

SUPPLEMENTARY MATERIAL TO

A reassessment of the species "*Podocnemis*" *brasiliensis* Staesche, 1937 (Pleurodira, Pelomedusoides) from the Late Cretaceous Bauru Group

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In this supplementary file we present data related to the shell thickness vs shell size regressions performed in the original paper. A list of specimens sampled in our study is given, followed by Figure S1, which demonstrates how the measurements of shell thickness and shell size were taken. Figure S2 is a box-plot graph illustrating the variation in the raw data among different taxonomic subsets, obtained using the software PAST vers. 4.08 (Hammer et al., 2001). The complementary information of the regression (Table S1) and summary statistics (Tables S2 and S3) are also given. Results of normality tests are summarized in Table 4, while Tables S5-S8 show parametric and non-parametric tests comparing differences between groups. The data used in the statistics are available in a separate DAT file.

Institutional abbreviations:

CPPLIP: Centro de Pesquisas Paleontológicas Llewellyn Ivor Price, Uberaba, Brazil; FFP PG: Faculdade de Formação de Professores da Universidade do Estado do Rio de Janeiro (Palaeontological Collection), São Gonçalo, Brazil; LPRP USP: Laboratório de Paleontologia de Ribeirão Preto, Ribeirão Preto, Brazil; MCT.R.: Museu de Ciências da Terra (Fossil Reptiles Collection), Rio de Janeiro, Brazil; MCT.RR.: Museu de Ciências da Terra (Recent Reptiles Collection), Rio de Janeiro, Brazil; MNRJ: Museu Nacional (Reptiles Collection), Rio de Janeiro, Brazil; MZSP-PV: Museu de Zoologia da USP (Vertebrate Palaeontology Collection), São Paulo, Brazil; MZUFV-P: Museu de Zoologia João Moojen (Palaeontology Collection), Universidade Federal de Viçosa, Viçosa, Brazil; UFRJ-DG: Universidade Federal do Rio de Janeiro, Departamento de Geologia (Fossil Reptiles Collection), Rio de Janeiro, Brazil.

List of specimens used in the Linear Regressions

“*Podocnemis*” *brasiliensis* (n=2): FFP GP 218, MCT.R.214.

Roxochelys wanderleyi (n=6): MCT.R.216, MCT.R.933, MCT.R.1722, MCT.R.1787, UFRJ-DG 404-R, UFRJ-DG 423-R.

Bauruemys elegans (n=13): LPRP USP 0201, LPRP USP 0202, LPRP USP 0455, LPRP USP 0457, LPRP USP 0730, MCT.R.1492, MCT.R.1891-B, MCT.R.1891-D, MCT.R.2101, MZSP-PV 136, MZSP-PV 137, MZSP-PV uncatalogued, MZUFV-P 0023.

“*Peirópolis A*” (n=21): CPPLIP-293, CPPLIP-294, CPPLIP-495, CPPLIP-524, CPPLIP-646, CPPLIP-730, CPPLIP-734, CPPLIP-780, CPPLIP-784, MCT.R.321, MCT.R.1499, MCT.R.1888, MCT.R.1889-A, MCT.R.1889-C, MCT.R.1889-F, MCT.R.1890, MCT.R.2093, MCT.R.2094, MCT.R.2095, MCT.R.2096, MCT.R.2100.

Indeterminate Serra da Galga Member *epiplastra* (n=3): CPPLIP-593, CPPLIP-843, MCT.R.2092.

Podocnemis expansa (n=3): MCT.RR.276, MCT.RR.277, MCT.RR.366.

Podocnemis sextuberculata (n=2): MCT.RR.188, MCT.RR.280.

Podocnemis unifilis (n=10): MCT.RR.222, MCT.RR.224, MCT.RR.229, MCT.RR.281, MCT.RR.284, MCT.RR.363, MCT.RR.364, MCT.RR.373, MNRJ 3780, MNRJ 25207.

Peltocephalus dumerilianus (n=1): MCT.RR.360.

Figure S1 – Illustration showing how measurements of the shell size (**A**) and shell thickness (**B-D**) variables used in our study were taken. Shell size was estimated based on the width of the epi-hyoplastral suture in ventral view, defined as the linear distance between the lateralmost extreme of the epi-hyoplastral suture and the point of union between the epi-, ento- and hyoplastra in ventral view (shown as landmarks 1 and 2, respectively, in **A**). Shell thickness was measured by placing the external jaws of a caliper along the line defined for the shell size proxy and then closing the jaws. In **B-D**, the position of the caliper relative to the specimen can be seen, with the plastron observed in ventral (**B**), cranial (**C**) and right lateral (**D**) views. The figured specimen is MCT.R.216, the holotype of *Roxochelys wanderleyi* Price, 1953.

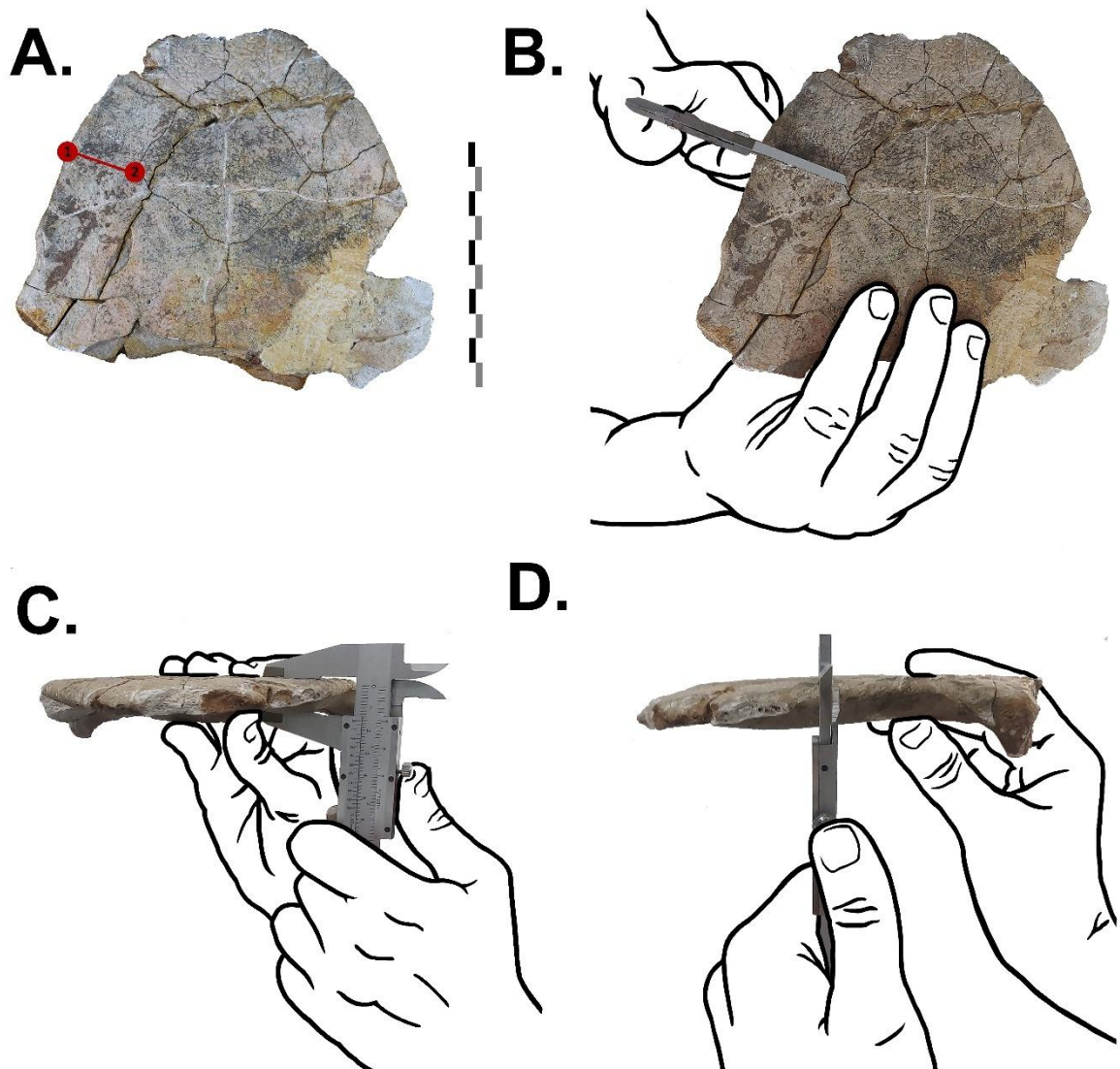


Figure S2 – Box-plot representation of the raw data (measurements given in mm) used for the linear regressions, showing shell thickness (A) and shell size (B) values for each species or morphotype studied. Open circles represent outlier specimens.

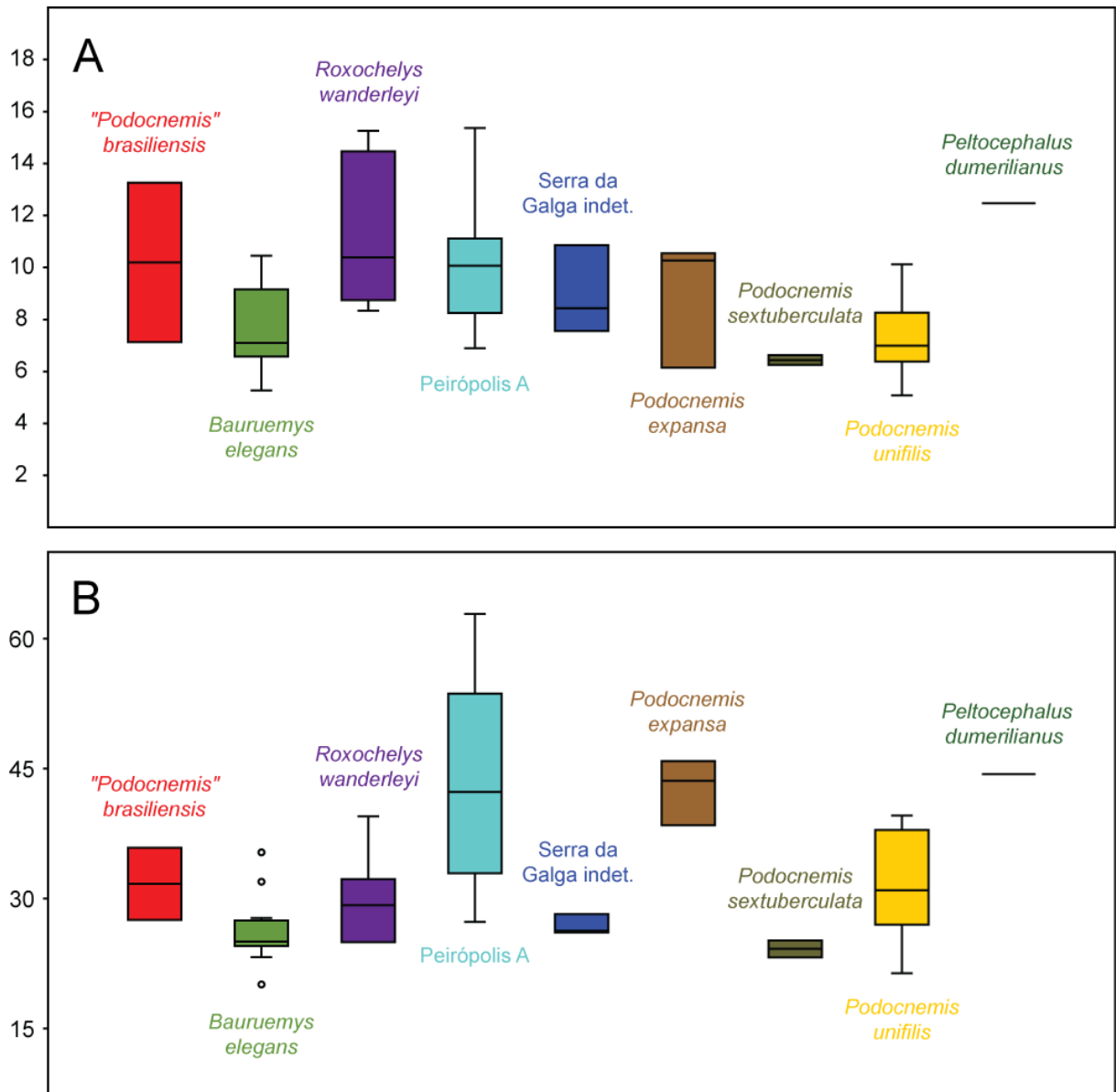


Table S1 – Complementary information of the regression.

Sample subset	Slope CI (95%)	Intercept	Intercept CI (95%)
Entire sample	[0.6016, 1.3683]	-0.34056	[-1.1655, 0.0069]
<i>Bauruemys elegans</i>	[-0.0583, 4.4284]	-0.75627	[-5.4243, 0.8144]
<i>Roxochelys wanderleyi</i>	[-122.29, 183.97]	-0.58854	[-270.25, 171.84]
"Peirópolis A"	[-0.2272, 0.6663]	0.26535	[-0.0866, 1.2765]

Table S2 – Summary statistics: Shell size proxy (epi-hyo-plastral suture width). Measurements given in mm.

Species / Morphotype	N	Min value	Max value	Mean	Median
<i>"Podocnemis" brasiliensis</i>	2	27,543	35,87	31,7065	31,7065
<i>Bauruemys elegans</i>	13	20,09	35,335	26,23315	25,028
<i>Roxochelys wanderleyi</i>	6	24,974	39,5	29,62867	29,243
"Peirópolis A"	21	27,303	62,86933	43,05851	42,302
Peirópolis indet.	3	26,104	28,22367	26,877	26,30333
<i>Podocnemis expansa</i>	3	38,467	45,865	42,64144	43,59233
<i>Podocnemis sextuberculata</i>	2	23,22533	25,164	24,19467	24,19467
<i>Podocnemis unifilis</i>	10	21,39633	39,58367	31,75943	30,95533
<i>Peltocephalus dumerilianus</i>	1	44,377	44,377	44,377	44,377

(continuation)

Species / Morphotype	Variance	Stand. dev	Std. error	25 prcntil	75 prcntil
<i>"Podocnemis" brasiliensis</i>	34,66946	5,888078	4,1635	27,543	35,87
<i>Bauruemys elegans</i>	14,87136	3,856341	1,069557	24,516	27,46467
<i>Roxochelys wanderleyi</i>	28,30396	5,320147	2,171941	24,9835	32,244
"Peirópolis A"	122,3603	11,06166	2,413852	32,93483	53,662
Peirópolis indet.	1,370067	1,170499	0,675788	26,104	28,22367
<i>Podocnemis expansa</i>	14,36074	3,789557	2,187902	38,467	45,865
<i>Podocnemis sextuberculata</i>	1,879214	1,370844	0,969333	23,22533	25,164
<i>Podocnemis unifilis</i>	37,46368	6,120758	1,935554	26,98508	37,91525
<i>Peltocephalus dumerilianus</i>	0	0	0	44,377	44,377

(continuation)

Species / Morphotype	Skewness	Kurtosis	Geom. mean	Coeff. variation
<i>"Podocnemis" brasiliensis</i>	0	-2,75	31,43195	18,57057
<i>Bauruemys elegans</i>	1,142802	1,980262	25,98874	14,70026
<i>Roxochelys wanderleyi</i>	1,514739	2,863183	29,26722	17,95608
"Peirópolis A"	0,201651	-1,25699	41,69589	25,68983
Peirópolis indet.	1,675711	-2,33333	26,86027	4,355019
<i>Podocnemis expansa</i>	-1,05806	-2,33333	42,52653	8,887028
<i>Podocnemis sextuberculata</i>	0	-2,75	24,17524	5,665895
<i>Podocnemis unifilis</i>	-0,22779	-0,89816	31,20124	19,27225
<i>Peltocephalus dumerilianus</i>	0	0	44,377	0

Table S3 – Summary statistics: Shell thickness (taken at the epi-hyoplastral suture).
Measurements given in mm.

Species / Morphotype	N	Min value	Max value	Mean	Median
<i>"Podocnemis" brasiliensis</i>	2	7,13	13,26667	10,19833	10,19833
<i>Bauruemys elegans</i>	13	5,27	10,45333	7,670513	7,1
<i>Roxochelys wanderleyi</i>	6	8,34	15,25667	11,24222	10,38667
"Peirópolis A"	21	6,896667	15,37	10,05238	10,06667
Peirópolis indet.	3	7,553333	10,85333	8,945556	8,43
<i>Podocnemis expansa</i>	3	6,15	10,55	8,99	10,27
<i>Podocnemis sextuberculata</i>	2	6,253333	6,623333	6,438333	6,438333
<i>Podocnemis unifilis</i>	10	5,08	10,11667	7,353	6,986667
<i>Peltocephalus dumerilianus</i>	1	12,47333	12,47333	12,47333	12,47333

(continuation)

Species / Morphotype	Variance	Stand. dev	Std. error	25 prcntil	75 prcntil
<i>"Podocnemis" brasiliensis</i>	18,82934	4,339279	3,068333	7,13	13,26667
<i>Bauruemys elegans</i>	2,480789	1,575052	0,436841	6,571667	9,155
<i>Roxochelys wanderleyi</i>	8,124967	2,850433	1,163684	8,7475	14,46417
"Peirópolis A"	4,822225	2,195956	0,479197	8,251667	11,11833
Peirópolis indet.	2,921848	1,709341	0,986889	7,553333	10,85333
<i>Podocnemis expansa</i>	6,0688	2,463493	1,422299	6,15	10,55
<i>Podocnemis sextuberculata</i>	0,06845	0,26163	0,185	6,253333	6,623333
<i>Podocnemis unifilis</i>	2,631799	1,622282	0,513011	6,3775	8,26
<i>Peltocephalus dumerilianus</i>	0	0	0	12,47333	12,47333

(continuation)

Species / Morphotype	Skewness	Kurtosis	Geom. mean	Coeff. variation
<i>"Podocnemis" brasiliensis</i>	0	-2,75	9,725808	42,5489
<i>Bauruemys elegans</i>	0,473765	-0,81665	7,525211	20,53385
<i>Roxochelys wanderleyi</i>	0,660039	-1,57763	10,95561	25,35471
"Peirópolis A"	0,89702	0,606257	9,8399	21,84514
Peirópolis indet.	1,23378	-2,33333	8,841171	19,10828
<i>Podocnemis expansa</i>	-1,70691	-2,33333	8,734392	27,4026
<i>Podocnemis sextuberculata</i>	0	-2,75	6,435675	4,063622
<i>Podocnemis unifilis</i>	0,833034	0,162386	7,201328	22,06286
<i>Peltocephalus dumerilianus</i>	0	0	12,47333	0

Table S4 – Normality tests of shell thickness measurements for the three analysed subsets. All groups show normal distribution.

	<i>Bauruemys</i>	<i>Roxochelys</i>	“Peirópolis A”
N	13	6	21
Shapiro-Wilk W	0,9384	0,8888	0,9329
p(normal)	0,4369	0,3122	0,157
Anderson-Darling A	0,4152	0,3593	0,4613
p(normal)	0,2842	0,3138	0,2334
p(Monte Carlo)	0,2929	0,344	0,2388
Lilliefors L	0,1852	0,2311	0,1234
p(normal)	0,2513	0,4027	0,5426
p(Monte Carlo)	0,2489	0,4236	0,5392
Jarque-Bera JB	0,8798	0,721	2,455
p(normal)	0,6441	0,6973	0,293
p(Monte Carlo)	0,4107	0,296	0,0939

Table S5 – Test for equal means and homogeneity of shell thickness measurements for the three analysed subsets. The null-hypotesis of equal means is refuted and there is homogeneity of variance.

	Sum of sqrs	df	Mean square	F	p(same):
Between groups:	68,0561	2	34,0281	7,546	0,001784*
Within groups:	166,839	37	4,50916	Permutation p (n=99999)	
Total:	234,895	39	0,00232		
Components of variance (only for random effects):					
Var(group):	2,47538	Var(error):	4,50916	ICC:	0,354409
Omega2:	0,2466				
Levene´s test, from means¹	p (same):	0,2352			
Levene´s test, from medians	p (same):	0,3527			

¹ for homogeneity of variance

Table S6 – Kruskal-Wallis test for equal medians of the shell thickness measurements for the three analysed subsets. The null-hypotesis of equal medians is refuted (there is a significant difference between the sample medians).

H (chi2):	12,01
Hc (tie corrected):	12,01
p (same):	0,002461*

Table S7 – Turkey pairwise test for equal means of the shell thickness measurements for the three analysed subsets. The null-hypotesis of equal means is refuted between some groups (*Bauruemys* has a thinner shell).

	<i>Bauruemys</i>	<i>Roxochelys</i>	“Peirópolis A”
<i>Bauruemys</i>		0,004528*	0,008312*
<i>Roxochelys</i>	0,004528*		0,4547
“Peirópolis A”	0,008312*	0,4547	

Table S8 – Mann-Whitney pairwise test for equal medians of the shell thickness measurements for the three analysed subsets. The null-hypotesis of equal medians is refuted between some groups (*Bauruemys* has a thinner shell).

	<i>Bauruemys</i>	<i>Roxochelys</i>	“Peirópolis A”
<i>Bauruemys</i>		0,02902*	0,006145*
<i>Roxochelys</i>	0,02902*		1
“Peirópolis A”	0,006145*	1	

References to the supplementary material:

Hammer, Ø., Harper, D.A.T., & Ryan, P.D. (2001). PAST: Paleontological Statistics software package for education and data analysis. *Palaeontologia Electronica*, 4(1).

Price, L.I. (1953). Os quelônios da Formação Bauru, Cretáceo terrestre do Brasil Meridional. *Boletim da Divisão de Geologia e Mineralogia, Departamento Nacional da Produção Mineral, Ministério da Agricultura, Brasil*, 147.