

FossilTortoises

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27 Juni 2017

Introduction

Body size trends in Neogene fossil tortoises, Testudinidae, z. B. *Titanochelon bacharidisi*.

Material and Methods

Data set

Based on different sources:

- FosFarBase
- PDBD
- Fossil Turtle Checklist (during rise of humanity)
- ...

Analyses

All conducted in R.

Results

```
##                               Locality           Country
## Hohenhöwen, Engen, Hegau, southwestern Germany :11  USA           :21
## Arrisdrift                                     : 8  Germany        :18
## Auchas                                           : 4  Greece          :15
## Megalo Emvolon 1 (MEV), 20 km SW Thessaloniki   : 3  Namibia         :14
## Milia, Grevena, W Macedonia                     : 3  France          : 3
## Altan-Teli main fossiliferous bed (Dzereg valley): 2  Madagascar: 3
## (Other)                                           :57  (Other)         :14
##      Latitude      Longitude
## Min.      :-28.55   Min.      :-120.800
## 1st Qu.: 29.68     1st Qu.: -22.338
## Median : 40.04     Median :  11.598
## Mean    : 27.21     Mean     :  -8.431
## 3rd Qu.: 44.73     3rd Qu.:  21.644
## Max.     : 52.35     Max.      : 102.335
##
##                               Formation.Location.comment
## pedogenic gypsum, red and yellow-mottled clays and marls :11
## -                                                         : 9
## + aff. Psammobates-Homopus sp. Fossil meander of the proto-Orange: 8
## Fossil meander of the proto-Orange                        : 4
```

```

## Gonia Formation : 4
## Early Villafranchian : 3
## (Other) :49
##      MAmin      Mamax      Epoch
## Min. : 0.00125 Min. : 0.00075 Miocene :46
## 1st Qu.: 2.60000 1st Qu.: 4.20000 Pliocene :20
## Median : 7.50000 Median :10.50000 Pleistocene : 9
## Mean : 8.91444 Mean : 9.73273 Pliocene/Miocene : 4
## 3rd Qu.:13.87500 3rd Qu.:14.82500 Holocene : 3
## Max. :33.90000 Max. :34.00000 Pleistocene/Pliocene: 3
## (Other) : 3
##      upper.stage      lower.stage      Genus
## Burdigalian :19 Burdigalian :19 Testudo :16
## Serravallian :16 Serravallian:16 Paleotestudo :13
## Piacencian :12 Zanclean :15 Hesperotestudo:10
## Zanclean :11 Messinian : 7 Titanochelon :10
## Lower Pleistocene: 6 Piacencian : 7 Geochelone : 9
## Tortonian : 6 Tortonian : 6 Namibchersus : 9
## (Other) :18 (Other) :18 (Other) :21
##      Species      Taxon
## sp. :16 Paleotestudo antiqua :13
## antiqua :13 Geochelone sp. : 6
## namaquensis: 6 Namibchersus namaquensis: 6
## orangeus : 5 Mesocherus orangeus : 5
## ? sp. : 4 Testudo sp. : 5
## bacharidisi: 4 Testudo graeca : 4
## (Other) :40 (Other) :49
##      Author
## (Bronn, 1831) :13
## Linnaeus, 1758 :11
## (Stromer, 1926) : 9
## Fitzinger, 1835 : 6
## Lapparent de Broin, 2003 : 5
## (Vlachos, Tsoukala & Corsini, 2014): 4
## (Other) :40
## -
## Neotypus: MT PAL 2012.0.10 nearly intact shell, ref.mat.: FFSM 3446.1, FFSM 3446.2, FFSM 3446.3, FF
## Holotypus: MSGN AD 389'96 left epiplastron, multiple other remains
## MSGN about 50 specimen: AM 9'93, AM 1'99, AM x, AM xa'98, AM xb'98, AM xe, AM 11'95, AM xf, AM 10'9
## MSGN old collections: PQ AD 73, PQ AD 1293, PQ AD 2789, PQ AD 3478, PQ AD 2108, PQ AD 608. new coll
## Holotypus: LGPUT MIL 495 post.p.carapace, ref.mat.: 255 fr.plastron, 256a neural, 256c fr.pygal, 98
## (Other)
##      CollNo      CL
## - :21 Min. : 111.0
## Holotypus : 5 1st Qu.: 195.0
## several specimens, no exact number given : 3 Median : 400.0
## 1959 II 2033 : 1 Mean : 655.7
## 264 : 1 3rd Qu.:1100.0
## 7 specimens: 192.0-264.0 mm (mean=211.6 mm): 1 Max. :2500.0
## (Other) :56 NA's :23
##      PL      size
## Min. : 110.0 giant :11
## 1st Qu.: 167.0 large : 6

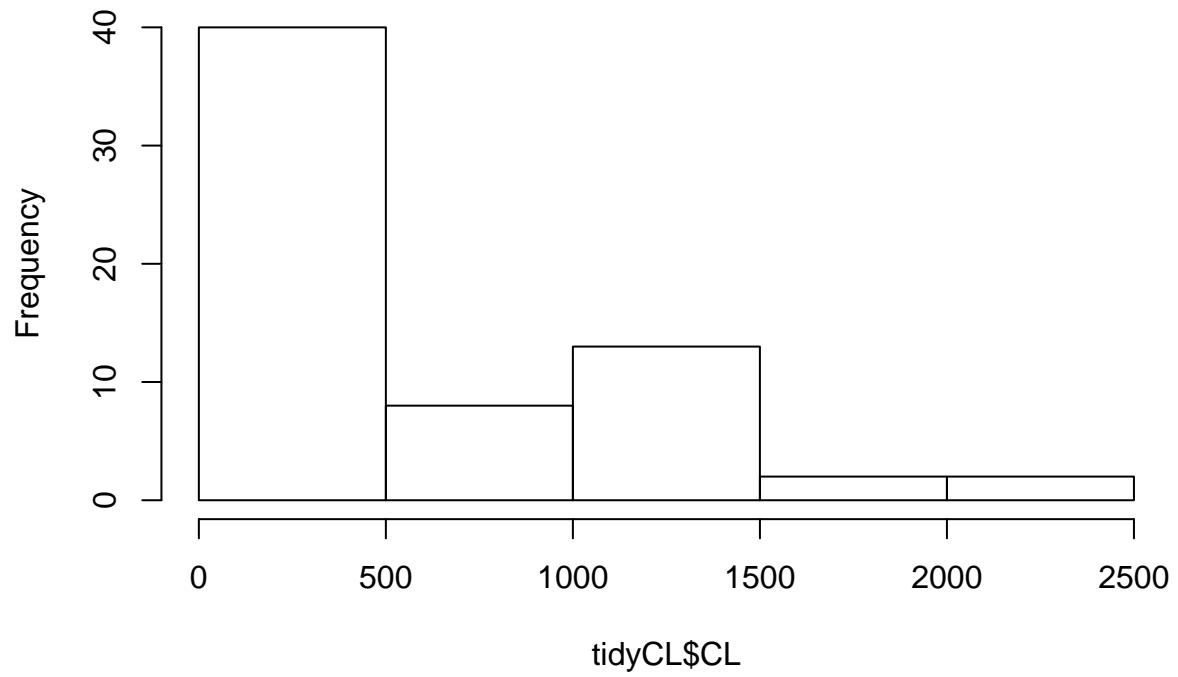
```

```

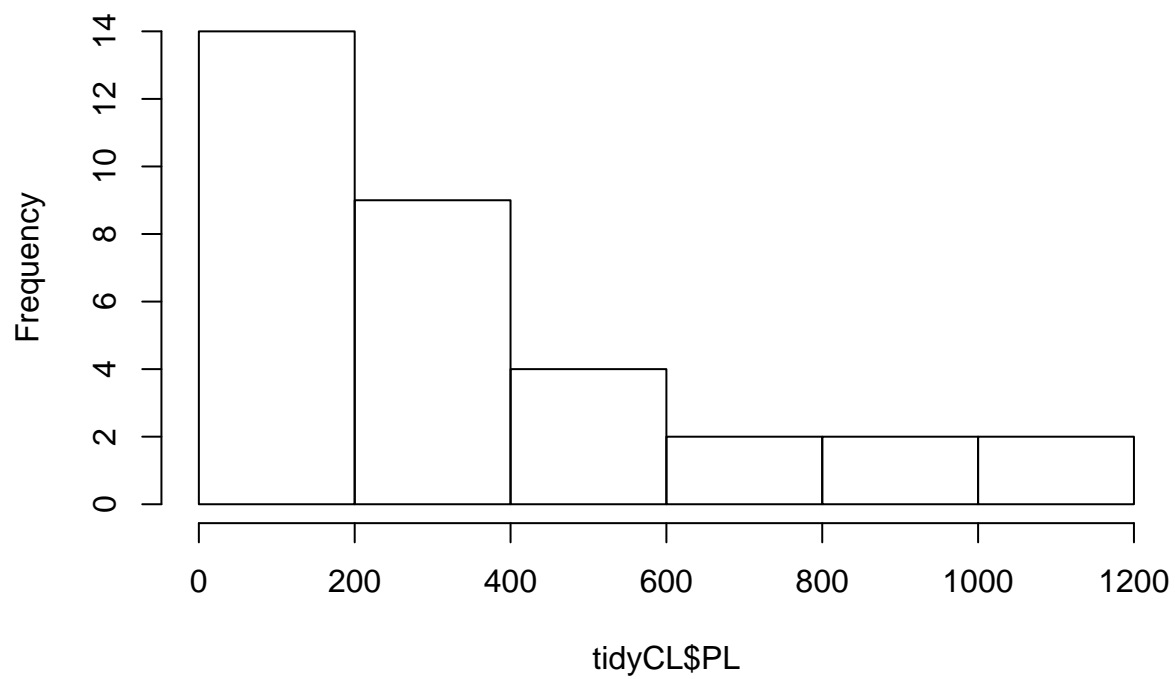
## Median : 219.0    larrge      : 1
## Mean   : 355.9    medium      : 5
## 3rd Qu.: 450.0    medium to large: 1
## Max.   :1150.0    small       : 6
## NA's   :55        NA's        :58
##
## medium sized form, CL 16 - 20 cm
## large species of tortoise
## Tortoises (Geochelone sp. and ?Gopherus sp. with carapaces up to 0.5 m in length are found throughout
## (fragmented)
## ...Reste von mindestens 2 Individuen. Die Größe der Krallenphalangen kann man die Größe der Schildkr
## (Other)
## NA's
## estimated Island      Continent
## e : 3      n:82      Africa      :17
## ev: 3      y: 6      Asia        : 4
## m :46              Eurasia      : 2
## mf:16              Europe       :43
## mo:20              N-America:21
##                  S-America: 1
##
##
## Lapparent de Broin F.de, 2003: Miocene Chelonians from southern Namibia. in: B. Senut & M. Pickford
## Schleich H.H., 1981: Jungtertiäre Schildkröten Süddeutschlands unter besonderer Berücksichtigung der
## Corsini J.A., Böhme M., Joyce W.G., 2014: Reappraisal of Testudo antiqua (Testudines, Testudinidae)
## Lapparent de Broin F.de, 2002a: A giant tortoise from the Late Pliocene of Lesvos Island (Greece) and
## Vlachos E., Tsoukala E., Corsini J., 2014: Cheirogaster bacharidisi, sp. nov., a new species of a genus
## Bachmayer F., Mlynarski M., Symeonidis N., 1980: Fossile Schildkröten aus dem Pliozän von Megalo Em
## (Other)
##      Age
## Min.   : 0.00177
## 1st Qu.: 3.67500
## Median : 9.00000
## Mean   : 9.32358
## 3rd Qu.:14.35000
## Max.   :33.95000
##
##
##      Colombia      France      Georgia      Germany      Greece      Italy
##      1              3          1            18          15          2
## Madagascar      Malta      Mongolia      Namibia      Poland      Russia
##      3              1          2            14          1          1
##      Spain      Thailand      USA
##      3          2          21

```

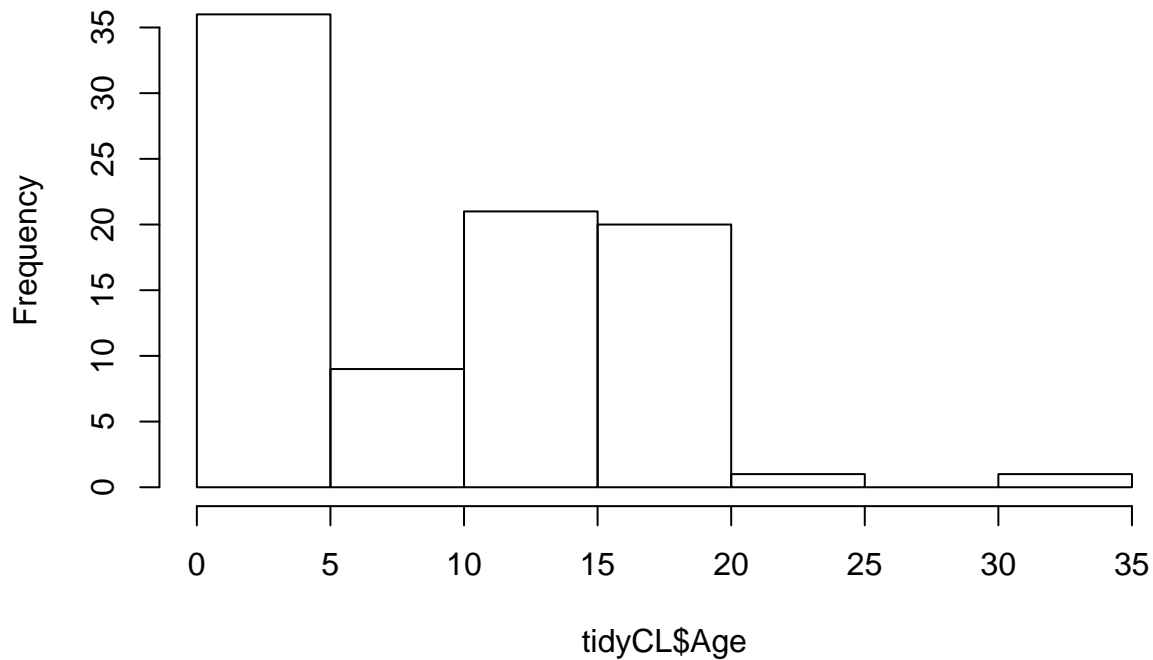
Histogram of tidyCL\$CL



Histogram of tidyCL\$PL



Histogram of tidyCL\$Age



Discussion

Acknowledgements

References

Appendices

Declaration of Authorship

R Markdown

This is an R Markdown document. Markdown is a simple formatting syntax for authoring HTML, PDF, and MS Word documents. For more details on using R Markdown see <http://rmarkdown.rstudio.com>.

When you click the **Knit** button a document will be generated that includes both content as well as the output of any embedded R code chunks within the document. You can embed an R code chunk like this:

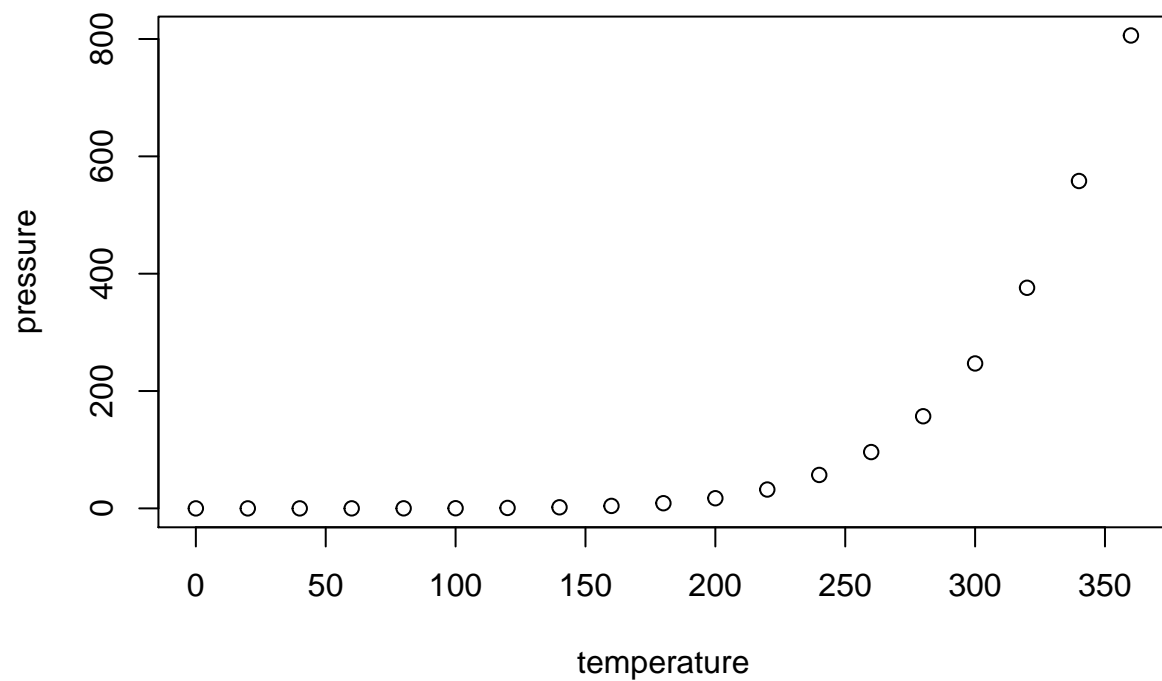
```
summary(cars)
```

```
##      speed      dist
##  Min.   : 4.0    Min.   : 2.00
```

```
## 1st Qu.:12.0    1st Qu.: 26.00
## Median :15.0    Median : 36.00
## Mean   :15.4    Mean   : 42.98
## 3rd Qu.:19.0    3rd Qu.: 56.00
## Max.   :25.0    Max.    :120.00
```

Including Plots

You can also embed plots, for example:



Note that the `echo = FALSE` parameter was added to the code chunk to prevent printing of the R code that generated the plot.