HUMBOLDT-UNIVERSITÄT ZU BERLIN

LEBENSWISSENSCHAFTLICHE FAKULTÄT

INSTITUT FÜR BIOLOGIE

MASTERARBEIT

ZUM ERWERB DES AKADEMISCHEN GRADES

MASTER OF SCIENCE

"Körpergrößentrends in fossilen Landschildkröten aus dem Neogen"

"Body size trends in Neogene testudinid tortoises"

vorgelegt von

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geb. am 18.05.1991 in Freudenstadt

angefertigt in der Arbeitsgruppe Paläozoologie

am Institut für Biologie/Museum für Naturkunde

Berlin, im September 2017

Contents

List of Figures

List of Tables

1 Material & Methods

1.1 Data collection

I collected data on body size of fossil testudinids from the Miocene until recent times. The body size data set includes 26 fossil genera, comprising over 100 fossil species. The majority of the data was obtained from the primary literature (Table S17). To find relevant publications, I relied mostly on the references listed in the FosFarBase (Böhme and Ilg, 2003), the Paleobiology Database (http://paleobiodb.org), and the review on fossil turtles and tortoises by Rhodin et al. (2015). Furthermore, the FosFarBase provided fossil occurrences of testudinids all over the world, including their exact localities and age (Table **??**), which were used to get an overview over the availability of body size data. The FosFarBase (http://www.wahre-staerke.com/, last accessed 23.03.2017) contained 769 testudinid occurrences between the Eocene (33.9 - 56 mya) and the Holocene from 647 localities (Fig. 1). Of those, 641 occurrences from 534 localities were of relevant age (Miocene to Holocene). The final body size data set, however, includes 376 data records from 193 localities, of which 106 localities are present in the FosFarBase.

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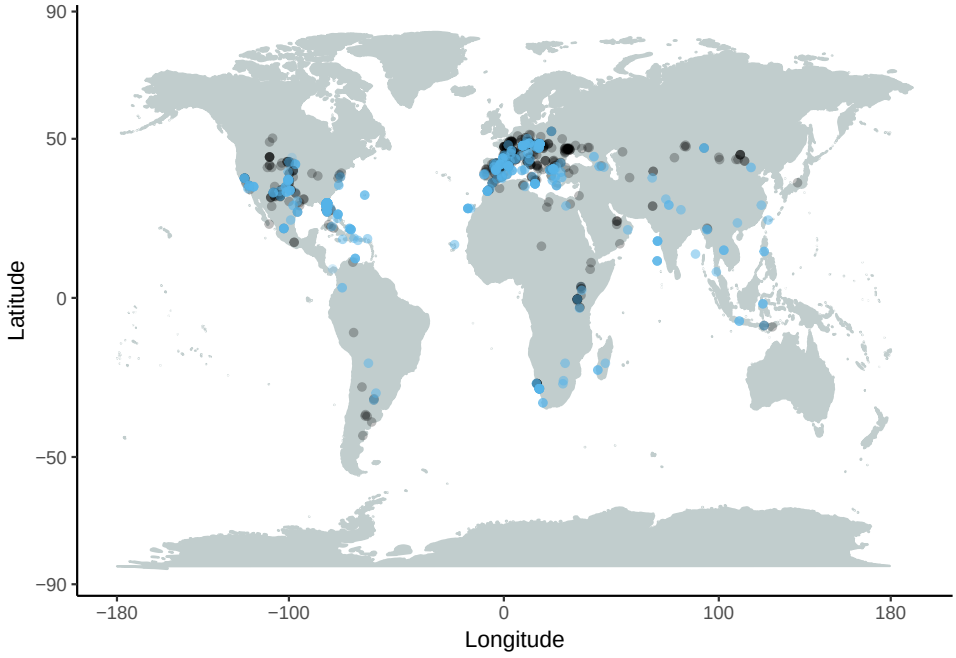


Figure 1: Map displaying all fossil occurrences of testudinids from the Eocene to the Holocene according to the FosFarBase, with color indicating whether body size data was available (blue) or not (black).

For extant testudinid taxa, I measured dry material (n = 67) from the collection of the Museum für Naturkunde zu Berlin (MFN) with an accuracy of the first decimal (unless stated otherwise)

using calipers. In addition, body size data (n = 173) from the literature was included (Table S18).

1.2 Body size estimation

Body size is reported as straight carapace length (SCL) in mm. When SCL for fossil taxa was not available from the primary literature, it was estimated (n = 254) either from plastron length (PL) or appendicular elements (Table S17). For carapace length estimations based on plastron length, the measurements from the MFN collection material were used to calculate the ratio between SCL and PL. Since the SC/PL ratio did not show a significant difference among species (Kruskal Wallis Test, P > 0.05; SCL/PL between 0.95 - 1.47), a single general ratio (SCL/PL = 1.1) was calculated for all testudinids and hence used for the SCL estimations unless stated otherwise (Table S17). For estimations based on femora and humeri, ratios based on data provided by Hutterer et al. (1998) and Franz et al. (2001), respectively, were used. A number of publications did not state measurements but instead provided scaled figures of the fossil remains, from which either SCL directly or PL, humeri, or femora lengths for estimating SCL could be measured.

1.3 Analyses

All subsequent analyses were performed with R 3.4.1 (R Core Team, 2017), including the packages dplyr (Wickham et al., 2017) to prepare the data for the analysis and ggplot2 (Wickham, 2009) to create figures. The R package vegan (Oksanen et al., 2017) was used to create randomized sample-based accumulation curves, which show the increase in individuals, species or genera per sampling unit and are therefore used to determine if sampling is sufficient or not in terms of covering diversity and richness (Thompson and Withers, 2003). Most commonly these accumulation curves are conducted on individual or species level, but they can also be applied to higher taxa like families and genera (Gotelli and Colwell, 2011, 2001). The accumulation curves also give information about species richness, relative abundance and diversity (Thompson and Withers, 2003). Typically a species accumulation curve shows a steep initial slope followed by gradual plateuing until converging to an asymptote, when the maximum number of species has been reached. However, this shape can be affected in several ways, for example when a lot of rare species opposed to only a few abundant species are present or if sampling is conducted on a large geographical scale, the inflection point may be lower and the

following slope towards the asymptote may be rather long or an asymptote may not be reached at all within figure margins (Gotelli and Colwell, 2011, 2001). Since the data set in this study relies on literature, references were used as a sampling unit (x-axis). Sampling accumulation curves were created on species as well as genus level, since genera of fossil testudinids are relatively well resolved whereas determination on the species level is still obscure in some cases, because fossil species are frequently based on single individuals that are often fragmentary as well (Brattstrom, 1961; de Lapparent de Broin, 2001). Since genera were better sampled than species (Fig. 3, S2 (a) - (b)), all subsequent analysis were performed on the generic level. Additional sampling accumulation curves for the continents were created (Fig. S2 (c) - (i)), to check if subsequent analyses could be applied to these subgroups.

figure necessary?

1.3.1 Descriptive statistics

To explore the structure of the data set normalized histograms with density curves and boxplots of the entire data set and several subgroups (fossil vs. modern, insular vs. continental) were created. Descriptive statistics like mean, median, variance, skewness and kurtosis were calculatedand with the R package moments (Komsta and Novomestky, 2015) (Table S14) for the raw and log-transformed data. While mean, median and variance describe the location and distribution of a data set, skewness and kurtosis are referred to as 'shape statistics', which give information about symmetry (skewness) and the weight of the tails compared to the rest of the distribution, i. e. outliers will results in a higher kurtosis. However, the accuracy and suitability of these shape statistics has been debated, since sample size, extreme values and homogeinity of the data impact their results and uncertainties are higher than for mean and median (McNeese, 2016; Bai and Ng, 2005). Especially for small sample sizes, the histograms might provide more reliable information about the structure of the data set than skewness and kurtosis (McNeese, 2016).

The Wilcoxon Rank Sum Test (unpaired data) was used to test for differences in body size between modern and fossil taxa as well as between insular and continental taxa. To be able to compare different subgroups, a random subsample (1000 repeats) of the respective larger subgroup was taken to compare equal sample sizes. For the majority of random subsamples, the median coincided with the real median (see Appendix E), therefore subsamples were assumed to reflect the actual sample and subsequently used for statistical comparisons. The Kruskal-Wallis test was used to test for differences among subsamples, e. g. body size per time bin and

body size per continent. As post-hoc test, a multiple comparison (Siegel and Castellan, 1988) was conducted to identify which groups exactly differed significantly from each other.

1.3.2 Body size trends over time

To investigate trends in body size over time, the R package paleoTS (Hunt, 2015) was used. Data were split into time bins according to stratigraphic stages (Table 1, Fig. 2), with the exeption of the two lower stages of the Miocene, which were considered as one time bin, because the last bin otherwise would have contained only 2 data records. To prevent sampling bias and because sampling accumulation curves showed that the genus level was better sampled than species level, the mean SCL per genus was calculated before summarising mean SCL per time bin for the timescale analysis. The paleoTS plots display the mean trait over time and can be fitted to different evolutionary models: stasis, where the trait mean fluctuates around a steady mean (no change), generalized random walk (GRW), where the trait mean increases or decreases over time (directional change) or unbiased random walk (URW), where the trait mean changes over time but not in a way where that these changes accumulate and move the trait mean in a specific direction (non-directional change). Model fits are based on maximum-likelihood estimation and model support is reported as Akaike Information Criterion (AICc), with the lowest values indication the best suited model. Additionally, Akaike weights are reported, which give the proportional support for each model. paleoTS plots and model-fitting was performed for the entire data set, continental, and insular genera subsets. The same approach was repeated for European and Eurasian genera for all data, as well as continental and insular genera separately.

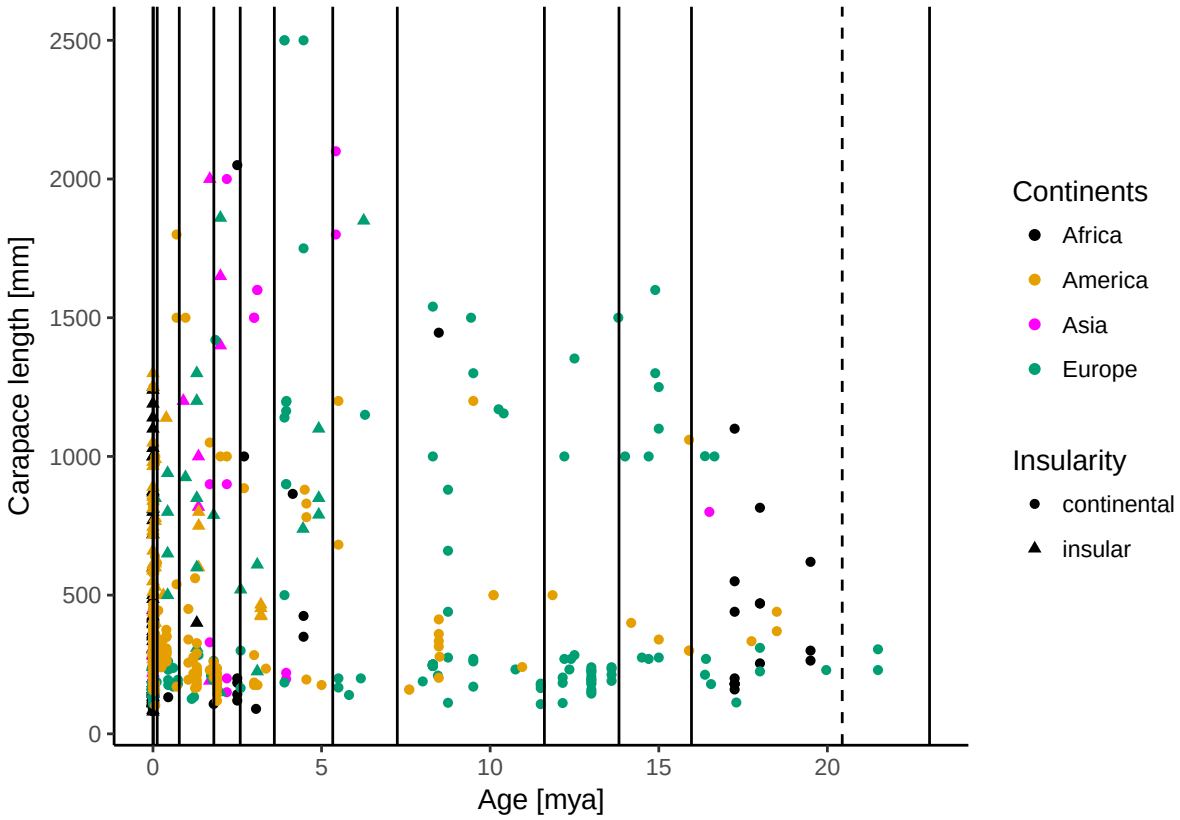


Figure 2: Scatterplot of carapace length over time, indicating insular (triangle) and continental (circles) and colour indicating continents. Lines indicate stratigraphic stages which were used as time bins, the dashed line indicates the border between the two stages of the Lower Miocene, which were consideres as one time bin.

Table 1: Time ranges, mean age per bin, corresponding stratigraphic stages and epochs, and respective sample sizes (on individual, species and genus level).)

Age Range [mya]	Mean Age [mya]	Stages	Epochs	n (Individuals)	n (Species)	n (Genera)
0 - 0.0117	0.00585	Modern	Modern	254	66	18
0.0117 - 0.126	0.06885	Upper Pleistocene	Upper Pleistocene	50	18	8
0.126 - 0.781	0.45350	Middle Pleistocene	Middle Pleistocene	53	13	7
0.781 - 1.81	1.29350	Lower Pleistocene	Lower Pleistocene	57	27	12
1.81 - 2.59	2.19700	Gelasian	Lower Pleistocene	33	15	9
2.59 - 3.6	3.09400	Piacencian	Upper Pliocene	24	15	10
3.6 - 5.33	4.46600	Zanclean	Lower Pliocene	31	17	8
5.33 - 7.25	6.28900	Messinian	Upper Miocene	12	9	6
7.25 - 11.6	9.42700	Tortonian	Upper Miocene	46	20	9
11.6 - 13.8	12.71400	Serravallian	Middle Miocene	27	8	6
13.8 - 16	14.89500	Langhian	Middle Miocene	18	14	9
16 - 23	19.50000	Burdigalian/Aquitanian	Lower Miocene	31	15	9

2 Results

2.1 Sample-based accumulation curves

The sample-based accumulation curve (SAC) on the generic level shows a relatively low intial slope and a long upward slope to the asymptote, which does not reach full saturation (Fig. 3). Although the SAC does not completely plateau, considering the large area covered and the high number of rare genera in the dataset, it can be considered well enough sampled for our purposes. In contrast, the species accumulation curves, both per reference and per locality, show only a slight initial increase and, for the same number of references/sampling units, are far from reaching an asymptote (Fig. S2 (a), (b)). Since there are less genera than species, it is to be expected that genera reach an asymptote earlier than species. Accumulation curves for individual continents show that Europe reflects the trend of the overall dataset, with a long upward slope after the inflection point, whereas the other continents require further sampling (Fig. S2 (c) - (i)).

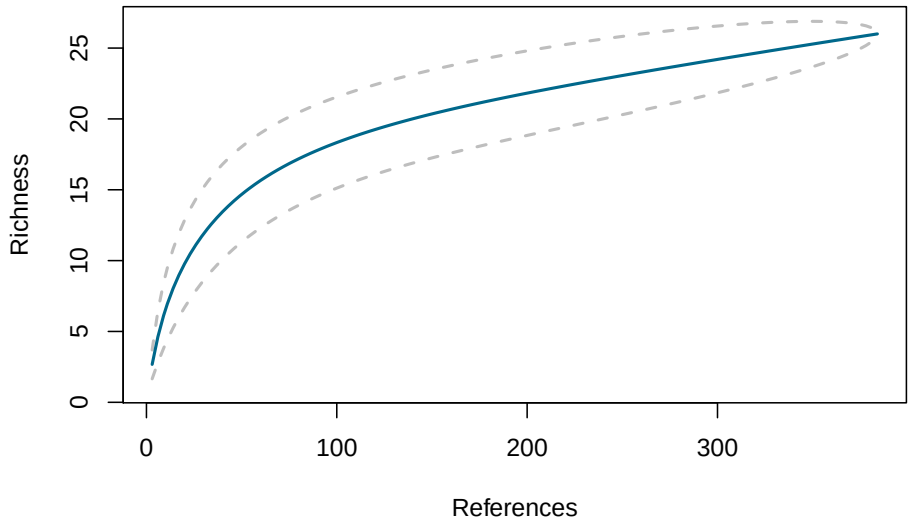


Figure 3: Sample-based accumulation curve of fossil genera per reference. Dashed lines represent the confidence inteval.

2.2 Descriptive statistics

The histograms indicate that testudinid body size is not normally distributed (Fig. 4), which is supported by QQ-Plots for raw as well as log-transformed data (Fig. S3). The body size distribution is moderately right-skewed (Table S14), with a higher frequency of smaller body sizes.

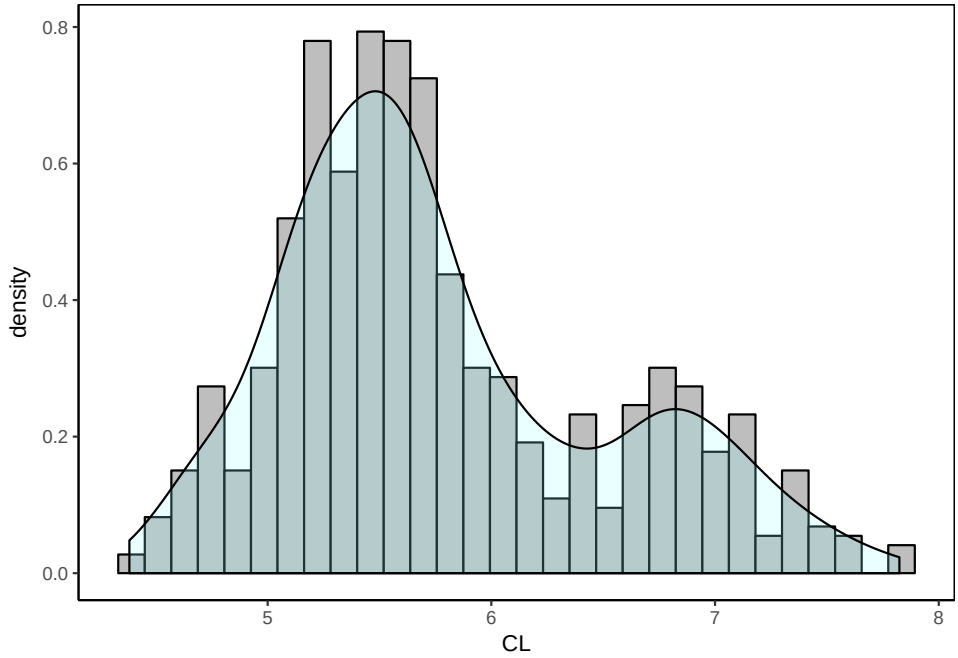
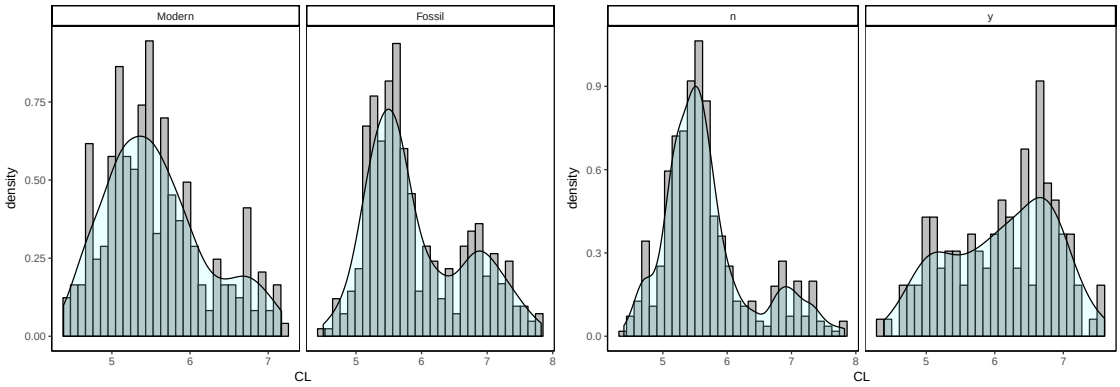


Figure 4: Body size distribution of complete data set. Bimodally distributed and right-skewed.

This pattern is also apparent when splitting the data set into fossil and modern taxa (Fig. 5 (a)). Considering insularity, body size distribution is right-skewed for continental taxa, but left-skewed for insular species, meaning larger body size occurs with a higher frequency than smaller body size on islands. Insular taxa are also left-skewed when only considering fossil taxa, but modern insular taxa have a skewness close to 0, indicating a symmetric distribution (Table S14). Kurtosis suggests light tails with no/few outliers (kurtosis < 3) for insular and modern insular species, whereas continental species have a heavy tail (kurtosis > 3; Table S14).

The histograms show a bimodal distribution, with is also apparent on most sublevels, except for modern insular species (Fig. S4 (a)). Body size distributions are similar, right-skewed and bimodal, for the four continents and reflect the overall trend (Fig. S4 (b)).



(a) Fossil vs. modern (b) Continental vs. insular

Figure 5: Histograms for fossil vs. modern and continental vs. insular data.

Mean body size differs significantly across time bins (Kruskal Wallis Test, χ^2 = 71.441, P < 0.01; Fig. 6). The multiple comparison test showed that modern median body size is smaller than body size in the Upper Pleistocene. There is no difference in body size within the Pleistocene and Pleistocene body size does not differ from body size in the Upper Miocene. Serravallian body size is smaller than Langhian body size in the Middle Miocene, but Langhian body size is not different from Lower Miocene body size.

Comparison of modern and fossil testudinids showed that modern tortoises are smaller than fossil ones (Wilcoxon Rank Sum Test, W = 22318, P < 0.01; Fig. 7). Furthermore, continental testudinids are smaller than insular taxa (Wilcoxon Rank Sum Test, W = 13854, P < 0.01; Fig. 7). These results can even be considered in combination: modern continental taxa are smaller than fossil continental taxa (Wilcoxon Rank Sum Test, W = 8046, P < 0.01; Fig. S5) and modern insular taxa are smaller than fossil insular taxa (Wilcoxon Rank Sum Test, W = 631.5, P < 0.01; Fig. S5))

Finally, body size differs among continents (Kruskal Wallis Test, χ^2 = 34.343, P < 0.01; Fig. 8). The multiple comparison test showed that African testudinids differ significantly from the other three continents in body size. American testudinid body size is comparable to that of Asia, but differs from those of Africa and Europe. Furthermore, Asian and European testidinids are similar in body size.

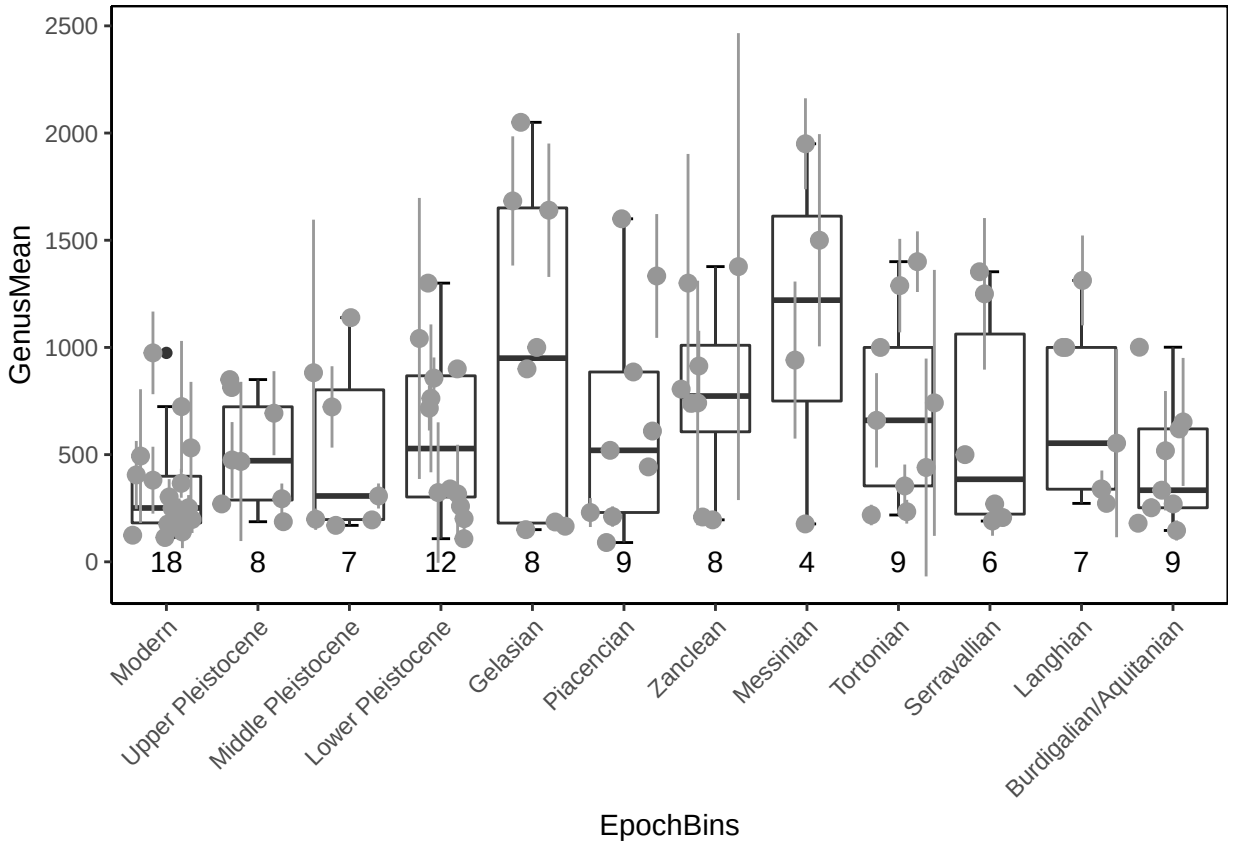
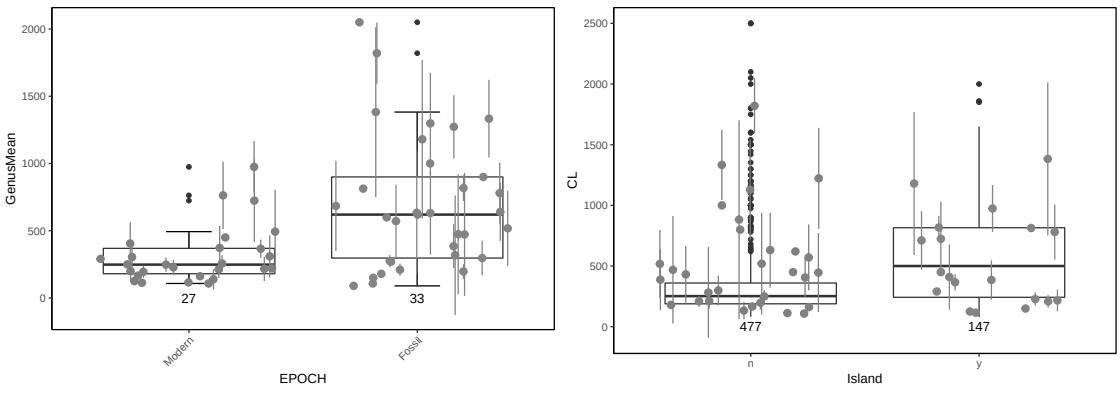


Figure 6: Boxplots of mean CL per time bin, including mean and sd CL for each genus (as pointrange).



(a) Fossil vs. modern

(b) Continental vs. insular

Figure 7: Boxplots of CL split into fossil vs. modern (a) and cotinental vs. insular (b)

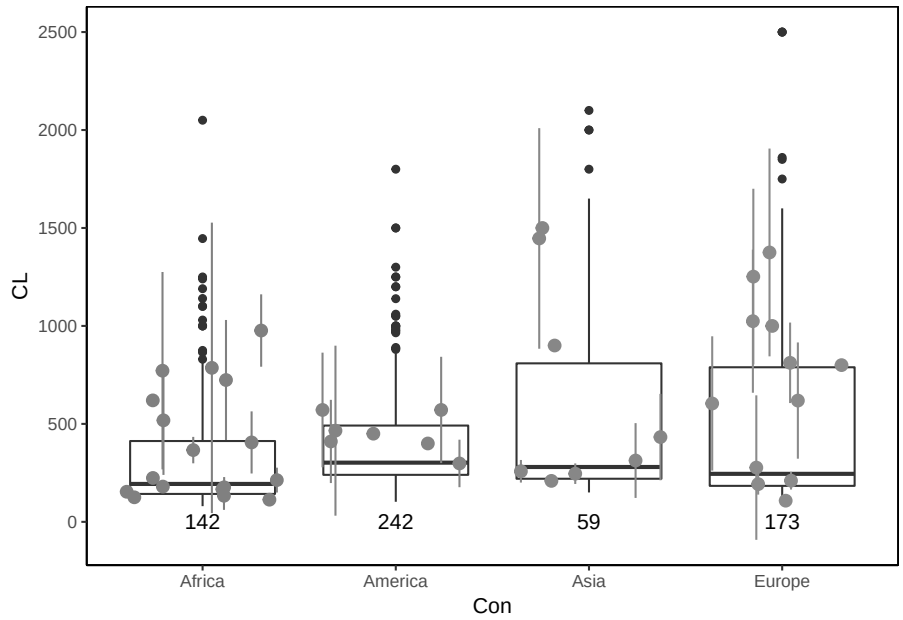


Figure 8: Boxplot: body size on different continents, genera summarised

2.3 paleoTS analysis

2.3.1 complete dataset

Fitting of the three evolutionary models favoured stasis for the whole data set, although model support was only 51 % followed by 33 % support for the unbiased random walk (Fig. 9, Table S1). When solely considering continental genera, the best-fitting model was the unbiased random walk, but again not ideally supported with 55 % (Fig. 10, Table 3). In contrast, insular genera are best described by stasis, which was very well supported (100 %; Fig. 11, Table 4)).

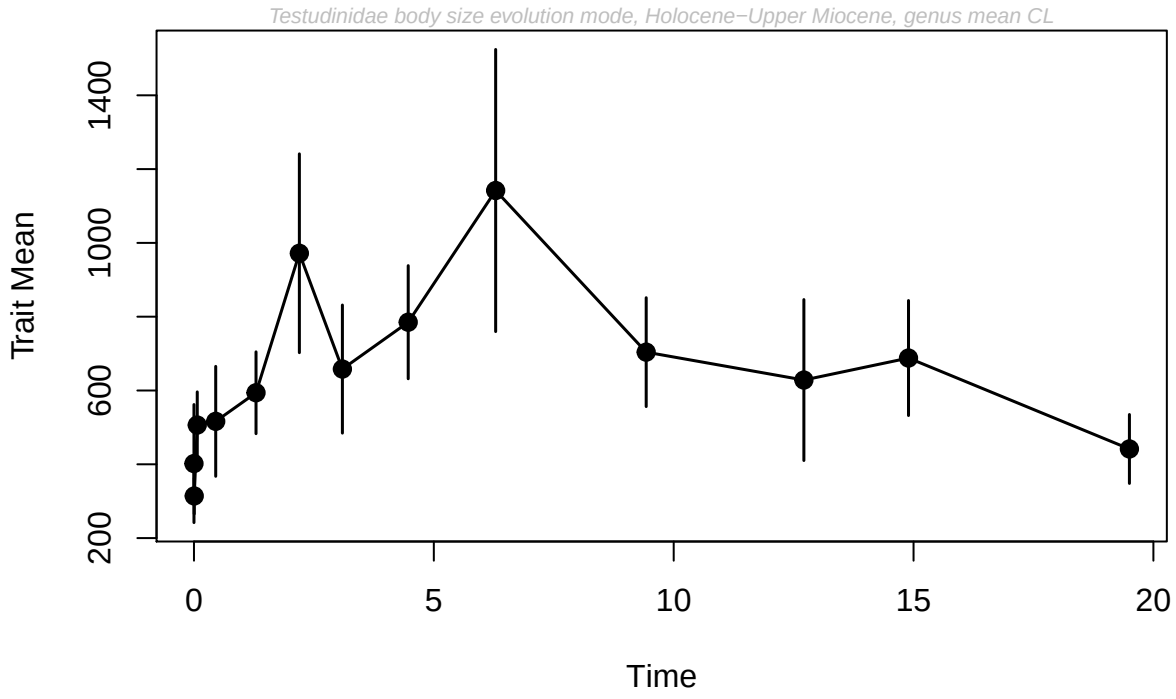


Figure 9: paleoTS plot with genus mean, all

Table 2: Model-fitting results for testudinidae, genera, all

	logL	K	AICc	Akaike.wt
GRW	-81.31790	2	167.9691	0.161
URW	-82.05721	1	166.5144	0.332
Stasis	-80.16802	2	165.6694	0.507

2.3.2 continental dataset (excluding insular species)

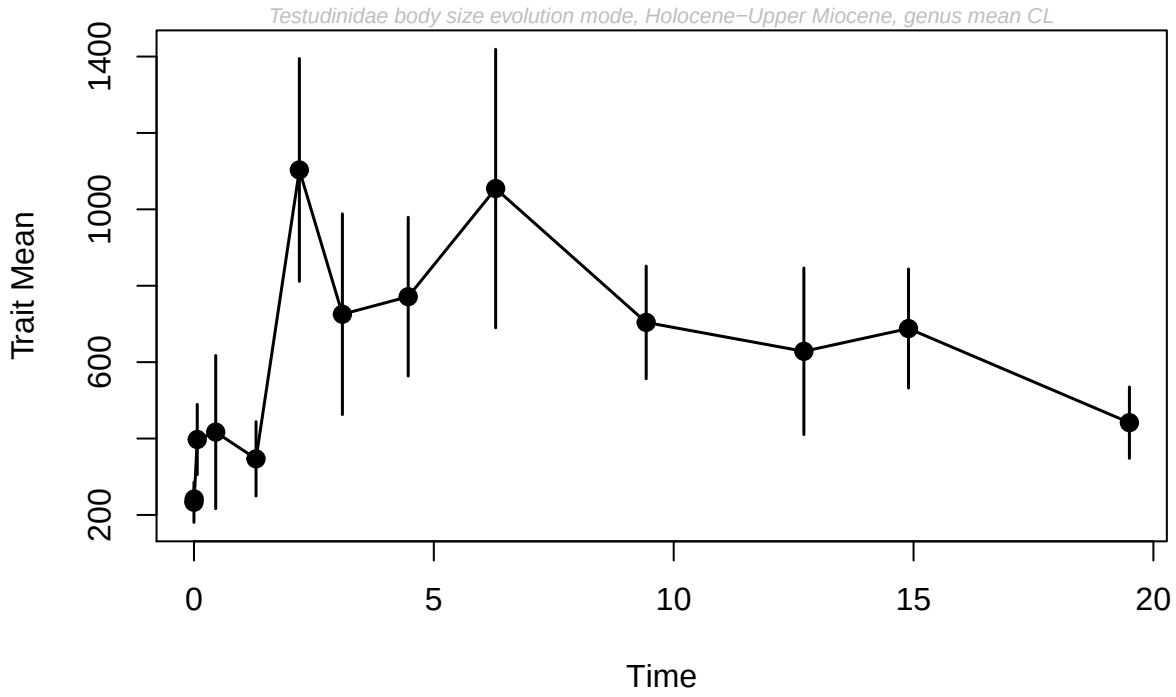


Figure 10: paleoTS plot with genus mean, continental

Table 3: Model-fitting results for testudinidae, genera, continental

	logL	K	AICc	Akaike.wt
GRW	-82.26287	2	169.8591	0.300
URW	-83.12577	1	168.6515	0.548
Stasis	-82.93984	2	171.2130	0.152

2.3.3 insular dataset (excluding continental)

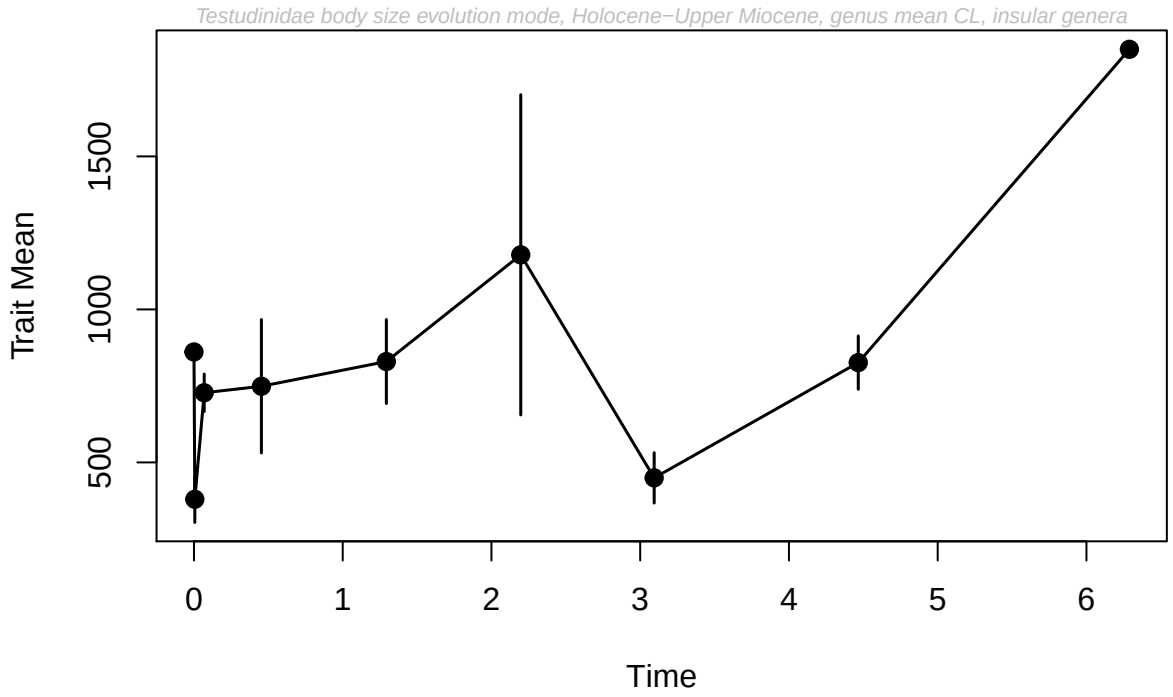


Figure 11: paleoTS plot with genus mean, insular

Table 4: Model-fitting results for testudinidae, genera, insular

	logL	K	AICc	Akaike.wt
GRW	-68.57344	2	143.5469	0
URW	-75.76576	1	154.1982	0
Stasis	-60.41581	2	127.2316	1

2.3.4 per continent

2.3.4.1 Europe, genera

When repeating the analysis for European taxa only, all three groups – complete, continental and insular data – are best described by stasis with a model support between 92 - 99 % (Fig. 12, S8, S9; Tables 5, S6, S8).

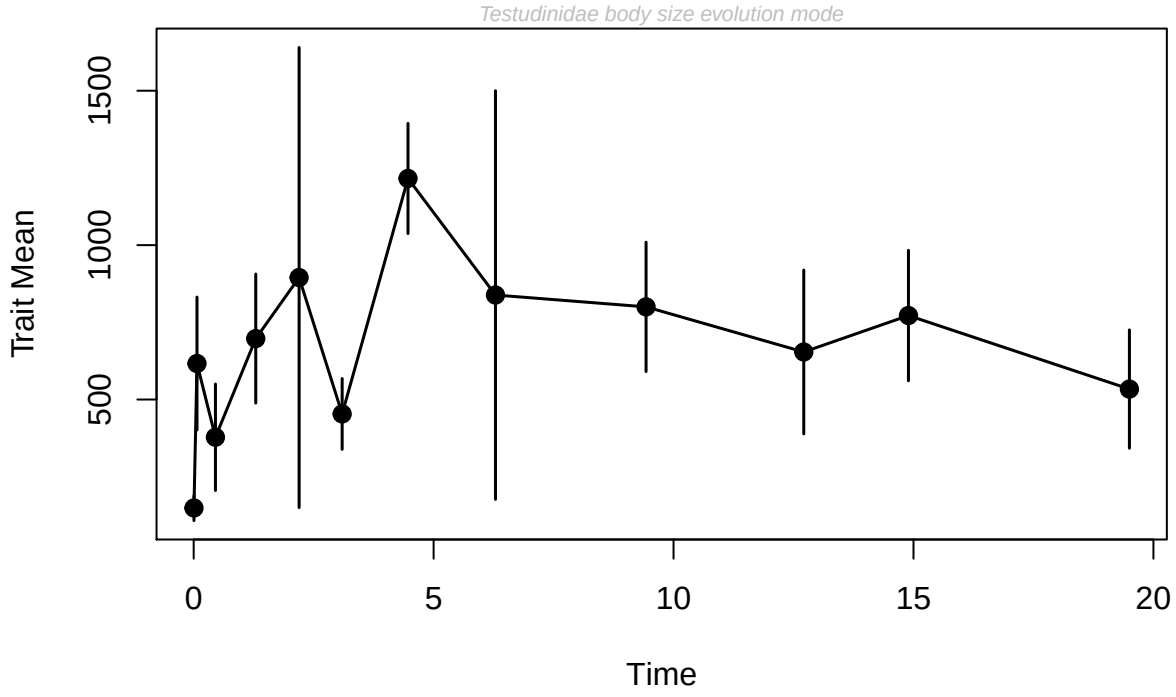


Figure 12: Genera, Europe

Table 5: Model-fitting results for testudinidae, genera, Europe

	logL	K	AICc	Akaike.wt
GRW	-84.14010	2	173.7802	0.006
URW	-85.90727	1	174.2590	0.005
Stasis	-79.01365	2	163.5273	0.990

2.3.4.2 Eurasia, genera

For Eurasia, the entire data as well as continental genera are best described by the unbiased random walk, although the model support is weak again. Continental species still have a better support (78 %; Fig. S10, Table S11) than all Eurasian data with only 56 % (Fig. 13, Table 6). Insular Eurasian species, however, conform to stasis again, although with lower support values (68 %; Fig. S11, Table S13).

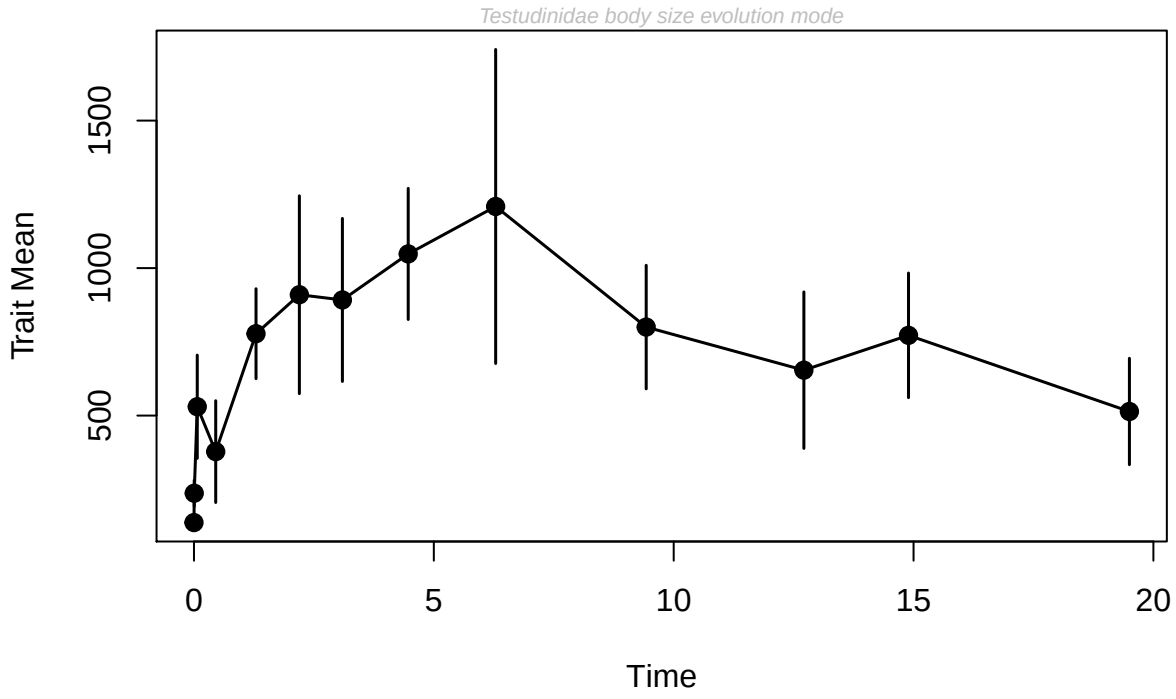


Figure 13: paleoTS, genera, Eurasia

Table 6: Model-fitting results for testudinidae, genera, Eurasia

	logL	K	AICc	Akaike.wt
GRW	-85.25195	2	175.8372	0.149
URW	-85.39072	1	173.1814	0.562
Stasis	-84.58890	2	174.5111	0.289

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Appendix A Geographical and stratigraphic distribution of body size data

Body size data was available from all four continents, were testudinidae occur, and over a time period of 20 mya (Fig. S1, Table 1).

–> samples all over the world and over the whole time period with more or less equally distributed sample sizes (over time bins, continents are uneven –> see SAC)

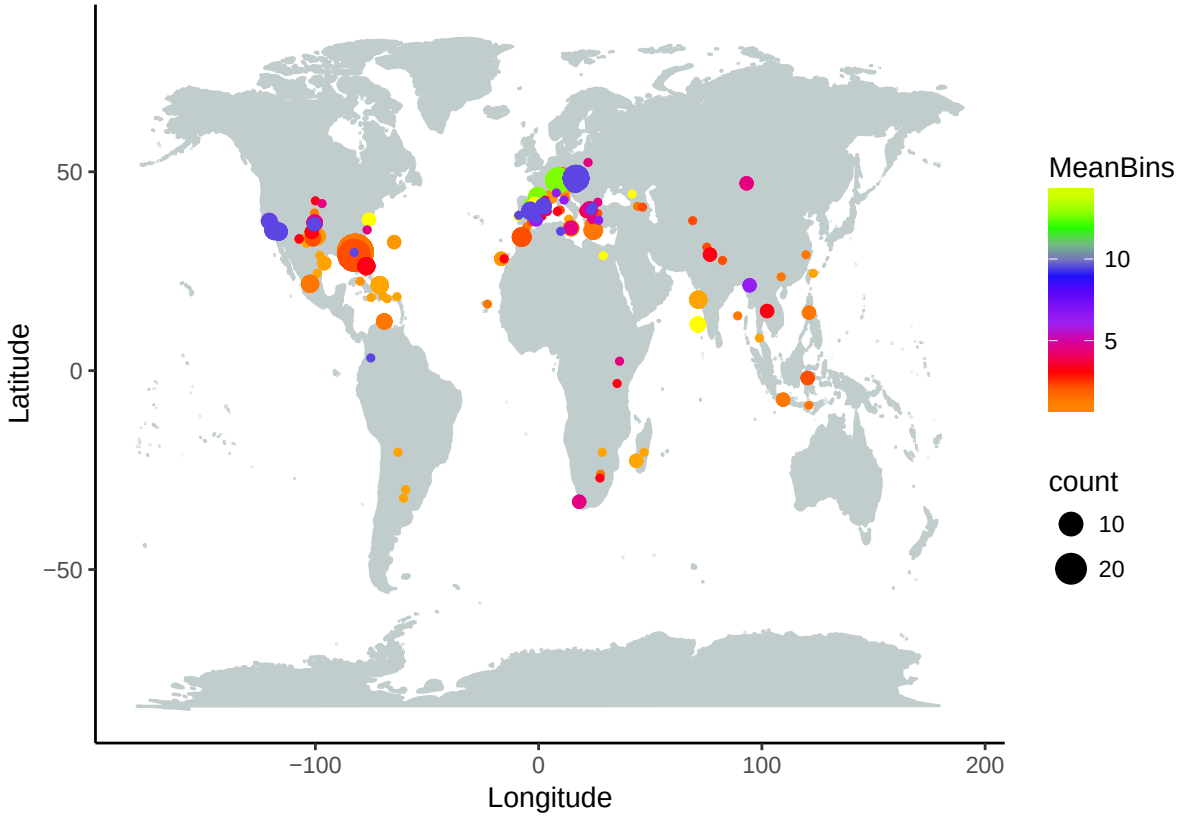
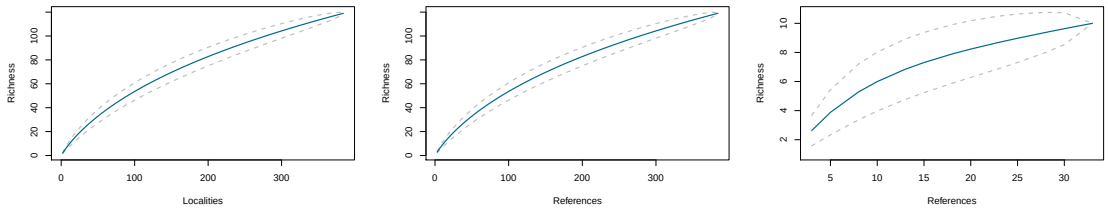
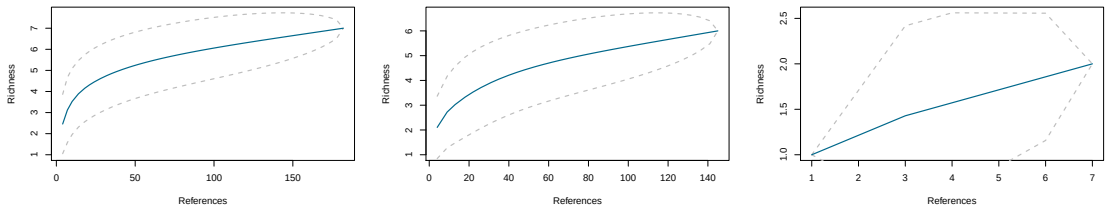


Figure S1: Map displaying all localities for which body size data for testudinids was available in the literature. Size of points denotes sample size, color denotes approximate age.

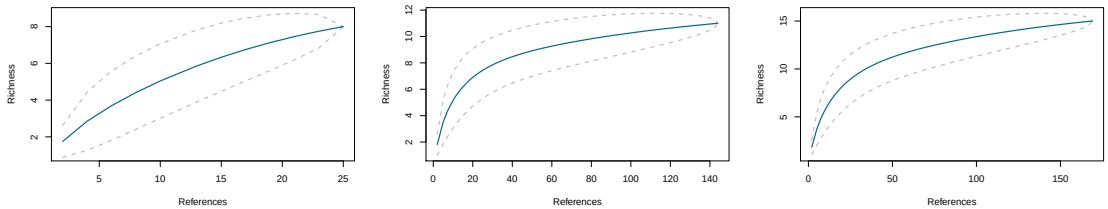
Appendix B Sampling accumulation curves



(a) Species per locality (b) Species per reference (c) Africa



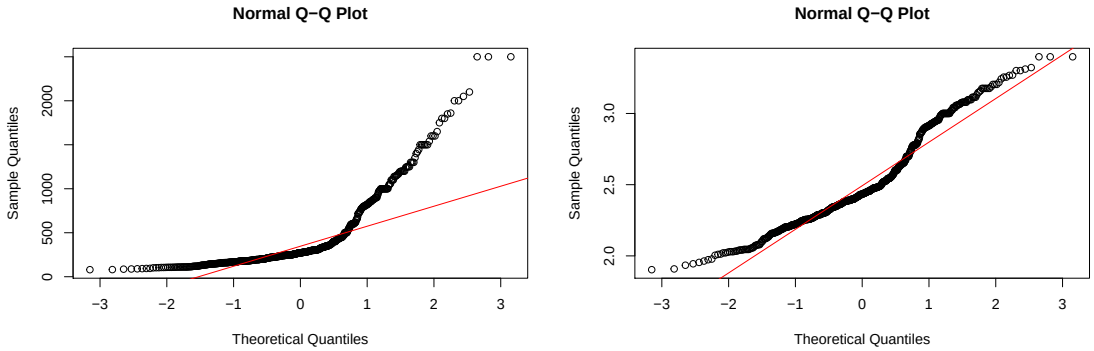
(d) America (e) North America (f) South America



(g) Asia (h) Europe (i) Eurasia

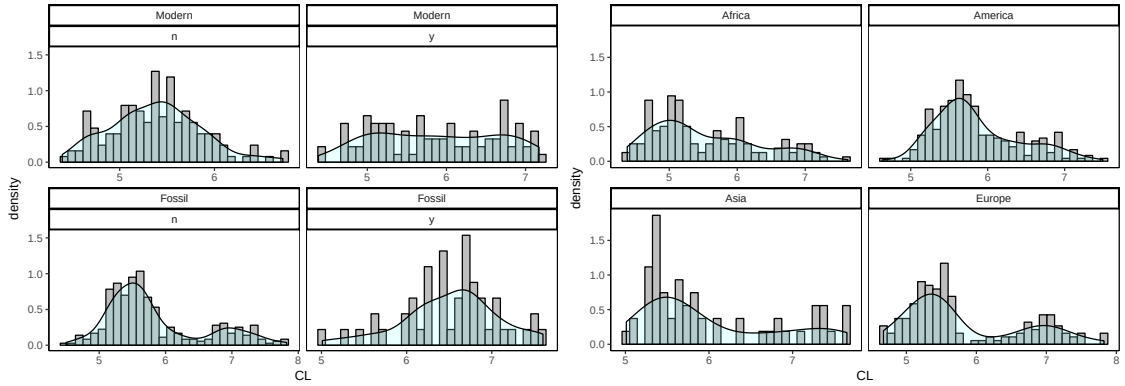
Figure S2: Sampling accumulation curves: (a) - (b) Species are not sufficiently sampled, regardless of sampling unit. (c) - (i) Sampling Accumulation Curves on generic level per continent. Only Europe (h) and Eurasia (i) are sufficiently sampled. Dashed lines represent the confidence interval.

Appendix C Histograms



(a) Raw data (b) Logtransformed data

Figure S3: Visual test for normal distribution. In case of normally distributed data, the black circles should follow the red line, which is not the case for either raw data (a) nor logtransformed data (b). Therefore, data is not normally distributed.



(a) Fossil vs. modern, continental vs. insular (b) Per continent

Figure S4: Histograms for several subgroups of the dataset.

Appendix D Boxplots

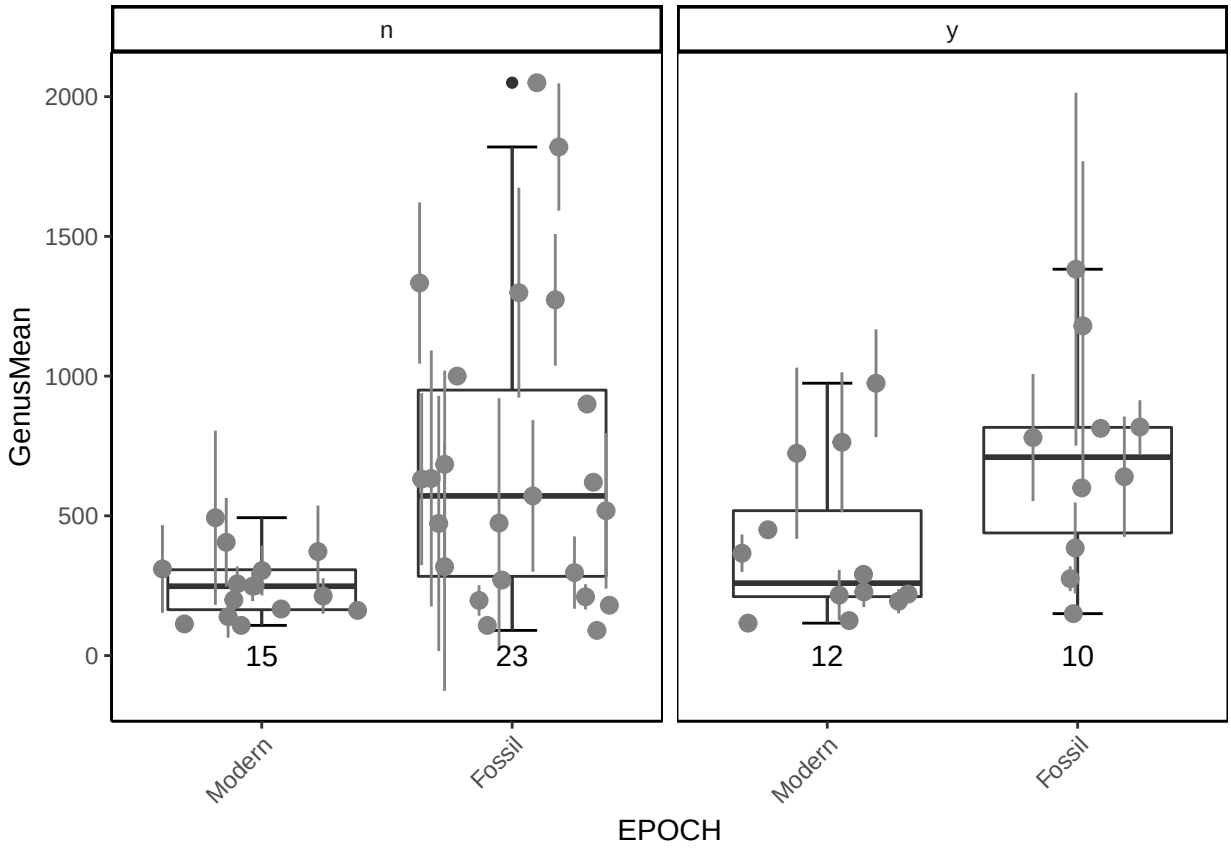


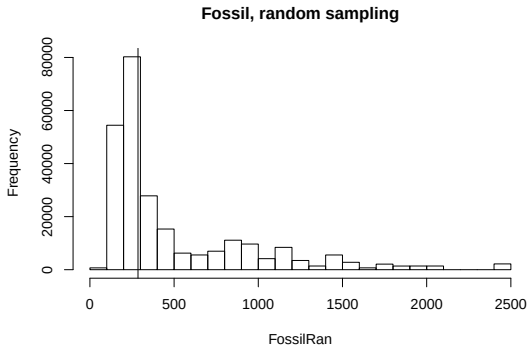
Figure S5: Boxplots fossil vs. modern, continental vs. insular species.

Wilcoxon Rank Sum Test (unpaired data):

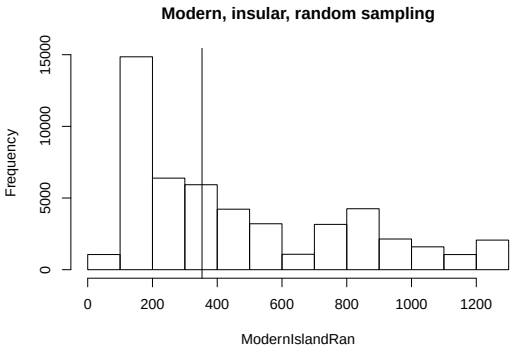
modern continental < fossil continental (P = 4.8532266×10^{-8})

modern insular < fossil insular (P = 0.0018564)

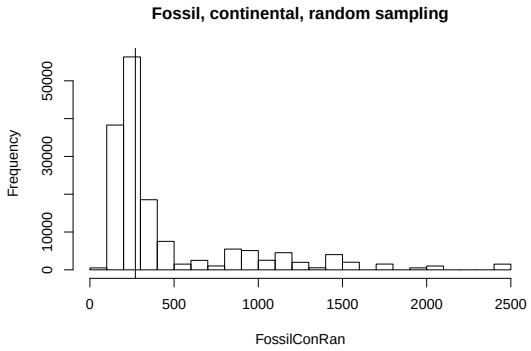
Appendix E Random Sampling



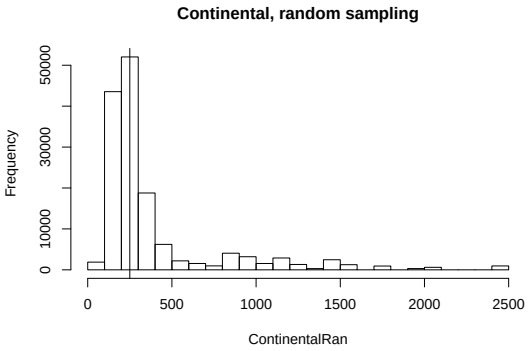
(a) Fossil



(b) Modern, insular

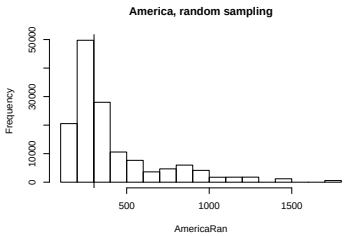


(c) Fossil, continental

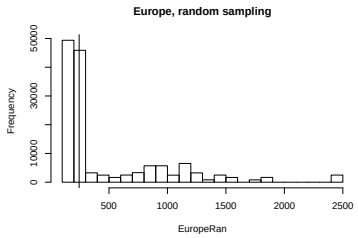


(d) Continental

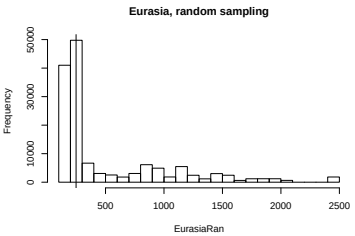
Figure S6: Random sampling for several subgroups. For (a), (c), and (d) the random sample reflects the real sample, for (b) this is not the case.



(a) America



(b) Europe



(c) Eurasia

Figure S7: Random sampling for different continents. All random samples reflect the real sample.

Appendix F paleoTS

all (continental and insular)

Table S1: paleoTS object, all data

tt	mm	vv	nn
0.0000005	401.9641	102306.64	4
0.0058500	314.1859	42607.58	18
0.0688500	506.3265	64620.11	8
0.4535000	516.4053	155241.85	7
1.2935000	593.8669	147507.20	12
2.1970000	971.8850	580540.76	8
3.0940000	658.0826	271043.73	9
4.4660000	785.0792	187937.61	8
6.2890000	1141.9375	584378.85	4
9.4270000	703.9570	195766.19	9
12.7140000	628.3020	285258.36	6
14.8950000	687.9619	169914.58	7
19.5000000	441.5420	78467.65	9

continental (excluding insular species)

Table S2: paleoTS object, continental

tt	mm	vv	nn
0.0000005	233.1680	8331.753	3
0.0058500	241.7917	13004.928	15
0.0688500	397.4606	50619.392	6
0.4535000	416.9341	200982.124	5
1.2935000	346.8484	66240.066	7
2.1970000	1103.1067	595507.933	7
3.0940000	725.4156	414253.291	6

tt	mm	vv	nn
4.4660000	771.3833	259173.082	6
6.2890000	1054.4375	531455.932	4
9.4270000	703.9570	195766.185	9
12.7140000	628.3020	285258.362	6
14.8950000	687.9619	169914.577	7
19.5000000	441.5420	78467.646	9

insular (excluding continental)

Table S3: paleoTS object, insular

tt	mm	vv	nn
0.0000005	860.9268	0.00	1
0.0058500	379.5354	68570.44	12
0.0688500	727.5938	14997.58	4
0.4535000	748.8333	142649.08	3
1.2935000	829.6744	112964.44	6
2.1970000	1178.3333	821158.33	3
3.0940000	449.4375	27058.77	4
4.4660000	826.1667	15196.06	2
6.2890000	1850.0000	0.00	1

Europe, genera

Table S4: paleoTS object, Europe

mm	nn	vv	tt
148.8559	2	3338.406	0.00585
616.6667	3	138802.333	0.06885
377.8167	3	89203.953	0.45350
697.3717	5	218431.974	1.29350

mm	nn	vv	tt
895.0000	2	1110050.000	2.19700
453.3333	3	39433.333	3.09400
1215.8667	5	159317.256	4.46600
838.3750	2	875495.281	6.28900
800.0508	6	263434.389	9.42700
653.9625	5	351634.528	12.71400
772.0000	5	223154.375	14.89500
533.8533	5	183706.682	19.50000

Europe, genera, continental

Table S5: paleoTs object, Europe, continental

mm	nn	vv	tt
149.5381	2	3450.8267	0.00585
187.0000	1	0.0000	0.06885
205.4750	2	198.0050	0.45350
204.9292	2	23.1767	1.29350
1420.0000	1	0.0000	2.19700
232.5000	1	0.0000	3.09400
1475.6667	3	57926.3333	4.46600
663.3750	2	473607.7812	6.28900
800.0508	6	263434.3893	9.42700
653.9625	5	351634.5281	12.71400
772.0000	5	223154.3750	14.89500
533.8533	5	183706.6821	19.50000

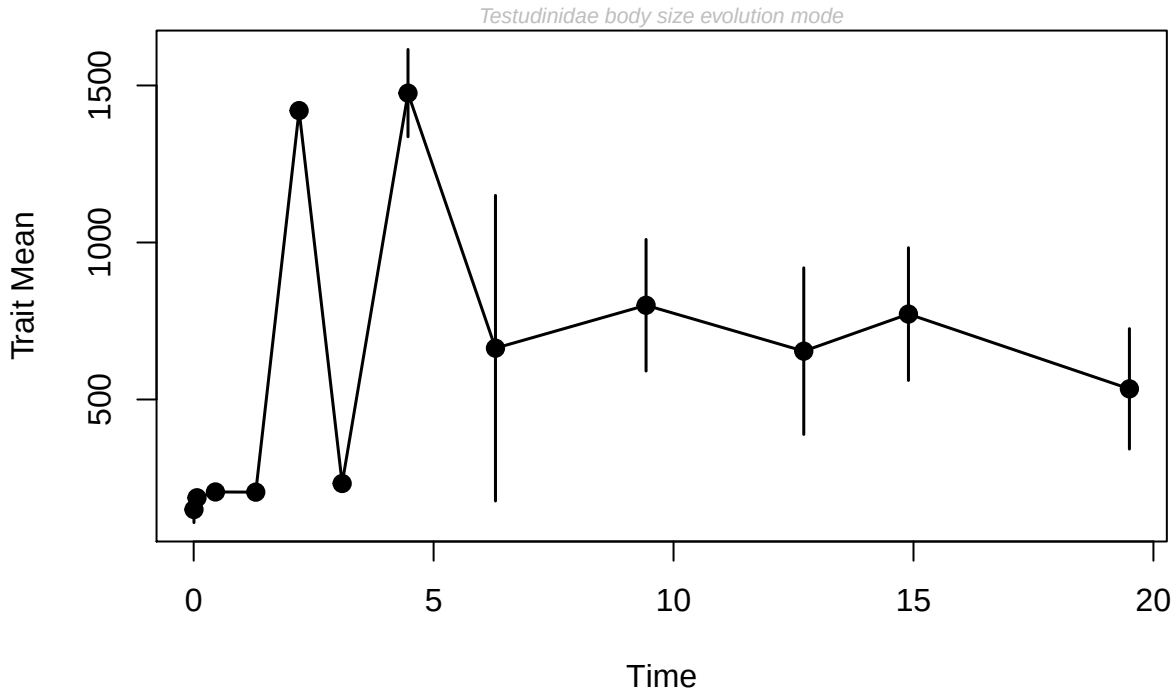


Figure S8: paleoTS, genera, Europe, continental

Table S6: Model-fitting results for testudinidae, genera, Europe, continental

	logL	K	AICc	Akaike.wt
GRW	-87.93137	2	181.3627	0.009
URW	-92.56882	1	187.5821	0.000
Stasis	-83.21073	2	171.9215	0.991

Europe, genera, insular

Table S7: paleoTs object, Europe, insular

mm	nn	vv	tt
187.5077	1	0.00	0.00585
831.5000	2	684.50	0.06885
722.5000	1	0.00	0.45350

mm	nn	vv	tt
835.0833	4	168423.36	1.29350
1005.0000	2	1462050.00	2.19700
451.6667	3	40558.33	3.09400
826.1667	2	15196.06	4.46600
1850.0000	1	0.00	6.28900

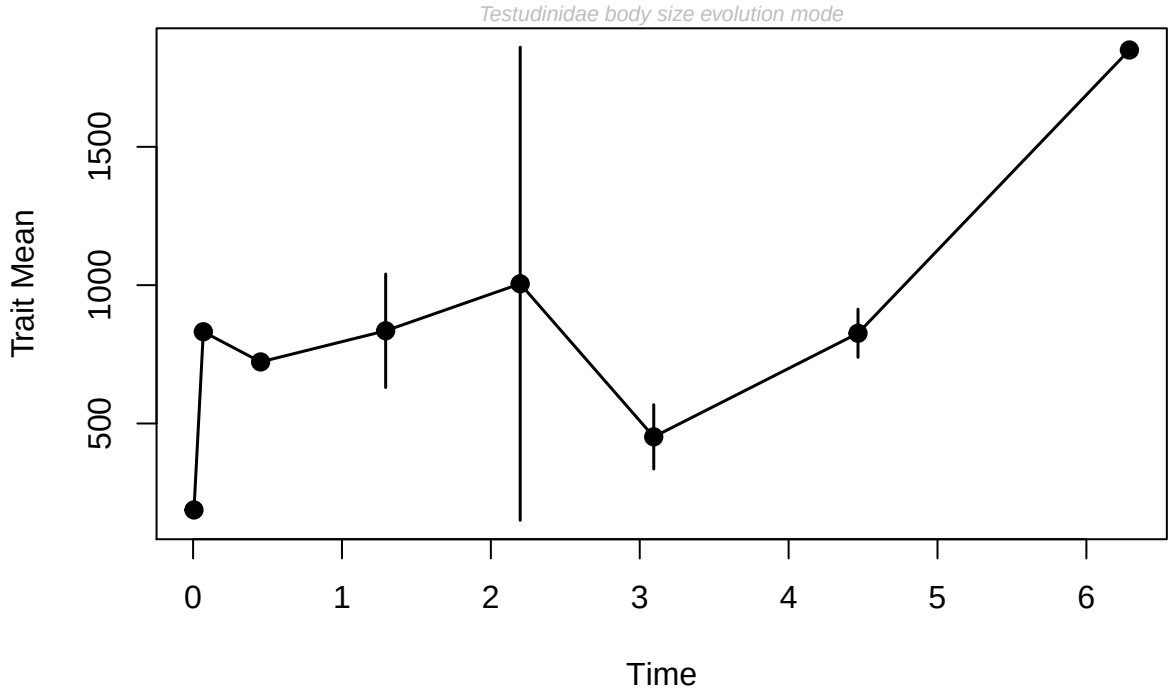


Figure S9: paleoTS, genera, Europe, insular

Table S8: Model-fitting results for testudinidae, genera, Europe, insular

	logL	K	AICc	Akaike.wt
GRW	-67.12192	2	141.2438	0.000
URW	-57.51634	1	117.8327	0.074
Stasis	-52.89638	2	112.7928	0.926

Eurasia, genera

Table S9: paleoTS object, Eurasia

tt	mm	vv	nn
0.0000005	137.2637	0.000	1
0.0058500	236.8217	9760.467	5
0.0688500	530.0000	122579.333	4
0.4535000	377.8167	89203.953	3
1.2935000	777.5579	162641.142	7
2.1970000	909.6667	562217.222	5
3.0940000	892.0000	381770.000	5
4.4660000	1048.0556	296417.219	6
6.2890000	1208.9167	849651.021	3
9.4270000	800.0508	263434.389	6
12.7140000	653.9625	351634.528	5
14.8950000	772.0000	223154.375	5
19.5000000	513.8533	162399.349	5

Eurasia, genera, continental

Table S10: paleoTS object, Eurasia, continental

tt	mm	vv	nn
0.0000005	137.2637	0.000	1
0.0058500	238.0120	9654.865	5
0.0688500	228.5000	3444.500	2
0.4535000	205.4750	198.005	2
1.2935000	595.5388	191487.404	4
2.1970000	1044.5833	442006.250	4
3.0940000	1110.8333	581102.083	3
4.4660000	1159.0000	439728.667	4
6.2890000	1092.2500	788605.188	3

tt	mm	vv	nn
9.4270000	800.0508	263434.389	6
12.7140000	653.9625	351634.528	5
14.8950000	772.0000	223154.375	5
19.5000000	513.8533	162399.349	5

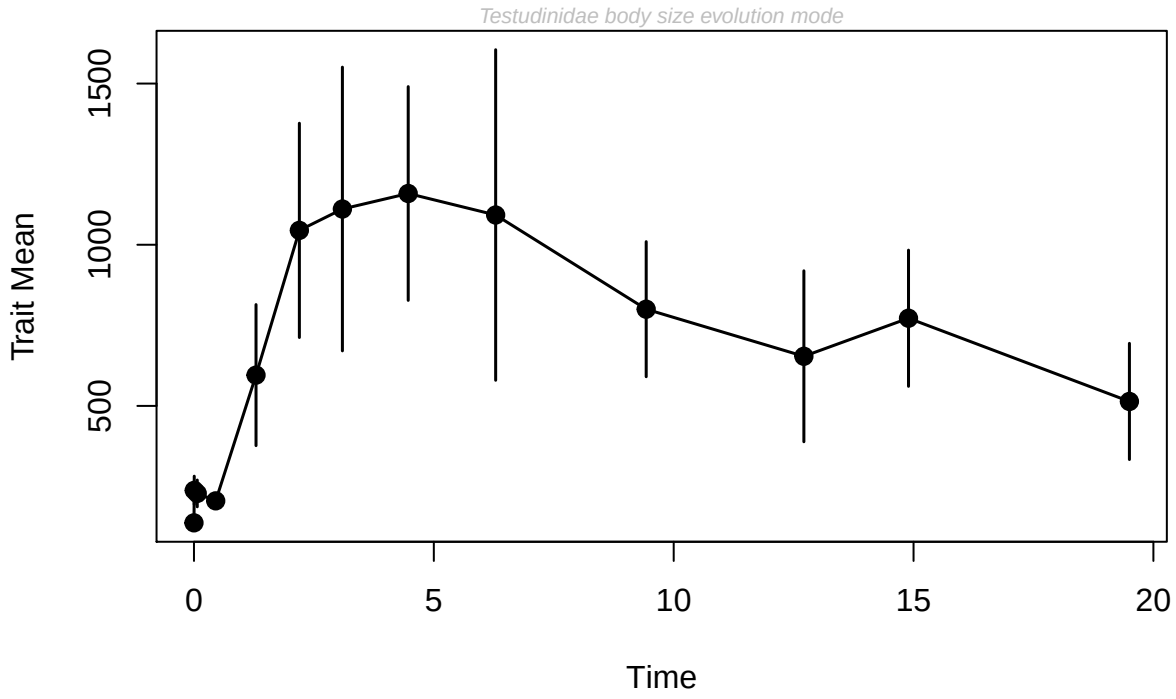


Figure S10: paleoTS, genera, Eurasia, continental

Table S11: Model-fitting results for testudinidae, genera, Eurasia, continental

	logL	K	AICc	Akaike.wt
GRW	-82.20698	2	169.7473	0.222
URW	-82.42344	1	167.2469	0.776
Stasis	-87.19538	2	179.7241	0.002

Eurasia, genera, insular

Table S12: paleoTS object, Eurasia, insular

tt	mm	vv	nn
0.0000005	137.2637	0.000	1
0.0058500	271.4596	5668.485	4
0.0688500	644.3333	105436.333	3
0.4535000	722.5000	0.000	1
1.2935000	882.0356	105684.077	6
2.1970000	953.6667	652233.889	5
3.0940000	891.0000	383430.000	5
4.4660000	620.4444	134562.926	3
6.2890000	1900.0000	5000.000	2
19.5000000	800.0000	0.000	1

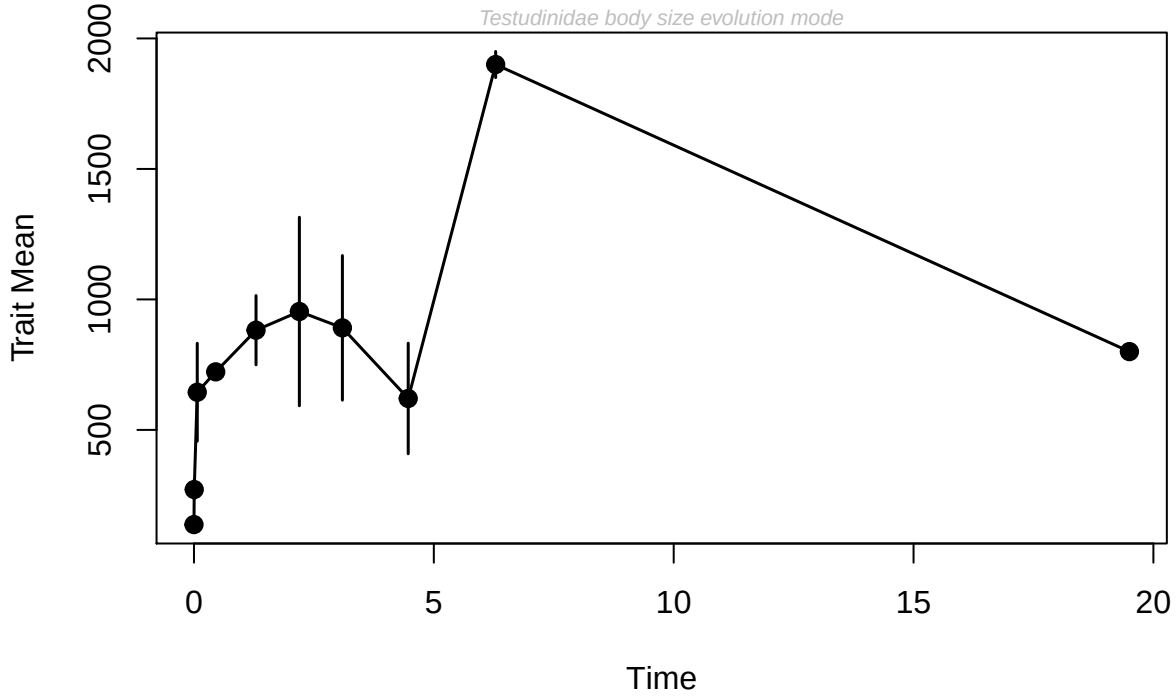


Figure S11: paleoTS, genera, Eurasia, insular

Table S13: Model-fitting results for testudinidae, genera, Eurasia, insular

	logL	K	AICc	Akaike.wt
GRW	-69.56419	2	145.1284	0.193
URW	-71.67437	1	145.9202	0.130
Stasis	-68.31026	2	142.6205	0.677

Appendix G Tables

Table S14: General statistics of body size data: all, per time bin, insular and continental, per continent (all referring to CL: min, max, variance, mean, logmean, median, logmedian, skewness, logskewness, kurosis, logkurtosis

nCL	min	max	var	mean	logm	med	logmed	skew	logsk	kurt	logku	Variable
616	80.00	2500	164537.80	437.2	2.5	270.5	2.4	2.14	0.69	8.00	2.73	all
253	80.00	1300	67485.50	330.3	2.4	242.0	2.4	1.83	0.58	5.87	2.69	Modern
49	102.44	1250	69690.66	445.9	2.6	334.7	2.5	1.20	0.24	3.61	2.56	Upper Pleistocene
53	132.00	1800	97910.83	387.1	2.5	292.9	2.5	3.03	1.52	12.24	5.55	Middle Pleistocene
57	107.80	2000	161948.82	463.5	2.5	263.0	2.4	1.74	0.73	5.76	2.40	Lower Pleistocene
31	118.90	2050	411224.51	555.2	2.5	194.9	2.3	1.31	0.93	3.12	2.11	Gelasian
21	90.00	1600	270535.82	610.6	2.6	428.0	2.6	1.00	0.14	2.50	1.99	Piacencian
26	176.00	2500	476162.71	955.2	2.9	857.5	2.9	1.11	-0.40	3.56	2.30	Zanclean
10	140.00	2100	602611.21	948.9	2.8	916.0	2.9	0.26	-0.22	1.49	1.29	Messinian
45	107.00	1540	175470.12	462.7	2.5	250.0	2.4	1.49	0.81	3.74	2.54	Tortonian
27	111.00	1500	126060.40	337.7	2.4	220.0	2.3	2.49	1.77	7.77	5.30	Serravallian
14	270.00	1600	230451.33	747.9	2.8	700.0	2.8	0.30	0.03	1.55	1.18	Langhian
30	113.00	1100	76288.76	406.8	2.5	302.4	2.5	1.27	0.45	3.45	2.26	Burdigalian/Aquitanian
253	80.00	1300	67485.50	330.3	2.4	242.0	2.4	1.83	0.58	5.87	2.69	Modern
363	90.00	2500	219004.66	511.7	2.6	285.6	2.5	1.83	0.68	6.11	2.42	Fossil
469	81.00	2500	157808.79	392.9	2.5	250.0	2.4	2.65	1.07	10.57	3.74	continental
147	80.00	2000	160834.35	578.5	2.6	500.0	2.7	1.02	-0.27	3.95	2.05	insular

Table S14 – *continued from previous page*

nCL	min	max	var	mean	logm	med	logmed	skew	logsk	kurt	logku	Variable
157	81.00	830	17009.02	244.0	2.3	221.0	2.3	1.92	0.29	8.09	2.98	modern-con
96	80.00	1300	118641.09	471.5	2.6	353.0	2.5	0.82	0.01	2.47	1.77	modern-ins
312	90.00	2500	212116.79	467.9	2.5	270.0	2.4	2.11	0.96	7.25	2.96	fossil-con
51	150.00	2000	180825.40	780.0	2.8	750.0	2.9	1.11	-0.40	4.02	3.18	fossil-ins
142	80.00	2050	112417.26	347.7	2.4	193.5	2.3	2.10	0.68	7.97	2.48	Africa
242	102.44	1800	82209.71	415.0	2.5	302.2	2.5	1.92	0.75	6.79	2.91	America
59	150.00	2100	323123.20	585.5	2.6	280.0	2.4	1.43	0.85	3.61	2.24	Asia
173	107.00	2500	254222.84	491.2	2.5	245.0	2.4	1.86	0.81	6.30	2.34	Europe

Table S15: Overview over genera (modern and fossil) per time bin, with sample sizes and mean CL.

EpochBins	Genus	n	meanCL
Modern	Aldabrachelys	12	974.5833
Modern	Astrochelys	14	366.2143
Modern	Centrochelys	3	493.3333
Modern	Chelonoidis	45	531.5178
Modern	Chersina	15	176.2667
Modern	Cylindraspis	5	724.0000
Modern	Geochelone	8	252.1250
Modern	Gopherus	23	302.4839
Modern	Hesperotestudo	1	250.0000
Modern	Homopus	7	139.2857
Modern	Indotestudo	16	242.9875
Modern	Kinixys	15	213.0667
Modern	Malacochersus	2	166.5000
Modern	Manouria	9	380.7778
Modern	Psammobates	17	113.4118
Modern	Pyxis	16	124.1875
Modern	Stigmochelys	6	405.3333
Modern	Testudo	39	197.5436
Upper Pleistocene	Centrochelys	1	850.0000
Upper Pleistocene	Chelonoidis	11	693.1818
Upper Pleistocene	Eurotestudo	1	187.0000
Upper Pleistocene	gen.	1	813.0000
Upper Pleistocene	Geochelone	2	475.0000
Upper Pleistocene	Gopherus	22	294.1545
Upper Pleistocene	Hesperotestudo	10	468.2760
Upper Pleistocene	Indotestudo	1	270.0000
Middle Pleistocene	Centrochelys	4	722.5000
Middle Pleistocene	Chelonoidis	1	1139.0000

Table S15 – *continued from previous page*

EpochBins	Genus	n	meanCL
Middle Pleistocene	Eurotestudo	4	195.5250
Middle Pleistocene	Geochelone	1	170.0000
Middle Pleistocene	Gopherus	33	307.0721
Middle Pleistocene	Hesperotestudo	5	882.0000
Middle Pleistocene	Testudo	5	198.7400
Lower Pleistocene	Centrochelys	4	762.5000
Lower Pleistocene	Cheirogaster	2	857.0000
Lower Pleistocene	Chelonoidis	3	716.6667
Lower Pleistocene	Eurotestudo	4	201.5250
Lower Pleistocene	gen.	1	900.0000
Lower Pleistocene	Geochelone	1	340.0000
Lower Pleistocene	Gopherus	13	316.8077
Lower Pleistocene	Hesperotestudo	16	323.0562
Lower Pleistocene	Megalochelys	5	1041.8800
Lower Pleistocene	Psammobates	1	107.8000
Lower Pleistocene	Testudo	6	259.1667
Lower Pleistocene	Titanochelon	1	1300.0000
Gelasian	Centrochelys	1	2050.0000
Gelasian	Eurotestudo	1	150.0000
Gelasian	Gopherus	15	185.7467
Gelasian	Hesperotestudo	2	1000.0000
Gelasian	Manouria	1	900.0000
Gelasian	Megalochelys	3	1683.3333
Gelasian	Testudo	6	166.0000
Gelasian	Titanochelon	2	1640.0000
Piacencian	Aldabrachelys	3	1333.3333
Piacencian	Centrochelys	1	610.0000
Piacencian	Chelonoidis	4	442.7500
Piacencian	Gopherus	1	885.5000

Table S15 – *continued from previous page*

EpochBins	Genus	n	meanCL
Piacencian	Hesperotestudo	5	211.1600
Piacencian	Homopus	1	90.0000
Piacencian	Megalochelys	2	1600.0000
Piacencian	Testudo	3	230.0000
Piacencian	Titanochelon	1	520.0000
Zanclean	Caudochelys	2	805.5000
Zanclean	Centrochelys	3	913.3333
Zanclean	Cheirogaster	1	739.0000
Zanclean	Ergilemys	2	209.0000
Zanclean	Geochelone	6	741.0000
Zanclean	Hesperotestudo	1	195.8000
Zanclean	Testudo	5	1377.0000
Zanclean	Titanochelon	6	1300.0000
Messinian	Hesperotestudo	2	941.0000
Messinian	Megalochelys	2	1950.0000
Messinian	Testudo	4	176.7500
Messinian	Titanochelon	2	1500.0000
Tortonian	“Hadrianus”	1	1000.0000
Tortonian	Cheirogaster	3	1288.3333
Tortonian	gen.	3	660.0000
Tortonian	Geochelone	3	741.3333
Tortonian	Gopherus	6	354.0000
Tortonian	Hesperotestudo	4	439.9750
Tortonian	Paleotestudo	3	233.6667
Tortonian	Testudo	20	218.3050
Tortonian	Titanochelon	2	1400.0000
Serravallian	Cheirogaster	2	1250.0000
Serravallian	gen.	1	270.0000
Serravallian	Gopherus	1	500.0000

Table S15 – *continued from previous page*

EpochBins	Genus	n	meanCL
Serravallian	Paleotestudo	19	206.5789
Serravallian	Testudo	3	190.2333
Serravallian	Titanochelon	1	1353.0000
Langhian	Caudochelys	1	339.9000
Langhian	Chelonoidis	3	553.3333
Langhian	Ergilemys	1	1000.0000
Langhian	gen.	1	1000.0000
Langhian	Paleotestudo	2	272.5000
Langhian	Testudo	2	337.5000
Langhian	Titanochelon	4	1312.5000
Burdigalian/Aquitanian	Caudochelys	1	334.0000
Burdigalian/Aquitanian	gen.	1	270.0000
Burdigalian/Aquitanian	Geochelone	4	652.5000
Burdigalian/Aquitanian	Impregnochelys	1	620.0000
Burdigalian/Aquitanian	Mesocherus	5	180.0000
Burdigalian/Aquitanian	Namibchersus	9	518.1111
Burdigalian/Aquitanian	Paleotestudo	2	146.1500
Burdigalian/Aquitanian	Testudo	6	252.1167
Burdigalian/Aquitanian	Titanochelon	1	1001.0000

Table S16: General overview over genera, with sample sizes and mean CL.

Genus	n	meanCL
“Hadrianus”	1	1000.0000
Aldabrachelys	15	1046.3333
Astrochelys	14	366.2143
Caudochelys	4	571.2250
Centrochelys	17	804.1176
Cheirogaster	8	1102.2500
Chelonoidis	67	571.0940

Table S16 – *continued from previous page*

Genus	n	meanCL
Chersina	15	176.2667
Cylindraspis	5	724.0000
Ergilemys	3	472.6667
Eurotestudo	10	192.5200
gen.	8	654.1250
Geochelone	25	510.2800
Gopherus	114	298.0361
Hesperotestudo	46	465.3296
Homopus	8	133.1250
Impregnochelys	1	620.0000
Indotestudo	17	244.5765
Kinixys	15	213.0667
Malacochersus	2	166.5000
Manouria	10	432.7000
Megalochelys	12	1446.6167
Mesocherus	5	180.0000
Namibchersus	9	518.1111
Paleotestudo	26	210.1269
Psammobates	18	113.1000
Pyxis	16	124.1875
Stigmochelys	6	405.3333
Testudo	99	269.2465
Titanochelon	20	1315.2000

Table S17: Data set, fossil.

Genus	Taxon	CL	estimated	EpochBins	Age	Island	Con
Astrochelys	Astrochelys radiata	395.00	m	Modern	0.000001	y	Africa
Kinixys	Kinixys belliana	162.00	m	Modern	0.000001	n	Africa
Psammobates	Psammobates geometricus	107.00	m	Modern	0.000001	n	Africa
Kinixys	Kinixys belliana	157.00	m	Modern	0.000001	n	Africa
Aldabrachelys	Aldabrachelys gigantea	870.00	m	Modern	0.000001	y	Africa
Kinixys	Kinixys belliana	174.00	m	Modern	0.000001	n	Africa
Stigmochelys	Stigmochelys pardalis	345.00	m	Modern	0.000001	n	Africa
Psammobates	Psammobates geometricus	92.00	m	Modern	0.000001	n	Africa
Chersina	Chersina angulata	179.30	m	Modern	0.000001	n	Africa
Chersina	Chersina angulata	170.00	m	Modern	0.000001	n	Africa
Testudo	Testudo kleinmanni	144.00	m	Modern	0.000001	n	Africa
Malacochersus	Malacochersus tornieri	153.00	m	Modern	0.000001	n	Africa
Psammobates	Psammobates oculifer	119.00	m	Modern	0.000001	n	Africa
Kinixys	Kinixys homeana	193.00	m	Modern	0.000001	n	Africa
Cylindraspis	Cylindraspis vosmaeri	500.00	m	Modern	0.000001	y	Africa
Homopus	Homopus aerolatus	88.00	m	Modern	0.000001	n	Africa
Stigmochelys	Stigmochelys pardalis	405.00	m	Modern	0.000001	n	Africa
Chersina	Chersina angulata	162.00	m	Modern	0.000001	n	Africa

Table S17 – *continued from previous page*

Genus	Taxon	CL	estimated	EpochBins	Age	Island	Con
Kinixys	Kinixys belliana	180.00	m	Modern	0.000001	n	Africa
Astrochelys	Astrochelys radiata	285.00	m	Modern	0.000001	y	Africa
Kinixys	Kinixys erosa	400.00	m	Modern	0.000001	n	Africa
Astrochelys	Astrochelys radiata	242.00	m	Modern	0.000001	y	Africa
Aldabrachelys	Aldabrachelys gigantea	810.00	m	Modern	0.000001	y	Africa
Pyxis	Pyxis planicauda	126.00	m	Modern	0.000001	y	Africa
Cylindraspis	Cylindraspis indica	600.00	m	Modern	0.000001	y	Africa
Psammobates	Psammobates tentorius	111.00	m	Modern	0.000001	n	Africa
Kinixys	Kinixys erosa	164.00	m	Modern	0.000001	n	Africa
Kinixys	Kinixys erosa	271.00	m	Modern	0.000001	n	Africa
Indotestudo	Indotestudo travancorica	224.00	m	Modern	0.000001	n	Africa
Psammobates	Psammobates oculifer	101.00	m	Modern	0.000001	n	Africa
Homopus	Homopus signatus	94.00	m	Modern	0.000001	n	Africa
Kinixys	Kinixys belliana	194.00	m	Modern	0.000001	n	Africa
Kinixys	Kinixys belliana	230.00	m	Modern	0.000001	n	Africa
Stigmochelys	Stigmochelys pardalis	720.00	m	Modern	0.000001	n	Africa
Kinixys	Kinixys homeana	223.00	m	Modern	0.000001	n	Africa
Kinixys	Kinixys lobatsiana	200.00	m	Modern	0.000001	n	Africa

Table S17 – *continued from previous page*

Genus	Taxon	CL	estimated	EpochBins	Age	Island	Con
Kinixys	Kinixys natalensis	160.00	m	Modern	0.000001	n	Africa
Chersina	Chersina angulata	202.00	m	Modern	0.000001	n	Africa
Chersina	Chersina angulata	351.00	m	Modern	0.000001	y	Africa
Homopus	Homopus femoralis	168.00	m	Modern	0.000001	n	Africa
Centrochelys	Centrochelys sulcata	215.00	m	Modern	0.000001	n	Africa
Astrochelys	Astrochelys yniphora	307.00	m	Modern	0.000001	y	Africa
Chersina	Chersina angulata	181.00	m	Modern	0.000001	n	Africa
Psammobates	Psammobates tentorius	145.00	m	Modern	0.000001	n	Africa
Stigmochelys	Stigmochelys pardalis	315.00	m	Modern	0.000001	n	Africa
Pyxis	Pyxis planicauda	160.00	m	Modern	0.000001	y	Africa
Psammobates	Psammobates antiquorum	107.80	m	Lower Pleistocene	1.800000	n	Africa
Stigmochelys	Stigmochelys pardalis	350.00	m	Modern	0.000001	n	Africa
Aldabrachelys	Aldabrachelys abrupta	1000.00	mo	Modern	0.002000	y	Africa
Chersina	Chersina angulata	181.90	m	Modern	0.000001	y	Africa
Psammobates	Psammobates tentorius	116.00	m	Modern	0.000001	y	Africa
Astrochelys	Astrochelys yniphora	415.00	m	Modern	0.000001	y	Africa
Aldabrachelys	Aldabrachelys gigantea	770.00	m	Modern	0.000001	y	Africa
Chersina	Chersina angulata	160.00	m	Modern	0.000001	n	Africa

Table S17 – *continued from previous page*

Genus	Taxon	CL	estimated	EpochBins	Age	Island	Con
Chersina	Chersina angulata	148.00	m	Modern	0.000001	n	Africa
Aldabrachelys	Aldabrachelys gigantea	720.00	m	Modern	0.000001	y	Africa
Astrochelys	Astrochelys yniphora	426.00	m	Modern	0.000001	y	Africa
Astrochelys	Astrochelys radiata	334.00	m	Modern	0.000001	y	Africa
Centrochelys	Centrochelys sulcata	830.00	m	Modern	0.000001	n	Africa
Pyxis	Pyxis arachnoides	144.00	m	Modern	0.000001	y	Africa
Pyxis	Pyxis arachnoides	86.00	m	Modern	0.000001	y	Africa
Pyxis	Pyxis arachnoides	154.00	m	Modern	0.000001	y	Africa
Pyxis	Pyxis arachnoides	110.00	m	Modern	0.000001	y	Africa
Namibchersus	Namibchersus namaquensis	254.00	m	Burdigalian/Aquitanian	18.000000	n	Africa
Pyxis	Pyxis planicauda	132.00	m	Modern	0.000001	y	Africa
Homopus	Homopus boulengeri	110.00	m	Modern	0.000001	n	Africa
Pyxis	Pyxis planicauda	134.00	m	Modern	0.000001	y	Africa
Pyxis	Pyxis planicauda	120.00	m	Modern	0.000001	y	Africa
Homopus	Homopus solus	109.00	m	Modern	0.000001	n	Africa
Centrochelys	Centrochelys sulcata	435.00	m	Modern	0.000001	n	Africa
Pyxis	Pyxis arachnoides	110.00	m	Modern	0.000001	y	Africa
Pyxis	Pyxis arachnoides	80.00	m	Modern	0.000001	y	Africa

Table S17 – *continued from previous page*

Genus	Taxon	CL	estimated	EpochBins	Age	Island	Con
Astrochelys	Astrochelys radiata	305.00	m	Modern	0.000001	y	Africa
Stigmochelys	Stigmochelys pardalis	297.00	m	Modern	0.000001	n	Africa
Namibchersus	Namibchersus aff. namaquensis	1100.00	mo	Burdigalian/Aquitanian	17.250000	n	Africa
Aldabrachelys	Aldabrachelys gigantea	875.00	m	Modern	0.000001	y	Africa
Namibchersus	Namibchersus aff. namaquensis	550.00	mo	Burdigalian/Aquitanian	17.250000	n	Africa
Chersina	Chersina angulata	166.40	m	Modern	0.000001	n	Africa
Chersina	Chersina angulata	171.60	m	Modern	0.000001	y	Africa
Chersina	Chersina angulata	136.00	m	Modern	0.000001	n	Africa
Geochelone	Geochelone stromeri	425.00	m	Zanclean	4.466000	n	Africa
Testudo	Testudo sp.	184.00	mf	Gelasian	2.500000	n	Africa
Geochelone	Geochelone stromeri	350.00	m	Zanclean	4.466000	n	Africa
Namibchersus	Namibchersus namaquensis	264.00	m	Burdigalian/Aquitanian	19.500000	n	Africa
Pyxis	Pyxis arachnoides	150.00	m	Modern	0.000001	y	Africa
Psammobates	Psammobates oculifer	103.00	m	Modern	0.000001	n	Africa
Psammobates	Psammobates oculifer	105.00	m	Modern	0.000001	n	Africa
Psammobates	Psammobates geometricus	118.00	m	Modern	0.000001	n	Africa
Psammobates	Psammobates geometricus	105.00	m	Modern	0.000001	n	Africa
Testudo	Testudo oughlamensis	120.00	mo	Gelasian	2.500000	n	Africa

Table S17 – *continued from previous page*

Genus	Taxon	CL	estimated	EpochBins	Age	Island	Con
Astrochelys	Astrochelys radiata	355.00	m	Modern	0.000001	y	Africa
Aldabrachelys	Aldabrachelys gigantea	800.00	m	Modern	0.000001	y	Africa
Namibchersus	Namibchersus aff. namaquensis	440.00	mo	Burdigalian/Aquitanian	17.250000	n	Africa
Chersina	Chersina angulata	153.50	m	Modern	0.000001	n	Africa
Cylindraspis	Cylindraspis triserrata	1100.00	m	Modern	0.000001	y	Africa
Astrochelys	Astrochelys yniphora	486.00	m	Modern	0.000001	y	Africa
Chersina	Chersina angulata	161.30	m	Modern	0.000001	y	Africa
Aldabrachelys	“Aldabrachelys” laetoliensis	1000.00	mo	Piacencian	2.703000	n	Africa
Geochelone	Geochelone sp.	1446.00	eh	Tortonian	8.476000	n	Africa
Kinixys	Kinixys sp.	268.00	ef	Modern	0.009500	n	Africa
Aldabrachelys	Aldabrachelys grandidieri	1240.00	m	Modern	0.001500	y	Africa
Testudo	Testudo aff. kenitrensis	142.00	mf	Gelasian	2.500000	n	Africa
Testudo	Testudo sp.	200.00	mf	Gelasian	2.500000	n	Africa
Aldabrachelys	Aldabrachelys gigantea	1190.00	m	Modern	0.000001	y	Africa
Psammobates	Psammobates tentorius	95.00	m	Modern	0.000001	n	Africa
Psammobates	Psammobates tentorius	81.00	m	Modern	0.000001	n	Africa
Pyxis	Pyxis planicauda	114.00	m	Modern	0.000001	y	Africa
Mesocherus	Mesocherus orangeus	160.00	mo	Burdigalian/Aquitanian	17.250000	n	Africa

Table S17 – *continued from previous page*

Genus	Taxon	CL	estimated	EpochBins	Age	Island	Con
Pyxis	Pyxis planicauda	148.00	m	Modern	0.000001	y	Africa
Psammobates	Psammobates oculifer	111.00	m	Modern	0.000001	n	Africa
Geochelone	Geochelone crassa	865.00	mf	Zanclean	4.145000	n	Africa
Pyxis	Pyxis arachnoides	111.00	m	Modern	0.000001	y	Africa
Impregnochelys	Impregnochelys pachytectis	620.00	m	Burdigalian/Aquitanian	19.500000	n	Africa
Mesocherus	Mesocherus orangeus	200.00	mo	Burdigalian/Aquitanian	17.250000	n	Africa
Namibchersus	Namibchersus namaquensis	815.00	m	Burdigalian/Aquitanian	18.000000	n	Africa
Chersina	Chersina angulata	120.00	m	Modern	0.000001	n	Africa
Namibchersus	Namibchersus namaquensis	300.00	m	Burdigalian/Aquitanian	19.500000	n	Africa
Aldabrachelys	Aldabrachelys gigantea	1140.00	m	Modern	0.000001	y	Africa
Astrochelys	Astrochelys radiata	400.00	m	Modern	0.000001	y	Africa
Aldabrachelys	Aldabrachelys grandidieri	1250.00	mo	Modern	0.001500	y	Africa
Astrochelys	Astrochelys yniphora	446.00	m	Modern	0.000001	y	Africa
Cylindraspis	Cylindraspis peltastes	420.00	m	Modern	0.000001	y	Africa
Psammobates	Psammobates geometricus	165.00	m	Modern	0.000001	n	Africa
Mesocherus	Mesocherus orangeus	180.00	mo	Burdigalian/Aquitanian	17.250000	n	Africa
Psammobates	Psammobates oculifer	147.00	m	Modern	0.000001	n	Africa
Cylindraspis	Cylindraspis inepta	1000.00	m	Modern	0.000001	y	Africa

Table S17 – *continued from previous page*

Genus	Taxon	CL	estimated	EpochBins	Age	Island	Con
Centrochelys	Centrochelys atlantica	400.00	mo	Lower Pleistocene	1.300000	y	Africa
Aldabrachelys	Aldabrachelys gigantea	1030.00	m	Modern	0.000001	y	Africa
Homopus	Homopus aerolatus	300.00	m	Modern	0.000001	n	Africa
Psammobates	Psammobates oculifer	107.00	m	Modern	0.000001	n	Africa
Namibchersus	Namibchersus namaquensis	470.00	m	Burdigalian/Aquitanian	18.000000	n	Africa
Astrochelys	Astrochelys yniphora	370.00	m	Modern	0.000001	y	Africa
Centrochelys	Centrochelys marocana	2050.00	mo	Gelasian	2.500000	n	Africa
Kinixys	Kinixys spekii	220.00	m	Modern	0.000001	n	Africa
Homopus	Homopus fenestratus	90.00	mo	Piacencian	3.056500	n	Africa
Malacochersus	Malacochersus tornieri	180.00	m	Modern	0.000001	n	Africa
Homopus	Homopus signatus	106.00	m	Modern	0.000001	n	Africa
Mesocherus	Mesocherus orangeus	180.00	mo	Burdigalian/Aquitanian	17.250000	n	Africa
Testudo	Testudo kenitrensis	132.00	mo	Middle Pleistocene	0.453500	n	Africa
Mesocherus	Mesocherus orangeus	180.00	mo	Burdigalian/Aquitanian	17.250000	n	Africa
Astrochelys	Astrochelys yniphora	361.00	m	Modern	0.000001	y	Africa
Namibchersus	Namibchersus namaquensis	470.00	m	Burdigalian/Aquitanian	18.000000	n	Africa
Geochelone	Geochelone elegans	208.00	m	Modern	0.000001	n	Asia
Geochelone	Geochelone elegans	245.00	m	Modern	0.000001	n	Asia

Table S17 – *continued from previous page*

Genus	Taxon	CL	estimated	EpochBins	Age	Island	Con
Geochelone	Geochelone elegans	221.00	m	Modern	0.000001	n	Asia
Geochelone	Geochelone elegans	220.00	m	Modern	0.000001	y	Asia
Geochelone	Geochelone elegans	221.00	m	Modern	0.000001	n	Asia
Geochelone	Geochelone platynota	222.00	m	Modern	0.000001	n	Asia
Indotestudo	Indotestudo forstenii	202.00	m	Modern	0.000001	y	Asia
Megalochelys	Megalochelys sondaari	1000.00	ec	Lower Pleistocene	1.350000	y	Asia
Indotestudo	Indotestudo forstenii	309.00	m	Modern	0.000001	y	Asia
Megalochelys	Megalochelys atlas	1650.00	mo	Gelasian	2.000000	y	Asia
Indotestudo	Indotestudo forstenii	199.00	m	Modern	0.000001	y	Asia
Indotestudo	Indotestudo elongata	244.20	m	Modern	0.000001	n	Asia
Indotestudo	Indotestudo travancorica	244.20	m	Modern	0.000001	n	Asia
Testudo	Testudo graeca	300.00	m	Modern	0.000001	n	Asia
Manouria	Manouria impressa	165.00	m	Modern	0.000001	n	Asia
Indotestudo	Indotestudo elongata	276.00	m	Modern	0.000001	n	Asia
Indotestudo	Indotestudo elongata	235.00	m	Modern	0.000001	n	Asia
Indotestudo	Indotestudo elongata	208.00	m	Modern	0.000001	n	Asia
Indotestudo	Indotestudo elongata	166.00	m	Modern	0.000001	n	Asia
Manouria	Manouria impressa	350.00	m	Modern	0.000001	n	Asia

Table S17 – *continued from previous page*

Genus	Taxon	CL	estimated	EpochBins	Age	Island	Con
Testudo	Testudo graeca	250.00	m	Modern	0.000001	n	Asia
Testudo	Testudo graeca	280.00	m	Modern	0.000001	y	Asia
Manouria	Manouria emys	212.00	m	Modern	0.000001	n	Asia
Manouria	Manouria emys	445.00	m	Modern	0.000001	n	Asia
Manouria	Manouria emys	330.00	m	Modern	0.000001	n	Asia
Megalochelys	Megalochelys atlas	2000.00	mo	Gelasian	2.190500	n	Asia
Testudo	Testudo changshanesis	330.00	mo	Lower Pleistocene	1.684500	n	Asia
Indotestudo	Indotestudo forstenii	200.50	m	Modern	0.000001	y	Asia
Testudo	Testudo horsfieldii	280.00	m	Modern	0.000001	n	Asia
Megalochelys	Megalochelys sondaari	818.00	ec	Lower Pleistocene	1.350000	y	Asia
Indotestudo	Indotestudo travancorica	249.70	m	Modern	0.000001	n	Asia
Manouria	Manouria punjabiensis	900.00	mo	Gelasian	2.190500	n	Asia
Megalochelys	Megalochelys sp.	1200.00	ev	Lower Pleistocene	0.900000	y	Asia
Indotestudo	Indotestudo elongata	270.00	m	Upper Pleistocene	0.037000	n	Asia
Ergilemys	Ergilemys oskarkuhni	220.00	m	Zanclean	3.950000	n	Asia
Megalochelys	Megalochelys atlas	1600.00	mo	Piacencian	3.094000	n	Asia
Geochelone	Geochelone platynota	300.00	m	Modern	0.000001	n	Asia
Aldabrachelys	Aldabrachelys ? sp.	1500.00	mo	Piacencian	3.000000	n	Asia

Table S17 – *continued from previous page*

Genus	Taxon	CL	estimated	EpochBins	Age	Island	Con
Indotestudo	Indotestudo travancorica	219.60	m	Modern	0.000001	n	Asia
Megalochelys	Megalochelys sp.	191.40	m	Lower Pleistocene	1.684500	y	Asia
Manouria	Manouria oyamai	450.00	mo	Modern	0.011000	y	Asia
Indotestudo	Indotestudo elongata	219.60	m	Modern	0.000001	n	Asia
Megalochelys	Megalochelys atlas	1800.00	m	Messinian	5.423000	n	Asia
Testudo	Testudo transcaucasia	150.00	mo	Gelasian	2.190500	n	Asia
Megalochelys	Megalochelys atlas	1600.00	mo	Piacencian	3.094000	n	Asia
Manouria	Manouria emys	600.00	m	Modern	0.000001	n	Asia
Indotestudo	Indotestudo travancorica	331.00	m	Modern	0.000001	n	Asia
Geochelone	Geochelone sp.	800.00	ev	Burdigalian/Aquitanian	16.500000	n	Asia
Manouria	Manouria impressa	275.00	m	Modern	0.000001	n	Asia
Indotestudo	Indotestudo elongata	360.00	m	Modern	0.000001	n	Asia
Manouria	Manouria emys	600.00	m	Modern	0.000001	n	Asia
Ergilemys	Ergilemys oskarkuhni	198.00	m	Zanclean	3.950000	n	Asia
Megalochelys	Megalochelys sp.	2000.00	m	Lower Pleistocene	1.684500	y	Asia
Megalochelys	Megalochelys atlas	1400.00	mo	Gelasian	2.000000	y	Asia
Geochelone	Geochelone elegans	380.00	m	Modern	0.000001	n	Asia
gen.	gen. indet.	900.00	mo	Lower Pleistocene	1.684500	n	Asia

Table S17 – *continued from previous page*

Genus	Taxon	CL	estimated	EpochBins	Age	Island	Con
Testudo	Testudo ranovi	200.00	mo	Gelasian	2.190500	n	Asia
Aldabrachelys	Aldabrachelys ? sp.	1500.00	mo	Piacencian	3.000000	n	Asia
Megalochelys	Megalochelys atlas	2100.00	mo	Messinian	5.423000	n	Asia
Chelonoidis	Chelonoidis sp.	550.00	m	Modern	0.001000	y	America
Gopherus	Gopherus morafkai	299.00	m	Modern	0.000001	n	America
Hesperotestudo	Hesperotestudo bermudae	500.00	m	Middle Pleistocene	0.310000	y	America
Chelonoidis	Chelonoidis monensis	500.00	m	Upper Pleistocene	0.064500	y	America
Chelonoidis	Chelonoidis alburyorum	453.00	m	Piacencian	3.201500	y	America
Chelonoidis	Chelonoidis marcanoi	614.00	eh	Upper Pleistocene	0.069000	y	America
Chelonoidis	Chelonoidis marcanoi	767.00	eh	Upper Pleistocene	0.069000	y	America
Gopherus	Gopherus flavomarginatus	450.00	m	Lower Pleistocene	1.050000	n	America
Chelonoidis	Chelonoidis alburyorum	428.00	m	Piacencian	3.201500	y	America
Chelonoidis	Chelonoidis marcanoi	778.00	eh	Upper Pleistocene	0.069000	y	America
Chelonoidis	Chelonoidis sombrerensis	990.00	m	Upper Pleistocene	0.069000	y	America
Geochelone	Geochelone sp.	340.00	mo	Lower Pleistocene	1.050000	n	America
Hesperotestudo	Hesperotestudo sp.	1500.00	mo	Lower Pleistocene	0.966000	n	America
Gopherus	Gopherus flavomarginatus	400.00	m	Modern	0.000001	n	America
Chelonoidis	Chelonoidis alburyorum	466.00	m	Piacencian	3.201500	y	America

Table S17 – *continued from previous page*

Genus	Taxon	CL	estimated	EpochBins	Age	Island	Con
Chelonoidis	Chelonoidis sp.	600.00	mo	Upper Pleistocene	0.069000	y	America
Chelonoidis	Chelonoidis sp.	400.00	mo	Upper Pleistocene	0.069000	y	America
Gopherus	Gopherus berlandieri	195.00	m	Lower Pleistocene	1.050000	n	America
Chelonoidis	Chelonoidis sp.	440.00	mo	Modern	0.001000	y	America
Chelonoidis	Chelonoidis marcanoi	530.00	eh	Upper Pleistocene	0.069000	y	America
Chelonoidis	Chelonoidis cubensis	1139.00	ef	Middle Pleistocene	0.393500	y	America
Chelonoidis	Chelonoidis sp.	800.00	mo	Lower Pleistocene	1.357000	y	America
Gopherus	Gopherus berlandieri	240.00	m	Modern	0.000001	n	America
Chelonoidis	Chelonoidis sp.	660.00	mo	Modern	0.001000	y	America
Chelonoidis	Chelonoidis sp.	512.00	mo	Modern	0.001000	y	America
Chelonoidis	Chelonoidis sp.	854.00	mo	Modern	0.001000	y	America
Chelonoidis	Chelonoidis sp.	750.00	mo	Lower Pleistocene	1.357000	y	America
Chelonoidis	Chelonoidis alburyorum	424.00	m	Piacencian	3.201500	y	America
Chelonoidis	Chelonoidis sp.	550.00	mo	Modern	0.001000	y	America
Gopherus	Gopherus donlaloi	580.00	mo	Modern	0.000175	n	America
Hesperotestudo	Hesperotestudo bermudae	270.00	m	Middle Pleistocene	0.310000	y	America
Gopherus	Gopherus berlandieri	256.30	m	Lower Pleistocene	1.050000	n	America
Chelonoidis	Chelonoidis sp.	600.00	mo	Lower Pleistocene	1.357000	y	America

Table S17 – *continued from previous page*

Genus	Taxon	CL	estimated	EpochBins	Age	Island	Con
Ergilemys	Ergilemys sp.	1000.00	m	Langhian	14.000000	n	Europe
Testudo	Testudo graeca	195.00	mf	Lower Pleistocene	1.770000	n	Europe
Eurotestudo	Eurotestudo aff. hermanni	194.70	mf	Middle Pleistocene	0.740000	n	Europe
Centrochelys	Centrochelys burchardi	940.00	mo	Middle Pleistocene	0.435000	y	Europe
Titanochelon	Titanochelon bacharidisi	1164.00	m	Zanclean	3.950000	n	Europe
Paleotestudo	Paleotestudo antiqua	159.50	m	Serravallian	13.000000	n	Europe
Testudo	Testudo horsfieldii	111.00	m	Modern	0.000001	n	Europe
Testudo	Testudo marginata	210.00	m	Lower Pleistocene	1.720000	n	Europe
Testudo	Testudo graeca	178.20	m	Modern	0.000001	n	Europe
Testudo	Testudo graeca	200.00	mf	Messinian	5.500000	n	Europe
Testudo	Testudo lunellensis	260.70	mf	Middle Pleistocene	0.450000	n	Europe
Testudo	Testudo sp.	500.00	mo	Zanclean	3.900000	n	Europe
Testudo	Testudo sp.	200.00	mf	Messinian	6.165000	n	Europe
Testudo	Testudo hermanni	143.50	m	Modern	0.000001	y	Europe
Pyxis	Pyxis arachnoides	108.00	m	Modern	0.000001	n	Europe
Eurotestudo	Eurotestudo hermanni	237.60	mf	Middle Pleistocene	0.600000	n	Europe
Testudo	Testudo marginata	246.00	m	Modern	0.000001	n	Europe
Paleotestudo	Paleotestudo sp.	179.30	m	Burdigalian/Aquitanian	16.550000	n	Europe

Table S17 – *continued from previous page*

Genus	Taxon	CL	estimated	EpochBins	Age	Island	Con
Centrochelys	Centrochelys burchardi	500.00	mo	Middle Pleistocene	0.435000	y	Europe
Testudo	Testudo graeca	167.00	m	Messinian	5.500000	n	Europe
Testudo	Testudo marginata	290.00	m	Modern	0.000001	n	Europe
Paleotestudo	Paleotestudo antiqua	191.00	mf	Serravallian	13.600000	n	Europe
Testudo	Testudo hermanni	130.00	m	Modern	0.000001	n	Europe
Testudo	Testudo hermanni	138.50	m	Modern	0.000001	n	Europe
Testudo	Testudo kalksburgensis	230.00	m	Burdigalian/Aquitanian	19.965000	n	Europe
Testudo	Testudo marginata	250.00	m	Modern	0.000001	y	Europe
Testudo	Testudo marginata	242.50	m	Modern	0.000001	y	Europe
Cheirogaster	Cheirogaster sp.	925.00	ef	Lower Pleistocene	0.965000	y	Europe
Testudo	Testudo marginata	246.00	m	Modern	0.000001	n	Europe
Testudo	Testudo horsfieldii	123.00	m	Modern	0.000001	n	Europe
Testudo	Testudo marginata	246.70	m	Modern	0.000001	n	Europe
Testudo	Testudo marginata	241.70	m	Modern	0.000001	n	Europe
Testudo	Testudo hermanni	195.00	m	Modern	0.000001	y	Europe
Testudo	Testudo hermanni	250.00	m	Modern	0.000001	n	Europe
Paleotestudo	Paleotestudo antiqua	203.00	m	Serravallian	12.150000	n	Europe
Testudo	Testudo horsfieldii	114.00	m	Modern	0.000001	n	Europe

Table S17 – *continued from previous page*

Genus	Taxon	CL	estimated	EpochBins	Age	Island	Con
Testudo	Testudo horsfieldii	132.00	m	Modern	0.000001	n	Europe
Centrochelys	Centrochelys robusta	1200.00	ev	Lower Pleistocene	1.300000	y	Europe
Testudo	Testudo hermanni	183.30	m	Modern	0.000001	y	Europe
Testudo	Testudo hermanni	196.00	m	Modern	0.000001	n	Europe
Testudo	Testudo hermanni	176.90	m	Modern	0.000001	n	Europe
Titanochelon	Titanochelon bacharidisi	900.00	mo	Zanclean	3.950000	n	Europe
gen.	gen. indet.	1000.00	mo	Langhian	14.700000	n	Europe
gen.	gen. indet.	270.00	mo	Serravallian	12.200000	n	Europe
Paleotestudo	Paleotestudo cf. antiqua	113.00	mf	Burdigalian/Aquitanian	17.300000	n	Europe
Testudo	Testudo graeca	194.60	m	Modern	0.000001	n	Europe
Testudo	Testudo lunellensis	231.00	ev	Middle Pleistocene	0.453500	n	Europe
Testudo	Testudo lunellensis	176.00	mo	Middle Pleistocene	0.453500	n	Europe
Testudo	Testudo hermanni	168.30	m	Modern	0.000001	y	Europe
Testudo	Testudo sp.	2500.00	mf	Zanclean	3.900000	n	Europe
Testudo	Testudo burgenlandica	275.00	m	Tortonian	8.750000	n	Europe
Testudo	Testudo kalksburgensis	275.00	m	Langhian	14.500000	n	Europe
Titanochelon	Titanochelon bolivari	1150.00	m	Messinian	6.289000	n	Europe
Paleotestudo	Paleotestudo cf. sp.	270.00	mo	Langhian	14.700000	n	Europe

Table S17 – *continued from previous page*

Genus	Taxon	CL	estimated	EpochBins	Age	Island	Con
gen.	gen. indet.	880.00	m	Tortonian	8.750000	n	Europe
Eurotestudo	Eurotestudo globosa	263.00	m	Lower Pleistocene	1.800000	n	Europe
Paleotestudo	Paleotestudo antiqua	195.00	mf	Serravallian	13.000000	n	Europe
Testudo	Testudo sp.	1200.00	mf	Zanclean	3.960000	n	Europe
Centrochelys	Centrochelys burchardi	650.00	mo	Middle Pleistocene	0.435000	y	Europe
Centrochelys	Centrochelys robusta	850.00	ev	Lower Pleistocene	1.300000	y	Europe
Testudo	Testudo catalaunica	232.00	m	Serravallian	12.350000	n	Europe
Geochelone	Geochelone sp.	1000.00	m	Burdigalian/Aquitanian	16.650000	n	Europe
Geochelone	Geochelone s. l.	1750.00	mo	Zanclean	4.466000	n	Europe
Eurotestudo	Eurotestudo hermanni	170.50	mf	Middle Pleistocene	0.600000	n	Europe
Testudo	Testudo hermanni	160.00	m	Modern	0.000001	y	Europe
Testudo	Testudo hermanni	157.00	m	Modern	0.000001	y	Europe
gen.	gen. indet.	270.00	mo	Burdigalian/Aquitanian	16.400000	n	Europe
Testudo	Testudo hermanni	161.00	m	Modern	0.000001	n	Europe
Testudo	Testudo marginata	242.50	m	Modern	0.000001	y	Europe
Centrochelys	Centrochelys robusta	1100.00	mo	Zanclean	4.917000	y	Europe
Testudo	Testudo rectogularis	213.00	mo	Burdigalian/Aquitanian	16.370000	n	Europe
Testudo	Testudo kalksburgensis	225.00	mo	Burdigalian/Aquitanian	18.000000	n	Europe

Table S17 – *continued from previous page*

Genus	Taxon	CL	estimated	EpochBins	Age	Island	Con
Testudo	Testudo marginata	400.00	m	Modern	0.000001	n	Europe
Testudo	Testudo brevitesta	300.00	mf	Piacencian	2.600000	n	Europe
Testudo	Testudo sp.	232.10	m	Tortonian	10.750000	n	Europe
Testudo	Testudo horsfieldii	136.00	m	Modern	0.000001	n	Europe
Titanochelon	Titanochelon cf. bolivari	1300.00	ev	Langhian	14.895000	n	Europe
Testudo	Testudo marginata	290.00	m	Lower Pleistocene	1.300000	y	Europe
Testudo	Testudo hermanni	147.00	m	Modern	0.000001	n	Europe
Eurotestudo	Eurotestudo hermanni	187.00	mf	Upper Pleistocene	0.110500	n	Europe
Eurotestudo	Eurotestudo aff. hermanni	179.30	mf	Middle Pleistocene	0.740000	n	Europe
Titanochelon	Titanochelon cf. perpiniana	1001.00	mo	Burdigalian/Aquitanian	16.370000	n	Europe
Testudo	Testudo sp.	245.00	m	Tortonian	8.300000	n	Europe
Testudo	Testudo amiatae	140.00	mo	Messinian	5.815000	n	Europe
Cheirogaster	Cheirogaster cf. gymnesica	789.00	mo	Lower Pleistocene	1.800000	y	Europe
Eurotestudo	Eurotestudo hermanni	126.00	mf	Lower Pleistocene	1.150000	n	Europe
Paleotestudo	Paleotestudo antiqua	283.80	mf	Serravallian	12.500000	n	Europe
Cheirogaster	Cheirogaster sp.	1000.00	mo	Serravallian	12.200000	n	Europe
Paleotestudo	Paleotestudo cf. sp.	270.00	mo	Serravallian	12.400000	n	Europe
Paleotestudo	Paleotestudo antiqua	240.00	mf	Serravallian	13.600000	n	Europe

Table S17 – *continued from previous page*

Genus	Taxon	CL	estimated	EpochBins	Age	Island	Con
Paleotestudo	Paleotestudo antiqua	195.00	m	Serravallian	13.000000	n	Europe
Titanochelon	Titanochelon bolivari	1353.00	mo	Serravallian	12.500000	n	Europe
Testudo	Testudo hermanni	154.00	m	Modern	0.000001	n	Europe
Centrochelys	Centrochelys robusta	600.00	ev	Lower Pleistocene	1.300000	y	Europe
Paleotestudo	Paleotestudo antiqua	185.00	mf	Serravallian	13.000000	n	Europe
Titanochelon	Titanochelon schafferi	2500.00	mo	Zanclean	4.466000	n	Europe
Testudo	Testudo promarginata	310.00	mf	Burdigalian/Aquitanian	18.000000	n	Europe
Paleotestudo	Paleotestudo antiqua	206.00	mf	Serravallian	13.000000	n	Europe
Testudo	Testudo steinheimensis	227.70	mf	Serravallian	13.000000	n	Europe
Paleotestudo	Paleotestudo antiqua	234.00	mf	Serravallian	13.600000	n	Europe
Centrochelys	Centrochelys robusta	850.00	mo	Upper Pleistocene	0.066000	y	Europe
Testudo	Testudo promarginata	230.00	mf	Burdigalian/Aquitanian	21.500000	n	Europe
Titanochelon	Titanochelon sp.	1420.00	mo	Gelasian	1.850000	n	Europe
Paleotestudo	Paleotestudo antiqua	240.00	m	Serravallian	13.000000	n	Europe
Titanochelon	Titanochelon aff. schafferi	1860.00	m	Gelasian	2.000000	y	Europe
Testudo	Testudo hermanni	200.00	m	Modern	0.000001	y	Europe
Testudo	Testudo steinheimensis	111.00	m	Serravallian	12.150000	n	Europe
Titanochelon	Titanochelon perpiniana	1140.00	m	Zanclean	3.900000	n	Europe

Table S17 – *continued from previous page*

Genus	Taxon	CL	estimated	EpochBins	Age	Island	Con
Testudo	Testudo cf. graeca	185.00	m	Zanclean	3.900000	n	Europe
Paleotestudo	Paleotestudo antiqua	145.00	mf	Serravallian	13.000000	n	Europe
Cheirogaster	Cheirogaster sp.	1170.00	m	Tortonian	10.250000	n	Europe
Testudo	Testudo cf. promarginata	250.00	m	Tortonian	8.300000	n	Europe
Titanochelon	Titanochelon bolivari	1100.00	mo	Langhian	15.000000	n	Europe
Centrochelys	Centrochelys robusta	790.00	ef	Zanclean	4.917000	y	Europe
Titanochelon	Titanochelon cf. bolivari	1600.00	ef	Langhian	14.895000	n	Europe
Eurotestudo	Testudo hermanni	133.10	mf	Lower Pleistocene	1.220000	n	Europe
Testudo	Testudo hermanni	176.60	m	Modern	0.000001	y	Europe
Testudo	Testudo s. s.	189.00	m	Tortonian	8.000000	n	Europe
Centrochelys	Centrochelys robusta	850.00	mo	Zanclean	4.917000	y	Europe
Testudo	Testudo lunellensis	194.00	mf	Middle Pleistocene	0.450000	n	Europe
Testudo	Testudo hermanni	173.00	m	Modern	0.000001	y	Europe
Paleotestudo	Paleotestudo antiqua	229.00	mf	Serravallian	13.000000	n	Europe
Cheirogaster	Cheirogaster sp.	1500.00	e	Serravallian	13.800000	n	Europe
Testudo	Testudo catalaunica	181.00	m	Tortonian	11.500000	n	Europe
gen.	gen. indet.	813.00	ef	Upper Pleistocene	0.012500	y	Europe
Titanochelon	Titanochelon cf. bolivari	1500.00	mf	Tortonian	9.433000	n	Europe

Table S17 – *continued from previous page*

Genus	Taxon	CL	estimated	EpochBins	Age	Island	Con
Testudo	Testudo sp.	245.00	m	Tortonian	8.300000	n	Europe
Paleotestudo	Paleotestudo antiqua	213.00	mf	Serravallian	13.600000	n	Europe
Testudo	Testudo sp.	2500.00	mf	Zanclean	3.900000	n	Europe
Paleotestudo	Paleotestudo antiqua	180.00	m	Serravallian	13.000000	n	Europe
Paleotestudo	Paleotestudo sp.	270.00	mf	Tortonian	9.500000	n	Europe
Testudo	Testudo hermanni	220.00	mf	Lower Pleistocene	1.300000	n	Europe
Paleotestudo	Paleotestudo sp.	170.00	mf	Tortonian	9.500000	n	Europe
Paleotestudo	Paleotestudo antiqua	183.70	m	Serravallian	12.150000	n	Europe
Testudo	Testudo sp.	245.00	m	Tortonian	8.300000	n	Europe
Eurotestudo	Eurotestudo cf. hermanni	150.00	mo	Gelasian	2.000000	y	Europe
Cheirogaster	Cheirogaster gymnesica	739.00	ef	Zanclean	4.450000	y	Europe
Titanochelon	Titanochelon bolivari	1300.00	mf	Tortonian	9.500000	n	Europe
Testudo	Testudo graeca	210.00	mf	Tortonian	8.450000	n	Europe
Cheirogaster	Cheirogaster richardi	1155.00	mo	Tortonian	10.400000	n	Europe
Paleotestudo	Paleotestudo antiqua	275.00	mf	Langhian	15.000000	n	Europe
Testudo	Testudo cf. promarginata	250.00	m	Tortonian	8.300000	n	Europe
Titanochelon	Titanochelon bacharidisi	900.00	mo	Zanclean	3.950000	n	Europe
Titanochelon	Titanochelon bacharidisi	1196.00	m	Zanclean	3.950000	n	Europe

Table S17 – *continued from previous page*

Genus	Taxon	CL	estimated	EpochBins	Age	Island	Con
Paleotestudo	Paleotestudo antiqua	152.00	m	Serravallian	13.000000	n	Europe
Cheirogaster	Cheirogaster sp.	1540.00	ef	Tortonian	8.300000	n	Europe
Testudo	Testudo sp.	245.00	m	Tortonian	8.300000	n	Europe
Paleotestudo	Paleotestudo antiqua	220.00	mf	Serravallian	13.000000	n	Europe
gen.	gen. indet.	660.00	m	Tortonian	8.750000	n	Europe
Testudo	Testudo pecorinii	225.00	m	Piacencian	3.094000	y	Europe
Testudo	Testudo catalaunica	107.00	m	Tortonian	11.500000	n	Europe
Titanochelon	Titanochelon schafferi	1850.00	m	Messinian	6.250000	y	Europe
Testudo	Testudo catalaunica	175.00	m	Tortonian	11.500000	n	Europe
Titanochelon	Titanochelon sp.	520.00	mo	Piacencian	2.600000	y	Europe
Testudo	Testudo promarginata	304.70	mf	Burdigalian/Aquitanian	21.500000	n	Europe
Titanochelon	Titanochelon gymnesica	1300.00	ef	Lower Pleistocene	1.300000	y	Europe
Testudo	Testudo burgenlandica	112.00	m	Tortonian	8.750000	n	Europe
Centrochelys	Centrochelys vulcanica	610.00	mo	Piacencian	3.094000	y	Europe
Testudo	Testudo brevitesta	165.00	mf	Piacencian	2.600000	n	Europe
Testudo	Testudo sp.	245.00	m	Tortonian	8.300000	n	Europe
gen.	gen. indet.	440.00	m	Tortonian	8.750000	n	Europe
Testudo	Testudo sp.	245.00	m	Tortonian	8.300000	n	Europe

Table S17 – *continued from previous page*

Genus	Taxon	CL	estimated	EpochBins	Age	Island	Con
Eurotestudo	Eurotestudo hermanni	284.00	mf	Lower Pleistocene	1.350000	n	Europe
Testudo	Testudo hermanni	145.90	m	Modern	0.000001	y	Europe
Testudo	Testudo cf. promarginata	250.00	m	Tortonian	8.300000	n	Europe
Testudo	Testudo cf. promarginata	250.00	m	Tortonian	8.300000	n	Europe
Testudo	Testudo marginata	310.00	m	Lower Pleistocene	1.300000	y	Europe
Testudo	Testudo cf. promarginata	250.00	m	Tortonian	8.300000	n	Europe
Paleotestudo	Paleotestudo sp.	261.00	mf	Tortonian	9.500000	n	Europe
Testudo	Testudo catalaunica	165.00	m	Tortonian	11.500000	n	Europe
“Hadrianus”	“Hadrianus sp.”	1000.00	m	Tortonian	8.300000	n	Europe
Titanochelon	Titanochelon bolivari	1250.00	mo	Langhian	15.000000	n	Europe
Centrochelys	Centrochelys burchardi	800.00	m	Middle Pleistocene	0.435000	y	Europe
Gopherus	Gopherus polyphemus	217.90	mo	Lower Pleistocene	1.200000	n	America
Gopherus	Gopherus polyphemus	238.90	m	Modern	0.000001	n	America
Gopherus	Gopherus polyphemus	102.44	mo	Upper Pleistocene	0.069000	n	America
Gopherus	Gopherus polyphemus	327.60	mo	Upper Pleistocene	0.069000	n	America
Hesperotestudo	Hesperotestudo crassiscutata	284.90	m	Upper Pleistocene	0.069000	n	America
Gopherus	Gopherus polyphemus	276.60	mo	Lower Pleistocene	1.200000	n	America
Gopherus	Gopherus praecedens	360.00	mo	Upper Pleistocene	0.069000	n	America

Table S17 – *continued from previous page*

Genus	Taxon	CL	estimated	EpochBins	Age	Island	Con
Gopherus	Gopherus polyphemus	278.00	mo	Upper Pleistocene	0.069000	n	America
Gopherus	Gopherus sp.	236.70	mo	Gelasian	1.900000	n	America
Gopherus	Gopherus polyphemus	273.24	mo	Upper Pleistocene	0.069000	n	America
Gopherus	Gopherus polyphemus	302.40	mo	Upper Pleistocene	0.069000	n	America
Gopherus	Gopherus polyphemus	268.80	m	Modern	0.000001	y	America
Hesperotestudo	Hesperotestudo crassiscutata	425.00	mo	Upper Pleistocene	0.012000	n	America
Gopherus	Gopherus polyphemus	334.70	mo	Upper Pleistocene	0.069000	n	America
Gopherus	Gopherus polyphemus	300.00	m	Modern	0.000001	y	America
Gopherus	Gopherus polyphemus	350.00	mo	Upper Pleistocene	0.069000	n	America
Gopherus	Gopherus polyphemus	258.30	mo	Upper Pleistocene	0.069000	n	America
Hesperotestudo	Hesperotestudo crassiscutata	180.40	m	Upper Pleistocene	0.069000	n	America
Gopherus	Gopherus flavomarginatus	371.00	m	Modern	0.000001	n	America
Gopherus	Gopherus polyphemus	284.90	mo	Upper Pleistocene	0.069000	n	America
Hesperotestudo	Hesperotestudo crassiscutata	188.00	mo	Upper Pleistocene	0.012000	n	America
Gopherus	Gopherus ? sp.	500.00	m	Serravallian	11.850000	n	America
Hesperotestudo	Hesperotestudo crassiscutata	168.00	m	Lower Pleistocene	1.300000	n	America
Gopherus	Gopherus agassizii	400.00	m	Modern	0.000001	n	America
Hesperotestudo	Hesperotestudo orthopygia	1200.00	mo	Messinian	5.500000	n	America

Table S17 – *continued from previous page*

Genus	Taxon	CL	estimated	EpochBins	Age	Island	Con
Gopherus	Gopherus polyphemus	353.30	mo	Middle Pleistocene	0.400000	n	America
Gopherus	Gopherus sp.	202.80	mo	Lower Pleistocene	1.800000	n	America
Gopherus	Gopherus polyphemus	387.00	m	Modern	0.000001	n	America
Gopherus	Gopherus polyphemus	279.94	mo	Upper Pleistocene	0.069000	n	America
Gopherus	Gopherus sp.	224.10	mo	Lower Pleistocene	1.800000	n	America
Gopherus	Gopherus polyphemus	268.90	mo	Lower Pleistocene	1.200000	n	America
Hesperotestudo	Hesperotestudo sp.	639.00	m	Upper Pleistocene	0.060000	n	America
Gopherus	Gopherus flavomarginatus	281.00	m	Modern	0.000001	n	America
Gopherus	Gopherus polyphemus	252.56	mo	Upper Pleistocene	0.069000	n	America
Gopherus	Gopherus polyphemus	293.00	mo	Middle Pleistocene	0.400000	n	America
Gopherus	Gopherus polyphemus	155.50	mo	Upper Pleistocene	0.069000	n	America
Gopherus	Gopherus polyphemus	260.50	mo	Middle Pleistocene	0.400000	n	America
Gopherus	Gopherus polyphemus	256.44	mo	Middle Pleistocene	0.250000	n	America
Hesperotestudo	Hesperotestudo sp.	1000.00	mo	Gelasian	2.000000	n	America
Geochelone	Geochelone sp.	350.00	ef	Upper Pleistocene	0.069000	n	America
Gopherus	Gopherus sp.	181.00	mo	Gelasian	1.900000	n	America
Geochelone	Geochelone sp.	600.00	mo	Upper Pleistocene	0.012500	y	America
Gopherus	Gopherus polyphemus	303.00	m	Modern	0.000001	y	America

Table S17 – *continued from previous page*

Genus	Taxon	CL	estimated	EpochBins	Age	Island	Con
Gopherus	Gopherus polyphemus	342.00	m	Modern	0.000001	n	America
Gopherus	Gopherus sp.	256.08	m	Modern	0.000001	n	America
Gopherus	Gopherus sp.	180.90	mo	Gelasian	1.900000	n	America
Hesperotestudo	Hesperotestudo incisa	232.76	m	Upper Pleistocene	0.069000	n	America
Gopherus	Gopherus sp.	181.00	mo	Gelasian	1.900000	n	America
Geochelone	Geochelone tedwhitei	440.00	m	Burdigalian/Aquitanian	18.500000	n	America
Gopherus	Gopherus polyphemus	239.80	mo	Middle Pleistocene	0.250000	n	America
Hesperotestudo	Hesperotestudo sp.	974.00	ep	Upper Pleistocene	0.060000	n	America
Gopherus	Gopherus polyphemus	260.11	mo	Upper Pleistocene	0.069000	n	America
Gopherus	Gopherus sp.	204.40	mo	Gelasian	1.900000	n	America
Hesperotestudo	Hesperotestudo crassiscutata	192.00	m	Lower Pleistocene	1.300000	n	America
Gopherus	Gopherus sp.	194.90	mo	Gelasian	1.900000	n	America
Gopherus	Gopherus polyphemus	391.90	mo	Upper Pleistocene	0.069000	n	America
Gopherus	Gopherus sp.	259.50	mo	Lower Pleistocene	1.800000	n	America
Geochelone	Geochelone sp.	170.00	mf	Middle Pleistocene	0.700000	n	America
Gopherus	Gopherus sp.	230.10	mo	Lower Pleistocene	1.800000	n	America
Hesperotestudo	Hesperotestudo incisa	224.00	m	Lower Pleistocene	1.300000	n	America
Hesperotestudo	Hesperotestudo equicomes	340.00	ev	Middle Pleistocene	0.300000	n	America

Table S17 – *continued from previous page*

Genus	Taxon	CL	estimated	EpochBins	Age	Island	Con
Hesperotestudo	Hesperotestudo incisa	228.00	m	Lower Pleistocene	1.300000	n	America
Gopherus	Gopherus flavomarginatus	303.00	m	Modern	0.000001	n	America
Testudo	Testudo sp.	400.00	mo	Langhian	14.181000	n	America
Gopherus	Gopherus pertenuis	1050.00	mo	Lower Pleistocene	1.684500	n	America
Hesperotestudo	Hesperotestudo incisa	231.00	m	Lower Pleistocene	1.300000	n	America
Hesperotestudo	Hesperotestudo crassiscutata	327.00	m	Lower Pleistocene	1.300000	n	America
Hesperotestudo	Hesperotestudo incisa	241.00	m	Lower Pleistocene	1.300000	n	America
Hesperotestudo	Hesperotestudo incisa	250.00	e	Modern	0.007500	n	America
Gopherus	Gopherus polyphemus	352.00	mo	Upper Pleistocene	0.012000	n	America
Hesperotestudo	Hesperotestudo johnstoni	235.00	m	Piacencian	3.350000	n	America
Gopherus	Gopherus polyphemus	274.30	mo	Middle Pleistocene	0.250000	n	America
Gopherus	Gopherus flavomarginatus	222.00	m	Modern	0.000001	n	America
Gopherus	Gopherus sp.	241.90	mo	Lower Pleistocene	1.800000	n	America
Gopherus	Gopherus sp.	216.37	m	Modern	0.000001	n	America
Hesperotestudo	Hesperotestudo sp.	1200.00	ev	Tortonian	9.500000	n	America
Gopherus	Gopherus polyphemus	257.80	mo	Middle Pleistocene	0.250000	n	America
Hesperotestudo	Hesperotestudo crassiscutata	282.70	m	Upper Pleistocene	0.069000	n	America
Hesperotestudo	Hesperotestudo campester	1000.00	mo	Gelasian	2.190500	n	America

Table S17 – *continued from previous page*

Genus	Taxon	CL	estimated	EpochBins	Age	Island	Con
Hesperotestudo	Hesperotestudo incisa	216.00	m	Lower Pleistocene	1.300000	n	America
Hesperotestudo	Hesperotestudo mlynarskii	203.50	m	Lower Pleistocene	1.250000	n	America
Geochelone	Geochelone sp.	880.00	m	Zanclean	4.500000	n	America
Gopherus	Gopherus polyphemus	431.48	mo	Upper Pleistocene	0.069000	n	America
Gopherus	Gopherus polyphemus	308.00	m	Modern	0.000001	n	America
Gopherus	Gopherus mohavetus	315.00	m	Tortonian	8.476000	n	America
Gopherus	Gopherus sp.	264.11	m	Modern	0.000001	n	America
Gopherus	Gopherus sp.	118.90	mo	Gelasian	1.900000	n	America
Gopherus	Gopherus polyphemus	337.30	mo	Middle Pleistocene	0.250000	n	America
Gopherus	Gopherus sp.	163.50	mo	Gelasian	1.900000	n	America
Caudochelys	Caudochelys rexroadensis	830.00	m	Zanclean	4.550000	n	America
Hesperotestudo	Hesperotestudo riggsi	159.50	mo	Tortonian	7.600000	n	America
Gopherus	Gopherus polyphemus	306.00	mo	Middle Pleistocene	0.250000	n	America
Hesperotestudo	Hesperotestudo crassiscutata	561.00	m	Lower Pleistocene	1.250000	n	America
Geochelone	Geochelone sp.	176.00	e	Zanclean	5.000000	n	America
Gopherus	Gopherus sp.	218.80	mo	Gelasian	1.900000	n	America
Gopherus	Gopherus agassizi	252.00	m	Upper Pleistocene	0.025500	n	America
Hesperotestudo	Hesperotestudo crassiscutata	180.00	m	Lower Pleistocene	1.300000	n	America

Table S17 – *continued from previous page*

Genus	Taxon	CL	estimated	EpochBins	Age	Island	Con
Caudochelys	Caudochelys williamsi	334.00	m	Burdigalian/Aquitanian	17.750000	n	America
Hesperotestudo	Hesperotestudo incisa	290.40	m	Lower Pleistocene	1.300000	n	America
Gopherus	Gopherus sp.	245.40	mo	Lower Pleistocene	1.800000	n	America
Gopherus	Gopherus polyphemus	301.97	mo	Upper Pleistocene	0.069000	n	America
Hesperotestudo	Hesperotestudo incisa	212.00	m	Lower Pleistocene	1.300000	n	America
Gopherus	Gopherus sp.	188.30	mo	Gelasian	1.900000	n	America
Hesperotestudo	Hesperotestudo crassiscutata	1250.00	ev	Upper Pleistocene	0.012000	n	America
Gopherus	Gopherus polyphemus	350.83	mo	Middle Pleistocene	0.400000	n	America
Hesperotestudo	Hesperotestudo riggsi	176.00	m	Piacencian	3.000000	n	America
Gopherus	Gopherus polyphemus	304.70	mo	Middle Pleistocene	0.400000	n	America
Gopherus	Gopherus sp.	143.90	mo	Gelasian	1.900000	n	America
Hesperotestudo	Hesperotestudo sp.	176.00	mf	Piacencian	3.100000	n	America
Gopherus	Gopherus polyphemus	260.51	mo	Middle Pleistocene	0.400000	n	America
Gopherus	Gopherus sp.	241.56	m	Modern	0.000001	n	America
Hesperotestudo	Hesperotestudo orthopygia	682.00	mo	Messinian	5.500000	n	America
Hesperotestudo	Hesperotestudo wilsoni	226.00	m	Upper Pleistocene	0.018000	n	America
Gopherus	Gopherus sp.	211.31	m	Modern	0.000001	n	America
Gopherus	Gopherus polyphemus	304.20	mo	Upper Pleistocene	0.069000	n	America

Table S17 – *continued from previous page*

Genus	Taxon	CL	estimated	EpochBins	Age	Island	Con
Hesperotestudo	Hesperotestudo oelrichi	283.80	m	Piacencian	3.000000	n	America
Gopherus	Gopherus laticaudatus	375.00	mo	Middle Pleistocene	0.396350	n	America
Gopherus	Gopherus mohavetus	334.50	m	Tortonian	8.476000	n	America
Hesperotestudo	Hesperotestudo riggsi	159.50	mo	Tortonian	7.600000	n	America
Caudochelys	Caudochelys rexroadensis	781.00	m	Zanclean	4.550000	n	America
Gopherus	Gopherus polyphemus	267.00	mo	Middle Pleistocene	0.250000	n	America
Gopherus	Gopherus polyphemus	295.90	mo	Middle Pleistocene	0.400000	n	America
Hesperotestudo	Hesperotestudo riggsi	195.80	m	Zanclean	4.550000	n	America
Gopherus	Gopherus polyphemus	324.00	mo	Upper Pleistocene	0.069000	n	America
Gopherus	Gopherus sp.	182.30	mo	Gelasian	1.900000	n	America
Gopherus	Gopherus polyphemus	294.16	mo	Upper Pleistocene	0.069000	n	America
Hesperotestudo	Hesperotestudo alleni	240.90	m	Tortonian	10.950000	n	America
Gopherus	Gopherus polyphemus	283.41	mo	Middle Pleistocene	0.250000	n	America
Gopherus	Gopherus polyphemus	272.48	mo	Middle Pleistocene	0.250000	n	America
Hesperotestudo	Hesperotestudo riggsi	185.00	m	Piacencian	3.000000	n	America
Geochelone	Geochelone tedwhitei	370.00	m	Burdigalian/Aquitanian	18.500000	n	America
Gopherus	Gopherus ? sp.	500.00	m	Tortonian	10.100000	n	America
Gopherus	Gopherus sp.	209.60	mo	Gelasian	1.900000	n	America

Table S17 – *continued from previous page*

Genus	Taxon	CL	estimated	EpochBins	Age	Island	Con
Gopherus	Gopherus polyphemus	308.20	mo	Middle Pleistocene	0.400000	n	America
Gopherus	Gopherus polyphemus	314.60	mo	Middle Pleistocene	0.250000	n	America
Gopherus	Gopherus sp.	193.30	mo	Gelasian	1.900000	n	America
Gopherus	Gopherus sp.	188.70	mo	Gelasian	1.900000	n	America
Gopherus	Gopherus polyphemus	302.40	mo	Middle Pleistocene	0.250000	n	America
Gopherus	Gopherus polyphemus	292.00	mo	Middle Pleistocene	0.250000	n	America
Gopherus	Gopherus polyphemus	306.00	mo	Middle Pleistocene	0.250000	n	America
Hesperotestudo	Hesperotestudo turgida	230.00	mo	Lower Pleistocene	1.684500	n	America
Gopherus	Gopherus polyphemus	272.57	mo	Middle Pleistocene	0.400000	n	America
Gopherus	Gopherus polyphemus	322.63	mo	Middle Pleistocene	0.250000	n	America
Gopherus	Gopherus flavomarginatus	278.00	m	Modern	0.000001	n	America
Geochelone	Geochelone sp.	500.00	m	Tortonian	10.100000	n	America
Caudochelys	Caudochelys ducateli	339.90	m	Langhian	15.000000	n	America
Gopherus	Gopherus polyphemus	292.94	mo	Middle Pleistocene	0.250000	n	America
Gopherus	Gopherus polyphemus	348.70	mo	Middle Pleistocene	0.400000	n	America
Hesperotestudo	Hesperotestudo sp.	1500.00	mo	Middle Pleistocene	0.700000	n	America
Gopherus	Gopherus polyphemus	285.20	mo	Middle Pleistocene	0.250000	n	America
Gopherus	Gopherus mohavetus	412.50	m	Tortonian	8.476000	n	America

Table S17 – *continued from previous page*

Genus	Taxon	CL	estimated	EpochBins	Age	Island	Con
Hesperotestudo	Hesperotestudo sp.	1800.00	mo	Middle Pleistocene	0.700000	n	America
Gopherus	Gopherus polyphemus	285.60	mo	Middle Pleistocene	0.400000	n	America
Gopherus	Gopherus canyonensis	885.50	m	Piacencian	2.700000	n	America
Gopherus	Gopherus polyphemus	253.70	mo	Middle Pleistocene	0.250000	n	America
Gopherus	Gopherus polyphemus	293.57	mo	Middle Pleistocene	0.400000	n	America
Gopherus	Gopherus mohavetus	202.00	m	Tortonian	8.476000	n	America
Gopherus	Gopherus mohavetus	360.00	m	Tortonian	8.476000	n	America
Gopherus	Gopherus agassizi	445.00	mo	Middle Pleistocene	0.156000	n	America
Gopherus	Gopherus polyphemus	539.00	mf	Middle Pleistocene	0.700000	n	America
Gopherus	Gopherus polyphemus	283.00	mo	Middle Pleistocene	0.250000	n	America
Hesperotestudo	Hesperotestudo mlynarskii	165.00	m	Lower Pleistocene	1.250000	n	America
Gopherus	Gopherus flavomarginatus	246.00	m	Modern	0.000001	n	America
Chelonoidis	Chelonoidis chilensis	169.00	m	Modern	0.000001	n	America
Chelonoidis	Chelonoidis carbonaria	296.50	m	Modern	0.000001	n	America
Chelonoidis	Chelonoidis carbonaria	242.00	m	Modern	0.000001	n	America
Chelonoidis	Chelonoidis chilensis	200.00	m	Modern	0.000001	n	America
Chelonoidis	Chelonoidis carbonaria	253.00	m	Modern	0.000001	n	America
Chelonoidis	Chelonoidis denticulata	333.40	m	Modern	0.000001	n	America

Table S17 – *continued from previous page*

Genus	Taxon	CL	estimated	EpochBins	Age	Island	Con
Chelonoidis	Chelonoidis carbonaria	247.00	m	Modern	0.000001	n	America
Chelonoidis	Chelonoidis chilensis	186.00	m	Modern	0.000001	n	America
Chelonoidis	Chelonoidis chilensis	157.00	m	Modern	0.000001	n	America
Chelonoidis	Chelonoidis sp.	1000.00	mo	Upper Pleistocene	0.069000	n	America
Chelonoidis	Chelonoidis carbonaria	333.40	m	Modern	0.000001	n	America
Chelonoidis	Chelonoidis nigra	745.70	m	Modern	0.000001	y	America
Chelonoidis	Chelonoidis carbonaria	290.00	m	Modern	0.000001	y	America
Chelonoidis	Chelonoidis sp.	300.00	mo	Langhian	15.900000	n	America
Chelonoidis	Chelonoidis denticulata	365.00	m	Modern	0.000001	n	America
Chelonoidis	Chelonoidis chilensis	183.00	m	Modern	0.000001	n	America
Chelonoidis	Chelonoidis denticulata	317.00	m	Modern	0.000001	n	America
Chelonoidis	Chelonoidis chilensis	169.00	m	Modern	0.000001	n	America
Chelonoidis	Chelonoidis hoodensis	813.00	m	Modern	0.000001	y	America
Chelonoidis	Chelonoidis phantastica	860.00	m	Modern	0.000001	y	America
Chelonoidis	Chelonoidis lutzae	830.00	m	Upper Pleistocene	0.038500	n	America
Chelonoidis	Chelonoidis nigra	1300.00	m	Modern	0.000001	y	America
Chelonoidis	Chelonoidis becki	1050.00	m	Modern	0.000001	y	America
Chelonoidis	Chelonoidis nigra	595.00	m	Modern	0.000001	y	America

Table S17 – *continued from previous page*

Genus	Taxon	CL	estimated	EpochBins	Age	Island	Con
Chelonoidis	Chelonoidis sp.	300.00	mo	Langhian	15.900000	n	America
Chelonoidis	Chelonoidis chilensis	450.00	m	Modern	0.000001	n	America
Chelonoidis	Chelonoidis darwini	965.00	m	Modern	0.000001	y	America
Chelonoidis	Chelonoidis nigra	731.30	m	Modern	0.000001	y	America
Chelonoidis	Chelonoidis denticulata	616.00	m	Upper Pleistocene	0.120000	n	America
Chelonoidis	Chelonoidis duncanensis	840.00	m	Modern	0.000001	y	America
Chelonoidis	Chelonoidis denticulata	820.00	m	Modern	0.000001	n	America
Chelonoidis	Chelonoidis abingdonii	980.00	m	Modern	0.000001	y	America
Chelonoidis	Chelonoidis sp.	1060.00	ec	Langhian	15.900000	n	America
Chelonoidis	Chelonoidis nigra	588.00	m	Modern	0.000001	y	America
Chelonoidis	Chelonoidis carbonaria	189.00	m	Modern	0.000001	n	America
Chelonoidis	Chelonoidis chathamensis	890.00	m	Modern	0.000001	y	America
Chelonoidis	Chelonoidis chilensis	222.00	m	Modern	0.000001	n	America
Chelonoidis	Chelonoidis carbonaria	593.00	m	Modern	0.000001	n	America
Chelonoidis	Chelonoidis denticulata	333.00	m	Modern	0.000001	n	America
Chelonoidis	Chelonoidis nigra	610.00	m	Modern	0.000001	y	America
Chelonoidis	Chelonoidis vicina	1250.00	m	Modern	0.000001	y	America
Chelonoidis	Chelonoidis nigra	717.00	m	Modern	0.000001	y	America

Table S17 – *continued from previous page*

Genus	Taxon	CL	estimated	EpochBins	Age	Island	Con
Geochelone	Geochelone hesterna	278.00	m	Tortonian	8.500000	n	America
Chelonoidis	Chelonoidis denticulata	377.00	m	Modern	0.000001	n	America
Chelonoidis	Chelonoidis denticulata	466.00	m	Modern	0.000001	n	America
Chelonoidis	Chelonoidis carbonaria	226.00	m	Modern	0.000001	n	America

Table S18: Data set, extant, measured from collec

Genus	Taxon	CollNr	SCL	CCL	SCW	CCW	CH	PL	PW	estimated	Island	Con	Reference
Kinixys	Kinixys belliana	ZMB 37388	162.0	16.20	22.5	15.5	21.5	164.0	12.6	m	n	Africa	freshly measured (MFN collection)
Aldabrachelys	Aldabrachelys gigantea	ZMB 51996	770.0	77.00	106.0	52.0	112.0	NA	NA	m	y	Africa	freshly measured (MFN collection)
Astrochelys	Astrochelys yniphora	-	426.0	42.60	NA	NA	NA	NA	NA	m	y	Africa	Pedrono, M., & Smith, L. L. (2013). Overview of the
Centrochelys	Centrochelys sulcata	ZMB 63203	215.0	21.50	29.5	16.5	27.0	214.0	14.8	m	n	Africa	freshly measured (MFN collection)
Malacochersus	Malacochersus tornieri	ZMB 63174	153.0	15.30	17.0	10.5	14.0	149.0	9.8	m	n	Africa	freshly measured (MFN collection)
Astrochelys	Astrochelys radiata	-	395.0	39.50	NA	NA	NA	NA	NA	m	y	Africa	Pedrono, M., & Smith, L. L. (2013). Overview of the
Pyxis	Pyxis arachnoides	ZMB 37616	110.0	11.00	15.0	8.0	14.0	75.0	7.6	m	y	Africa	freshly measured (MFN collection)
Kinixys	Kinixys homeana	ZMB 17747	193.0	19.30	25.0	14.0	21.0	175.0	11.8	m	n	Africa	freshly measured (MFN collection)
Aldabrachelys	Aldabrachelys gigantea	ZMB 47494	870.0	87.00	116.0	57.0	110.0	NA	NA	m	y	Africa	freshly measured (MFN collection)
Psammobates	Psammobates tentorius	ZMB 28782	111.0	11.10	15.0	8.5	14.0	95.0	7.9	m	n	Africa	freshly measured (MFN collection)
Psammobates	Psammobates oculifer	ZMB 25439	119.0	11.90	17.0	9.0	14.5	99.0	8.4	m	n	Africa	freshly measured (MFN collection)
Psammobates	Psammobates oculifer	ZMB 37472	107.0	10.70	15.0	8.4	13.5	106.0	8	m	n	Africa	freshly measured (MFN collection)
Astrochelys	Astrochelys yniphora	-	307.0	30.70	NA	NA	NA	NA	NA	m	y	Africa	Pedrono, M., & Smith, L. L. (2013). Overview of the
Homopus	Homopus aerolatus	ZMB 229	88.0	8.80	10.5	6.9	9.0	78.0	6.1	m	n	Africa	freshly measured (MFN collection)
Homopus	Homopus signatus	ZMB 63173	94.0	9.40	12.5	7.7	11.0	82.0	5.6	m	n	Africa	freshly measured (MFN collection)
Kinixys	Kinixys belliana	ZMB 63191	194.0	19.40	25.5	12.5	19.0	173.0	12	m	n	Africa	freshly measured (MFN collection)
Astrochelys	Astrochelys radiata	-	285.0	28.50	NA	NA	NA	NA	NA	m	y	Africa	Pedrono, M., & Smith, L. L. (2013). Overview of the
Kinixys	Kinixys belliana	ZMB 63192	174.0	17.40	24.5	11.5	20.5	143.0	11.1	m	n	Africa	freshly measured (MFN collection)
Kinixys	Kinixys belliana	ZMB 63193	157.0	15.70	21.0	9.9	16.5	141.0	9.4	m	n	Africa	freshly measured (MFN collection)
Aldabrachelys	Aldabrachelys gigantea	ZMB 37545	810.0	81.00	110.0	52.0	NA	NA	NA	m	y	Africa	freshly measured (MFN collection)
Chersina	Chersina angulata	ZMB 49400	162.0	16.20	21.5	10.9	17.5	170.0	9.2	m	n	Africa	freshly measured (MFN collection)
Chersina	Chersina angulata	ZMB 63181	170.0	17.00	23.0	11.4	19.0	169.0	10	m	n	Africa	freshly measured (MFN collection)
Chersina	Chersina angulata	ZMB 63183	120.0	12.00	17.0	8.6	15.5	118.0	7.3	m	n	Africa	freshly measured (MFN collection)
Chersina	Chersina angulata	ZMB 63182	136.0	13.60	18.0	9.9	16.0	138.0	8	m	n	Africa	freshly measured (MFN collection)
Kinixys	Kinixys erosa	ZMB 63190	164.0	16.40	21.0	11.2	16.5	163.0	10.6	m	n	Africa	freshly measured (MFN collection)

Table S18 – *continued from previous page*

Genus	Taxon	CollNr	SCL	CCL	SCW	CCW	CH	PL	PW	estimated	Island	Con	Reference
Centrochelys	Centrochelys sulcata	ZMB 37387	435.0	43.50	54.0	29.9	53.0	405.0	29.1	m	n	Africa	freshly measured (MFN collection)
Indotestudo	Indotestudo travancorica	ZMB 37717	224.0	22.40	28.0	15.2	23.0	200.0	15.4	m	n	Africa	freshly measured (MFN collection)
Stigmochelys	Stigmochelys pardalis	ZMB 37344	405.0	40.50	55.0	27.0	50.5	350.0	24.3	m	n	Africa	freshly measured (MFN collection)
Stigmochelys	Stigmochelys pardalis	ZMB 63235	315.0	31.50	43.5	23.4	39.0	298.0	22.1	m	n	Africa	freshly measured (MFN collection)
Stigmochelys	Stigmochelys pardalis	ZMB 37495	297.0	29.70	41.5	21.4	36.0	271.0	19.2	m	n	Africa	freshly measured (MFN collection)
Stigmochelys	Stigmochelys pardalis	ZMB 42400	345.0	34.50	46.5	24.0	40.0	285.0	21.3	m	n	Africa	freshly measured (MFN collection)
Stigmochelys	Stigmochelys pardalis	ZMB 63232	350.0	35.00	46.0	23.9	45.0	303.0	21.1	m	n	Africa	freshly measured (MFN collection)
Psammobates	Psammobates geometricus	ZMB 192	92.0	9.20	13.5	7.1	13.0	68.0	6.3	m	n	Africa	freshly measured (MFN collection)
Chersina	Chersina angulata	-	181.9	18.19	NA	NA	NA	NA	NA	m	y	Africa	Itescu, Y., Karraker, N. E., Raia, P., Pritchard, P. C.,
Aldabrachelys	Aldabrachelys gigantea	ZMB 47443	800.0	80.00	105.0	51.5	105.0	NA	NA	m	y	Africa	freshly measured (MFN collection)
Astrochelys	Astrochelys yniphora	-	415.0	41.50	NA	NA	NA	NA	NA	m	y	Africa	Pedrono, M., & Smith, L. L. (2013). Overview of the
Astrochelys	Astrochelys yniphora	-	370.0	37.00	NA	NA	NA	NA	NA	m	y	Africa	Pedrono, M., & Smith, L. L. (2013). Overview of the
Aldabrachelys	Aldabrachelys gigantea	ZMB 51995	1030.0	103.00	138.0	NA	NA	NA	NA	m	y	Africa	freshly measured (MFN collection)
Aldabrachelys	Aldabrachelys gigantea	ZMB ???	720.0	72.00	105.5	55.0	117.0	NA	NA	m	y	Africa	freshly measured (MFN collection)
Cylindraspis	Cylindraspis triserrata	-	1100.0	110.00	NA	NA	NA	NA	NA	m	y	Africa	Itescu, Y., Karraker, N. E., Raia, P., Pritchard, P. C.,
Cylindraspis	Cylindraspis vosmaeri	-	500.0	50.00	NA	NA	NA	NA	NA	m	y	Africa	Itescu, Y., Karraker, N. E., Raia, P., Pritchard, P. C.,
Astrochelys	Astrochelys radiata	-	334.0	33.40	NA	NA	NA	NA	NA	m	y	Africa	Pedrono, M., & Smith, L. L. (2013). Overview of the
Astrochelys	Astrochelys radiata	-	305.0	30.50	NA	NA	NA	NA	NA	m	y	Africa	Pedrono, M., & Smith, L. L. (2013). Overview of the
Centrochelys	Centrochelys sulcata	-	830.0	83.00	NA	NA	NA	NA	NA	m	n	Africa	Itescu, Y., Karraker, N. E., Raia, P., Pritchard, P. C.,
Psammobates	Psammobates geometricus	ZMB 186	105.0	10.50	13.5	7.4	13.0	90.0	6.9	m	n	Africa	freshly measured (MFN collection)
Astrochelys	Astrochelys radiata	-	242.0	24.20	NA	NA	NA	NA	NA	m	y	Africa	Pedrono, M., & Smith, L. L. (2013). Overview of the
Psammobates	Psammobates tentorius	ZMB 37627	116.0	11.60	15.0	9.4	14.5	117.0	8.9	m	y	Africa	freshly measured (MFN collection)
Psammobates	Psammobates tentorius	ZMB 50571	95.0	9.50	12.0	7.3	12.0	79.0	7	m	n	Africa	freshly measured (MFN collection)
Psammobates	Psammobates tentorius	ZMB 14766	81.0	8.10	10.5	6.8	10.0	67.0	5.9	m	n	Africa	freshly measured (MFN collection)
Pyxis	Pyxis planicauda	-	114.0	11.40	NA	NA	NA	NA	NA	m	y	Africa	Pedrono, M., & Smith, L. L. (2013). Overview of the
Pyxis	Pyxis planicauda	-	134.0	13.40	NA	NA	NA	NA	NA	m	y	Africa	Pedrono, M., & Smith, L. L. (2013). Overview of the
Pyxis	Pyxis planicauda	-	120.0	12.00	NA	NA	NA	NA	NA	m	y	Africa	Pedrono, M., & Smith, L. L. (2013). Overview of the

Table S18 – *continued from previous page*

Genus	Taxon	CollNr	SCL	CCL	SCW	CCW	CH	PL	PW	estimated	Island	Con	Reference
Psammobates	Psammobates oculifer	ZMB 16399	111.0	11.10	16.0	8.8	14.0	108.0	7.9	m	n	Africa	freshly measured (MFN collection)
Psammobates	Psammobates oculifer	ZMB 14772	101.0	10.10	15.0	8.0	14.0	98.0	7.3	m	n	Africa	freshly measured (MFN collection)
Psammobates	Psammobates oculifer	ZMB 24261	103.0	10.30	14.0	8.2	13.5	100.0	7.8	m	n	Africa	freshly measured (MFN collection)
Psammobates	Psammobates oculifer	ZMB 37623	105.0	10.50	14.5	7.9	13.5	93.0	7.4	m	n	Africa	freshly measured (MFN collection)
Kinixys	Kinixys belliana	ZMB 37489	180.0	18.00	24.0	12.0	20.5	176.0	11.8	m	n	Africa	freshly measured (MFN collection)
Pyxis	Pyxis planicauda	-	160.0	16.00	NA	NA	NA	NA	NA	m	y	Africa	Itescu, Y., Karraker, N. E., Raia, P., Pritchard, P. C.,
Psammobates	Psammobates geometricus	ZMB 50568	107.0	10.70	15.0	7.9	14.5	79.0	7.3	m	n	Africa	freshly measured (MFN collection)
Aldabrachelys	Aldabrachelys gigantea	-	875.0	87.50	NA	NA	NA	NA	NA	m	y	Africa	Itescu, Y., Karraker, N. E., Raia, P., Pritchard, P. C.,
Aldabrachelys	Aldabrachelys gigantea	-	1190.0	119.00	NA	NA	NA	NA	NA	m	y	Africa	Itescu, Y., Karraker, N. E., Raia, P., Pritchard, P. C.,
Chersina	Chersina angulata	-	202.0	20.20	NA	NA	NA	NA	NA	m	n	Africa	Itescu, Y., Karraker, N. E., Raia, P., Pritchard, P. C.,
Chersina	Chersina angulata	-	351.0	35.10	NA	NA	NA	NA	NA	m	y	Africa	Itescu, Y., Karraker, N. E., Raia, P., Pritchard, P. C.,
Astrochelys	Astrochelys yniphora	-	446.0	44.60	NA	NA	NA	NA	NA	m	y	Africa	Itescu, Y., Karraker, N. E., Raia, P., Pritchard, P. C.,
Chersina	Chersina angulata	ZMB 37393	160.0	16.00	20.0	10.0	17.5	158.0	9.2	m	n	Africa	freshly measured (MFN collection)
Kinixys	Kinixys erosa	ZMB 50198	271.0	27.10	31.5	18.5	26.0	231.0	15.9	m	n	Africa	freshly measured (MFN collection)
Chersina	Chersina angulata	ZMB 37392	181.0	18.10	22.5	11.6	19.0	177.0	9.7	m	n	Africa	freshly measured (MFN collection)
Psammobates	Psammobates oculifer	-	147.0	14.70	NA	NA	NA	NA	NA	m	n	Africa	Itescu, Y., Karraker, N. E., Raia, P., Pritchard, P. C.,
Psammobates	Psammobates tentorius	-	145.0	14.50	NA	NA	NA	NA	NA	m	n	Africa	Itescu, Y., Karraker, N. E., Raia, P., Pritchard, P. C.,
Pyxis	Pyxis arachnoides	-	150.0	15.00	NA	NA	NA	NA	NA	m	y	Africa	Itescu, Y., Karraker, N. E., Raia, P., Pritchard, P. C.,
Psammobates	Psammobates geometricus	ZMB 185	118.0	11.80	18.0	9.1	16.5	112.0	8.2	m	n	Africa	freshly measured (MFN collection)
Stigmochelys	Stigmochelys pardalis	-	720.0	72.00	NA	NA	NA	NA	NA	m	n	Africa	Itescu, Y., Karraker, N. E., Raia, P., Pritchard, P. C.,
Chersina	Chersina angulata	-	179.3	17.93	NA	NA	NA	NA	NA	m	n	Africa	Itescu, Y., Karraker, N. E., Raia, P., Pritchard, P. C.,
Astrochelys	Astrochelys radiata	-	355.0	35.50	NA	NA	NA	NA	NA	m	y	Africa	Pedrono, M., & Smith, L. L. (2013). Overview of the
Pyxis	Pyxis planicauda	-	126.0	12.60	NA	NA	NA	NA	NA	m	y	Africa	Pedrono, M., & Smith, L. L. (2013). Overview of the
Testudo	Testudo kleinmanni	-	144.0	14.40	NA	NA	NA	NA	NA	m	n	Africa	Itescu, Y., Karraker, N. E., Raia, P., Pritchard, P. C.,
Cylindraspis	Cylindraspis indica	-	600.0	60.00	NA	NA	NA	NA	NA	m	y	Africa	Itescu, Y., Karraker, N. E., Raia, P., Pritchard, P. C.,
Astrochelys	Astrochelys yniphora	-	361.0	36.10	NA	NA	NA	NA	NA	m	y	Africa	Pedrono, M., & Smith, L. L. (2013). Overview of the
Astrochelys	Astrochelys yniphora	-	486.0	48.60	NA	NA	NA	NA	NA	m	y	Africa	Pedrono, M., & Smith, L. L. (2013). Overview of the

Table S18 – *continued from previous page*

Genus	Taxon	CollNr	SCL	CCL	SCW	CCW	CH	PL	PW	estimated	Island	Con	Reference
Pyxis	Pyxis planicauda	-	148.0	14.80	NA	NA	NA	NA	NA	m	y	Africa	Pedrono, M., & Smith, L. L. (2013). Overview of the
Pyxis	Pyxis arachnoides	-	111.0	11.10	NA	NA	NA	NA	NA	m	y	Africa	Pedrono, M., & Smith, L. L. (2013). Overview of the
Pyxis	Pyxis arachnoides	-	110.0	11.00	NA	NA	NA	NA	NA	m	y	Africa	Pedrono, M., & Smith, L. L. (2013). Overview of the
Pyxis	Pyxis arachnoides	-	80.0	8.00	NA	NA	NA	NA	NA	m	y	Africa	Pedrono, M., & Smith, L. L. (2013). Overview of the
Kinixys	Kinixys lobatsiana	-	200.0	20.00	NA	NA	NA	NA	NA	m	n	Africa	Itescu, Y., Karraker, N. E., Raia, P., Pritchard, P. C.,
Pyxis	Pyxis arachnoides	-	86.0	8.60	NA	NA	NA	NA	NA	m	y	Africa	Pedrono, M., & Smith, L. L. (2013). Overview of the
Pyxis	Pyxis arachnoides	-	154.0	15.40	NA	NA	NA	NA	NA	m	y	Africa	Pedrono, M., & Smith, L. L. (2013). Overview of the
Kinixys	Kinixys homeana	-	223.0	22.30	NA	NA	NA	NA	NA	m	n	Africa	Itescu, Y., Karraker, N. E., Raia, P., Pritchard, P. C.,
Homopus	Homopus femoralis	-	168.0	16.80	NA	NA	NA	NA	NA	m	n	Africa	Itescu, Y., Karraker, N. E., Raia, P., Pritchard, P. C.,
Pyxis	Pyxis planicauda	-	132.0	13.20	NA	NA	NA	NA	NA	m	y	Africa	Pedrono, M., & Smith, L. L. (2013). Overview of the
Homopus	Homopus aerolatus	-	300.0	30.00	NA	NA	NA	NA	NA	m	n	Africa	Itescu, Y., Karraker, N. E., Raia, P., Pritchard, P. C.,
Homopus	Homopus boulengeri	-	110.0	11.00	NA	NA	NA	NA	NA	m	n	Africa	Itescu, Y., Karraker, N. E., Raia, P., Pritchard, P. C.,
Kinixys	Kinixys erosa	-	400.0	40.00	NA	NA	NA	NA	NA	m	n	Africa	Itescu, Y., Karraker, N. E., Raia, P., Pritchard, P. C.,
Chersina	Chersina angulata	ZMB 37479	148.0	14.80	20.0	10.1	17.0	142.0	9.5	m	n	Africa	freshly measured (MFN collection)
Psammobates	Psammobates geometricus	-	165.0	16.50	NA	NA	NA	NA	NA	m	n	Africa	Itescu, Y., Karraker, N. E., Raia, P., Pritchard, P. C.,
Homopus	Homopus solus	-	109.0	10.90	NA	NA	NA	NA	NA	m	n	Africa	Itescu, Y., Karraker, N. E., Raia, P., Pritchard, P. C.,
Malacochersus	Malacochersus tornieri	-	180.0	18.00	NA	NA	NA	NA	NA	m	n	Africa	Itescu, Y., Karraker, N. E., Raia, P., Pritchard, P. C.,
Chersina	Chersina angulata	-	153.5	15.35	NA	NA	NA	NA	NA	m	n	Africa	Itescu, Y., Karraker, N. E., Raia, P., Pritchard, P. C.,
Pyxis	Pyxis arachnoides	-	144.0	14.40	NA	NA	NA	NA	NA	m	y	Africa	Pedrono, M., & Smith, L. L. (2013). Overview of the
Kinixys	Kinixys belliana	-	230.0	23.00	NA	NA	NA	NA	NA	m	n	Africa	Itescu, Y., Karraker, N. E., Raia, P., Pritchard, P. C.,
Aldabrachelys	Aldabrachelys gigantea	-	1140.0	114.00	NA	NA	NA	NA	NA	m	y	Africa	Itescu, Y., Karraker, N. E., Raia, P., Pritchard, P. C.,
Astrochelys	Astrochelys radiata	-	400.0	40.00	NA	NA	NA	NA	NA	m	y	Africa	Itescu, Y., Karraker, N. E., Raia, P., Pritchard, P. C.,
Chersina	Chersina angulata	-	166.4	16.64	NA	NA	NA	NA	NA	m	n	Africa	Itescu, Y., Karraker, N. E., Raia, P., Pritchard, P. C.,
Chersina	Chersina angulata	-	171.6	17.16	NA	NA	NA	NA	NA	m	y	Africa	Itescu, Y., Karraker, N. E., Raia, P., Pritchard, P. C.,
Cylindraspis	Cylindraspis peltastes	-	420.0	42.00	NA	NA	NA	NA	NA	m	y	Africa	Itescu, Y., Karraker, N. E., Raia, P., Pritchard, P. C.,
Chersina	Chersina angulata	-	161.3	16.13	NA	NA	NA	NA	NA	m	y	Africa	Itescu, Y., Karraker, N. E., Raia, P., Pritchard, P. C.,
Homopus	Homopus signatus	-	106.0	10.60	NA	NA	NA	NA	NA	m	n	Africa	Itescu, Y., Karraker, N. E., Raia, P., Pritchard, P. C.,

Table S18 – *continued from previous page*

Genus	Taxon	CollNr	SCL	CCL	SCW	CCW	CH	PL	PW	estimated	Island	Con	Reference
Kinixys	Kinixys spekii	-	220.0	22.00	NA	NA	NA	NA	NA	m	n	Africa	Itescu, Y., Karraker, N. E., Raia, P., Pritchard, P. C.,
Cylindraspis	Cylindraspis inepta	-	1000.0	100.00	NA	NA	NA	NA	NA	m	y	Africa	Itescu, Y., Karraker, N. E., Raia, P., Pritchard, P. C.,
Kinixys	Kinixys natalensis	-	160.0	16.00	NA	NA	NA	NA	NA	m	n	Africa	Itescu, Y., Karraker, N. E., Raia, P., Pritchard, P. C.,
Geochelone	Geochelone elegans	ZMB 63222	208.0	20.80	29.5	14.6	28.5	199.0	13.3	m	n	Asia	freshly measured (MFN collection)
Geochelone	Geochelone elegans	ZMB 37523	245.0	24.50	32.0	16.6	32.0	228.0	14.6	m	n	Asia	freshly measured (MFN collection)
Geochelone	Geochelone elegans	ZMB 63220	221.0	22.10	32.0	16.0	31.0	179.0	13.5	m	n	Asia	freshly measured (MFN collection)
Geochelone	Geochelone elegans	ZMB 63221	220.0	22.00	31.0	15.4	27.0	209.0	14	m	y	Asia	freshly measured (MFN collection)
Geochelone	Geochelone elegans	ZMB 63218	221.0	22.10	31.5	15.1	30.0	203.0	13.7	m	n	Asia	freshly measured (MFN collection)
Geochelone	Geochelone platynota	ZMB 6096	222.0	22.20	29.5	15.1	27.0	NA	MA	m	n	Asia	freshly measured (MFN collection)
Manouria	Manouria emys	-	600.0	60.00	NA	NA	NA	NA	NA	m	n	Asia	Itescu, Y., Karraker, N. E., Raia, P., Pritchard, P. C.,
Indotestudo	Indotestudo forstenii	-	202.0	20.20	NA	NA	NA	NA	NA	m	y	Asia	Itescu, Y., Karraker, N. E., Raia, P., Pritchard, P. C.,
Indotestudo	Indotestudo travancorica	-	249.7	24.97	NA	NA	NA	NA	NA	m	n	Asia	Itescu, Y., Karraker, N. E., Raia, P., Pritchard, P. C.,
Indotestudo	Indotestudo forstenii	-	309.0	30.90	NA	NA	NA	NA	NA	m	y	Asia	Itescu, Y., Karraker, N. E., Raia, P., Pritchard, P. C.,
Indotestudo	Indotestudo elongata	-	360.0	36.00	NA	NA	NA	NA	NA	m	n	Asia	Itescu, Y., Karraker, N. E., Raia, P., Pritchard, P. C.,
Indotestudo	Indotestudo forstenii	-	199.0	19.90	NA	NA	NA	NA	NA	m	y	Asia	Itescu, Y., Karraker, N. E., Raia, P., Pritchard, P. C.,
Indotestudo	Indotestudo elongata	-	244.2	24.42	NA	NA	NA	NA	NA	m	n	Asia	Itescu, Y., Karraker, N. E., Raia, P., Pritchard, P. C.,
Indotestudo	Indotestudo travancorica	-	244.2	24.42	NA	NA	NA	NA	NA	m	n	Asia	Itescu, Y., Karraker, N. E., Raia, P., Pritchard, P. C.,
Manouria	Manouria impressa	ZMB 63172	165.0	16.50	20.0	12.9	18.0	157.0	10.5	m	n	Asia	freshly measured (MFN collection)
Indotestudo	Indotestudo elongata	ZMB 50492	276.0	27.60	33.0	19.4	28.5	246.0	17.1	m	n	Asia	freshly measured (MFN collection)
Indotestudo	Indotestudo elongata	ZMB 63175	235.0	23.50	30.5	16.0	29.5	202.0	14.4	m	n	Asia	freshly measured (MFN collection)
Indotestudo	Indotestudo elongata	ZMB 4174	208.0	20.80	26.0	13.4	20.0	180.0	11.6	m	n	Asia	freshly measured (MFN collection)
Indotestudo	Indotestudo elongata	ZMB 6106	166.0	16.60	21.0	11.3	18.0	151.0	11.3	m	n	Asia	freshly measured (MFN collection)
Manouria	Manouria emys	-	600.0	60.00	NA	NA	NA	NA	NA	m	n	Asia	Karl, H., & Staesche, U. (2007). Fossile Riesen-Lar
Testudo	Testudo graeca	-	250.0	25.00	NA	NA	NA	NA	NA	m	n	Asia	Itescu, Y., Karraker, N. E., Raia, P., Pritchard, P. C.,
Testudo	Testudo graeca	-	280.0	28.00	NA	NA	NA	NA	NA	m	y	Asia	Itescu, Y., Karraker, N. E., Raia, P., Pritchard, P. C.,
Manouria	Manouria emys	ZMB 49049	212.0	21.20	26.5	16.5	25.0	NA	NA	m	n	Asia	freshly measured (MFN collection)
Manouria	Manouria emys	ZMB 37350	445.0	44.50	52.0	32.0	50.0	455.0	29.8	m	n	Asia	freshly measured (MFN collection)

Table S18 – *continued from previous page*

Genus	Taxon	CollNr	SCL	CCL	SCW	CCW	CH	PL	PW	estimated	Island	Con	Reference
Manouria	Manouria emys	ZMB 37342	330.0	33.00	40.5	26.7	37.0	330.0	23.4	m	n	Asia	freshly measured (MFN collection)
Indotestudo	Indotestudo travancorica	-	331.0	33.10	NA	NA	NA	NA	NA	m	n	Asia	Itescu, Y., Karraker, N. E., Raia, P., Pritchard, P. C.,
Indotestudo	Indotestudo travancorica	-	219.6	21.96	NA	NA	NA	NA	NA	m	n	Asia	Itescu, Y., Karraker, N. E., Raia, P., Pritchard, P. C.,
Indotestudo	Indotestudo forstenii	-	200.5	20.05	NA	NA	NA	NA	NA	m	y	Asia	Itescu, Y., Karraker, N. E., Raia, P., Pritchard, P. C.,
Testudo	Testudo horsfieldii	-	280.0	28.00	NA	NA	NA	NA	NA	m	n	Asia	Itescu, Y., Karraker, N. E., Raia, P., Pritchard, P. C.,
Manouria	Manouria impressa	-	350.0	35.00	NA	NA	NA	NA	NA	m	n	Asia	Itescu, Y., Karraker, N. E., Raia, P., Pritchard, P. C.,
Geochelone	Geochelone elegans	-	380.0	38.00	NA	NA	NA	NA	NA	m	n	Asia	Itescu, Y., Karraker, N. E., Raia, P., Pritchard, P. C.,
Manouria	Manouria impressa	-	275.0	27.50	NA	NA	NA	NA	NA	m	n	Asia	Karl, H., & Staesche, U. (2007). Fossile Riesen-Lar
Indotestudo	Indotestudo elongata	-	219.6	21.96	NA	NA	NA	NA	NA	m	n	Asia	Itescu, Y., Karraker, N. E., Raia, P., Pritchard, P. C.,
Geochelone	Geochelone platynota	-	300.0	30.00	NA	NA	NA	NA	NA	m	n	Asia	Itescu, Y., Karraker, N. E., Raia, P., Pritchard, P. C.,
Testudo	Testudo graeca	-	300.0	30.00	NA	NA	NA	NA	NA	m	n	Asia	Itescu, Y., Karraker, N. E., Raia, P., Pritchard, P. C.,
Gopherus	Gopherus flavomarginatus	-	400.0	40.00	NA	NA	NA	NA	NA	m	n	America	Itescu, Y., Karraker, N. E., Raia, P., Pritchard, P. C.,
Gopherus	Gopherus morafkai	-	299.0	29.90	NA	NA	NA	NA	NA	m	n	America	Itescu, Y., Karraker, N. E., Raia, P., Pritchard, P. C.,
Gopherus	Gopherus berlandieri	-	240.0	24.00	NA	NA	NA	NA	NA	m	n	America	Itescu, Y., Karraker, N. E., Raia, P., Pritchard, P. C.,
Testudo	Testudo horsfieldii	ZMB 63259	111.0	11.10	14.0	10.0	15.0	108.0	9.5	m	n	Europe	freshly measured (MFN collection)
Pyxis	Pyxis arachnoides	ZMB 37615	108.0	10.80	15.0	7.9	13.0	96.0	7.1	m	n	Europe	freshly measured (MFN collection)
Testudo	Testudo marginata	-	241.7	24.17	NA	NA	NA	NA	NA	m	n	Europe	Willemsen, R. E., & Hailey, A. (2003). Sexual dimor
Testudo	Testudo horsfieldii	ZMB 63258	123.0	12.30	14.5	10.9	15.0	121.0	9.8	m	n	Europe	freshly measured (MFN collection)
Testudo	Testudo hermanni	-	183.3	18.33	NA	NA	NA	NA	NA	m	y	Europe	Itescu, Y., Karraker, N. E., Raia, P., Pritchard, P. C.,
Testudo	Testudo hermanni	-	176.9	17.69	NA	NA	NA	NA	NA	m	n	Europe	Willemsen, R. E., & Hailey, A. (2003). Sexual dimor
Testudo	Testudo horsfieldii	ZMB 63257	114.0	11.40	14.5	10.2	14.0	110.0	9.9	m	n	Europe	freshly measured (MFN collection)
Testudo	Testudo marginata	-	246.7	24.67	NA	NA	NA	NA	NA	m	n	Europe	Willemsen, R. E., & Hailey, A. (2003). Sexual dimor
Testudo	Testudo hermanni	-	196.0	19.60	NA	NA	NA	NA	NA	m	n	Europe	Willemsen, R. E., & Hailey, A. (2003). Sexual dimor
Testudo	Testudo hermanni	-	143.5	14.35	NA	NA	NA	NA	NA	m	y	Europe	Itescu, Y., Karraker, N. E., Raia, P., Pritchard, P. C.,
Testudo	Testudo graeca	-	194.6	19.46	NA	NA	NA	NA	NA	m	n	Europe	Willemsen, R. E., & Hailey, A. (2003). Sexual dimor
Testudo	Testudo hermanni	-	200.0	20.00	NA	NA	NA	NA	NA	m	y	Europe	Itescu, Y., Karraker, N. E., Raia, P., Pritchard, P. C.,
Testudo	Testudo hermanni	-	250.0	25.00	NA	NA	NA	NA	NA	m	n	Europe	Itescu, Y., Karraker, N. E., Raia, P., Pritchard, P. C.,

Table S18 – *continued from previous page*

Genus	Taxon	CollNr	SCL	CCL	SCW	CCW	CH	PL	PW	estimated	Island	Con	Reference
Testudo	Testudo marginata	-	246.0	24.60	NA	NA	NA	NA	NA	m	n	Europe	Itescu, Y., Karraker, N. E., Raia, P., Pritchard, P. C.,
Testudo	Testudo marginata	-	242.5	24.25	NA	NA	NA	NA	NA	m	y	Europe	Itescu, Y., Karraker, N. E., Raia, P., Pritchard, P. C.,
Testudo	Testudo marginata	-	246.0	24.60	NA	NA	NA	NA	NA	m	n	Europe	Itescu, Y., Karraker, N. E., Raia, P., Pritchard, P. C.,
Testudo	Testudo hermanni	-	147.0	14.70	NA	NA	NA	NA	NA	m	n	Europe	Itescu, Y., Karraker, N. E., Raia, P., Pritchard, P. C.,
Testudo	Testudo marginata	-	290.0	29.00	NA	NA	NA	NA	NA	m	n	Europe	Itescu, Y., Karraker, N. E., Raia, P., Pritchard, P. C.,
Testudo	Testudo marginata	-	250.0	25.00	NA	NA	NA	NA	NA	m	y	Europe	Itescu, Y., Karraker, N. E., Raia, P., Pritchard, P. C.,
Testudo	Testudo hermanni	-	145.9	14.59	NA	NA	NA	NA	NA	m	y	Europe	Itescu, Y., Karraker, N. E., Raia, P., Pritchard, P. C.,
Testudo	Testudo graeca	-	178.2	17.82	NA	NA	NA	NA	NA	m	n	Europe	Willemsen, R. E., & Hailey, A. (2003). Sexual dimor
Testudo	Testudo marginata	-	400.0	40.00	NA	NA	NA	NA	NA	m	n	Europe	Itescu, Y., Karraker, N. E., Raia, P., Pritchard, P. C.,
Testudo	Testudo horsfieldii	ZMB 63255	136.0	13.60	18.0	13.0	16.5	129.0	12.2	m	n	Europe	freshly measured (MFN collection)
Testudo	Testudo horsfieldii	ZMB 63256	132.0	13.20	17.0	12.4	17.0	133.0	11.3	m	n	Europe	freshly measured (MFN collection)
Testudo	Testudo hermanni	-	168.3	16.83	NA	NA	NA	NA	NA	m	y	Europe	Itescu, Y., Karraker, N. E., Raia, P., Pritchard, P. C.,
Testudo	Testudo hermanni	-	160.0	16.00	NA	NA	NA	NA	NA	m	y	Europe	Itescu, Y., Karraker, N. E., Raia, P., Pritchard, P. C.,
Testudo	Testudo hermanni	-	154.0	15.40	NA	NA	NA	NA	NA	m	n	Europe	Itescu, Y., Karraker, N. E., Raia, P., Pritchard, P. C.,
Testudo	Testudo hermanni	-	138.5	13.85	NA	NA	NA	NA	NA	m	n	Europe	Itescu, Y., Karraker, N. E., Raia, P., Pritchard, P. C.,
Testudo	Testudo hermanni	-	173.0	17.30	NA	NA	NA	NA	NA	m	y	Europe	Itescu, Y., Karraker, N. E., Raia, P., Pritchard, P. C.,
Testudo	Testudo marginata	-	242.5	24.25	NA	NA	NA	NA	NA	m	y	Europe	Itescu, Y., Karraker, N. E., Raia, P., Pritchard, P. C.,
Testudo	Testudo hermanni	-	195.0	19.50	NA	NA	NA	NA	NA	m	y	Europe	Itescu, Y., Karraker, N. E., Raia, P., Pritchard, P. C.,
Testudo	Testudo hermanni	-	157.0	15.70	NA	NA	NA	NA	NA	m	y	Europe	Itescu, Y., Karraker, N. E., Raia, P., Pritchard, P. C.,
Testudo	Testudo hermanni	-	176.6	17.66	NA	NA	NA	NA	NA	m	y	Europe	Itescu, Y., Karraker, N. E., Raia, P., Pritchard, P. C.,
Testudo	Testudo hermanni	-	130.0	13.00	NA	NA	NA	NA	NA	m	n	Europe	Itescu, Y., Karraker, N. E., Raia, P., Pritchard, P. C.,
Testudo	Testudo hermanni	-	161.0	16.10	NA	NA	NA	NA	NA	m	n	Europe	Itescu, Y., Karraker, N. E., Raia, P., Pritchard, P. C.,
Gopherus	Gopherus polyphemus	-	300.0	30.00	NA	NA	NA	NA	NA	m	y	America	Itescu, Y., Karraker, N. E., Raia, P., Pritchard, P. C.,
Gopherus	Gopherus sp.	MVZ 210020	NA	NA	NA	NA	NA	219.6	NA	m	n	America	Biewer J., Sankey J., Hutchison H., Garber D., 2016
Gopherus	Gopherus sp.	MVZ 210003	NA	NA	NA	NA	NA	192.1	NA	m	n	America	Biewer J., Sankey J., Hutchison H., Garber D., 2016
Gopherus	Gopherus polyphemus	-	268.8	26.88	NA	NA	NA	NA	NA	m	y	America	Itescu, Y., Karraker, N. E., Raia, P., Pritchard, P. C.,
Gopherus	Gopherus sp.	MVZ 120004	NA	NA	NA	NA	NA	196.7	NA	m	n	America	Biewer J., Sankey J., Hutchison H., Garber D., 2016

Table S18 – *continued from previous page*

Genus	Taxon	CollNr	SCL	CCL	SCW	CCW	CH	PL	PW	estimated	Island	Con	Reference
Gopherus	Gopherus sp.	MVZ 210009	NA	NA	NA	NA	NA	232.8	NA	m	n	America	Biewer J., Sankey J., Hutchison H., Garber D., 2016
Gopherus	Gopherus sp.	MVZ 210010	NA	NA	NA	NA	NA	240.1	NA	m	n	America	Biewer J., Sankey J., Hutchison H., Garber D., 2016
Gopherus	Gopherus agassizii	-	400.0	40.00	NA	NA	NA	NA	NA	m	n	America	Itescu, Y., Karraker, N. E., Raia, P., Pritchard, P. C.,
Gopherus	Gopherus flavomarginatus	KU 39415	303.0	30.30	NA	23.2	NA	NA	NA	m	n	America	Legler, 1959
Gopherus	Gopherus polyphemus	-	308.0	30.80	NA	NA	NA	NA	NA	m	n	America	Itescu, Y., Karraker, N. E., Raia, P., Pritchard, P. C.,
Gopherus	Gopherus polyphemus	-	303.0	30.30	NA	NA	NA	NA	NA	m	y	America	Itescu, Y., Karraker, N. E., Raia, P., Pritchard, P. C.,
Gopherus	Gopherus polyphemus	-	387.0	38.70	NA	NA	NA	NA	NA	m	n	America	Itescu, Y., Karraker, N. E., Raia, P., Pritchard, P. C.,
Gopherus	Gopherus polyphemus	-	342.0	34.20	NA	NA	NA	NA	NA	m	n	America	Itescu, Y., Karraker, N. E., Raia, P., Pritchard, P. C.,
Gopherus	Gopherus flavomarginatus	USNM 61253	222.0	22.20	NA	16.6	NA	212.0	NA	m	n	America	Legler, 1959
Gopherus	Gopherus flavomarginatus	USNM 61254	371.0	37.10	NA	29.2	NA	358.0	NA	m	n	America	Legler, 1959
Gopherus	Gopherus polyphemus	-	238.9	23.89	NA	NA	NA	NA	NA	m	n	America	Itescu, Y., Karraker, N. E., Raia, P., Pritchard, P. C.,
Gopherus	Gopherus flavomarginatus	USNM 60976	246.0	24.60	NA	21.2	NA	252.0	NA	m	n	America	Legler, 1959
Gopherus	Gopherus flavomarginatus	IU 42953	281.0	28.10	NA	22.0	NA	NA	NA	m	n	America	Legler, 1959
Gopherus	Gopherus flavomarginatus	IU 42954	278.0	27.80	NA	21.4	NA	NA	NA	m	n	America	Legler, 1959
Chelonoidis	Chelonoidis nigra	USNM 51069	588.0	58.80	68.3	44.5	NA	506.0	NA	m	y	America	Franz, R., & Franz, S. E. (2009). A new fossil land t
Chelonoidis	Chelonoidis nigra	USNM1 102904	610.0	61.00	67.5	44.4	NA	515.0	NA	m	y	America	Franz, R., & Franz, S. E. (2009). A new fossil land t
Chelonoidis	Chelonoidis carbonaria	-	593.0	59.30	NA	NA	NA	NA	NA	m	n	America	Itescu, Y., Karraker, N. E., Raia, P., Pritchard, P. C.,
Chelonoidis	Chelonoidis abingdonii	-	980.0	98.00	NA	NA	NA	NA	NA	m	y	America	Itescu, Y., Karraker, N. E., Raia, P., Pritchard, P. C.,
Chelonoidis	Chelonoidis denticulata	-	333.4	33.34	NA	NA	NA	NA	NA	m	n	America	Itescu, Y., Karraker, N. E., Raia, P., Pritchard, P. C.,
Chelonoidis	Chelonoidis chilensis	UF33604	169.0	16.90	21.5	13.2	NA	161.0	NA	m	n	America	Franz, R., & Franz, S. E. (2009). A new fossil land t
Chelonoidis	Chelonoidis chilensis	UF33618	186.0	18.60	25.0	14.7	NA	169.0	NA	m	n	America	Franz, R., & Franz, S. E. (2009). A new fossil land t
Chelonoidis	Chelonoidis nigra	-	717.0	71.70	NA	NA	NA	NA	NA	m	y	America	Itescu, Y., Karraker, N. E., Raia, P., Pritchard, P. C.,
Chelonoidis	Chelonoidis chilensis	UF33617	169.0	16.90	22.8	14.6	NA	162.0	NA	m	n	America	Franz, R., & Franz, S. E. (2009). A new fossil land t
Chelonoidis	Chelonoidis carbonaria	UF27384	242.0	24.20	31.7	15.5	NA	219.0	NA	m	n	America	Franz, R., & Franz, S. E. (2009). A new fossil land t
Chelonoidis	Chelonoidis carbonaria	UF33597	253.0	25.30	31.7	15.3	NA	215.0	NA	m	n	America	Franz, R., & Franz, S. E. (2009). A new fossil land t
Chelonoidis	Chelonoidis nigra	USNM1 222494	595.0	59.50	68.0	43.6	NA	533.0	NA	m	y	America	Franz, R., & Franz, S. E. (2009). A new fossil land t
Chelonoidis	Chelonoidis carbonaria	-	333.4	33.34	NA	NA	NA	NA	NA	m	n	America	Itescu, Y., Karraker, N. E., Raia, P., Pritchard, P. C.,

Table S18 – *continued from previous page*

Genus	Taxon	CollNr	SCL	CCL	SCW	CCW	CH	PL	PW	estimated	Island	Con	Reference
Chelonoidis	Chelonoidis carbonaria	UF5259	226.0	22.60	28.7	12.9	NA	198.0	NA	m	n	America	Franz, R., & Franz, S. E. (2009). A new fossil land t
Chelonoidis	Chelonoidis becki	-	1050.0	105.00	NA	NA	NA	NA	NA	m	y	America	Itescu, Y., Karraker, N. E., Raia, P., Pritchard, P. C.,
Chelonoidis	Chelonoidis denticulata	UF33661	333.0	33.30	38.0	21.4	NA	305.0	NA	m	n	America	Franz, R., & Franz, S. E. (2009). A new fossil land t
Chelonoidis	Chelonoidis denticulata	UF61931	317.0	31.70	41.2	18.5	NA	291.0	NA	m	n	America	Franz, R., & Franz, S. E. (2009). A new fossil land t
Chelonoidis	Chelonoidis denticulata	UF33670	365.0	36.50	47.0	22.0	NA	326.0	NA	m	n	America	Franz, R., & Franz, S. E. (2009). A new fossil land t
Chelonoidis	Chelonoidis chilensis	UF33603	183.0	18.30	23.4	14.5	NA	166.0	NA	m	n	America	Franz, R., & Franz, S. E. (2009). A new fossil land t
Chelonoidis	Chelonoidis nigra	-	731.3	73.13	NA	NA	NA	NA	NA	m	y	America	Itescu, Y., Karraker, N. E., Raia, P., Pritchard, P. C.,
Chelonoidis	Chelonoidis chilensis	-	200.0	20.00	NA	NA	NA	NA	NA	m	n	America	Itescu, Y., Karraker, N. E., Raia, P., Pritchard, P. C.,
Chelonoidis	Chelonoidis carbonaria	UF48278	247.0	24.70	33.9	15.5	NA	214.0	NA	m	n	America	Franz, R., & Franz, S. E. (2009). A new fossil land t
Chelonoidis	Chelonoidis carbonaria	-	296.5	29.65	NA	NA	NA	NA	NA	m	n	America	Itescu, Y., Karraker, N. E., Raia, P., Pritchard, P. C.,
Chelonoidis	Chelonoidis carbonaria	-	290.0	29.00	NA	NA	NA	NA	NA	m	y	America	Itescu, Y., Karraker, N. E., Raia, P., Pritchard, P. C.,
Chelonoidis	Chelonoidis carbonaria	UF33596	189.0	18.90	24.7	12.1	NA	174.0	NA	m	n	America	Franz, R., & Franz, S. E. (2009). A new fossil land t
Chelonoidis	Chelonoidis nigra	-	745.7	74.57	NA	NA	NA	NA	NA	m	y	America	Itescu, Y., Karraker, N. E., Raia, P., Pritchard, P. C.,
Chelonoidis	Chelonoidis chathamensis	-	890.0	89.00	NA	NA	NA	NA	NA	m	y	America	Itescu, Y., Karraker, N. E., Raia, P., Pritchard, P. C.,
Chelonoidis	Chelonoidis denticulata	UF19242	466.0	46.60	59.7	26.5	NA	410.0	NA	m	n	America	Franz, R., & Franz, S. E. (2009). A new fossil land t
Chelonoidis	Chelonoidis denticulata	UF23231	377.0	37.70	47.1	23.8	NA	334.0	NA	m	n	America	Franz, R., & Franz, S. E. (2009). A new fossil land t
Chelonoidis	Chelonoidis denticulata	-	820.0	82.00	NA	NA	NA	NA	NA	m	n	America	Itescu, Y., Karraker, N. E., Raia, P., Pritchard, P. C.,
Chelonoidis	Chelonoidis duncanensis	-	840.0	84.00	NA	NA	NA	NA	NA	m	y	America	Itescu, Y., Karraker, N. E., Raia, P., Pritchard, P. C.,
Chelonoidis	Chelonoidis chilensis	-	222.0	22.20	NA	NA	NA	NA	NA	m	n	America	Itescu, Y., Karraker, N. E., Raia, P., Pritchard, P. C.,
Chelonoidis	Chelonoidis chilensis	UF33600	157.0	15.70	20.8	11.9	NA	145.0	NA	m	n	America	Franz, R., & Franz, S. E. (2009). A new fossil land t
Chelonoidis	Chelonoidis phantastica	-	860.0	86.00	NA	NA	NA	NA	NA	m	y	America	Itescu, Y., Karraker, N. E., Raia, P., Pritchard, P. C.,
Chelonoidis	Chelonoidis vicina	-	1250.0	125.00	NA	NA	NA	NA	NA	m	y	America	Itescu, Y., Karraker, N. E., Raia, P., Pritchard, P. C.,
Chelonoidis	Chelonoidis hoodensis	-	813.0	81.30	NA	NA	NA	NA	NA	m	y	America	Itescu, Y., Karraker, N. E., Raia, P., Pritchard, P. C.,
Chelonoidis	Chelonoidis nigra	-	1300.0	130.00	NA	NA	NA	NA	NA	m	y	America	Itescu, Y., Karraker, N. E., Raia, P., Pritchard, P. C.,
Chelonoidis	Chelonoidis darwini	-	965.0	96.50	NA	NA	NA	NA	NA	m	y	America	Itescu, Y., Karraker, N. E., Raia, P., Pritchard, P. C.,
Chelonoidis	Chelonoidis chilensis	-	450.0	45.00	NA	NA	NA	NA	NA	m	n	America	Itescu, Y., Karraker, N. E., Raia, P., Pritchard, P. C.,

Acknowledgements

Declaration of Authorship