Horizontal length of digit 2	53.24, 14.85	52.31, 9.79	0.215, 0.831
Horizontal length of digit 3	60.36, 17.76	48.75, 8.06	2.369, 0.023
Horizontal length of digit 4	43.99, 15.89	40.48, 8.05	0.789, 0.435
Medial to lateral span of digits	93.5, 17.15	71.88, 16.82	**3.828, 0.0005**
Distance from base of pad to horizontal end of digit 2	121.27, 17.44	108.32, 19.26	2.148, 0.038
Distance from base of pad to horizontal end of digit 3	130.00, 16.28	105.88, 10.39	**5.09, <0.0001**
Area of the plantar pad	3192.22, 1432.88	2422.85, 615.30	1.958, 0.058
Vertical length of digit 1	43.09, 10.13	46.57, 17.05	0.791, 0.434
Vertical length of digit 2	43.74, 10.98	37.34, 19.89	1.278, 0.209
Vertical length of digit 3	32.81, 9.19	33.08, 19.79	0.056, 0.956
Vertical length of digit 4	17.65, 9.50	20.67, 13.54	0.809, 0.424
Depth of pad base	9.93, 5.16	18.74, 12.97	2.938, 0.006
Depth of mid pad	15.40, 6.99	24.70, 13.47	2.797, 0.008
Depth of pad at base of digit 2	18.61, 7.84	28.58, 10.86	**3.288, 0.0023**

Scan S1. A 3-D scan of a locomotor pes cast.

Scan S2. A 3-D scan of a locomotor pes cast.

Scan S3. A 3-D scan of a pedal anchoring pes cast.

Scan S4. A 3-D scan of a pedal anchoring pes cast.