FossilTortoises

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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.

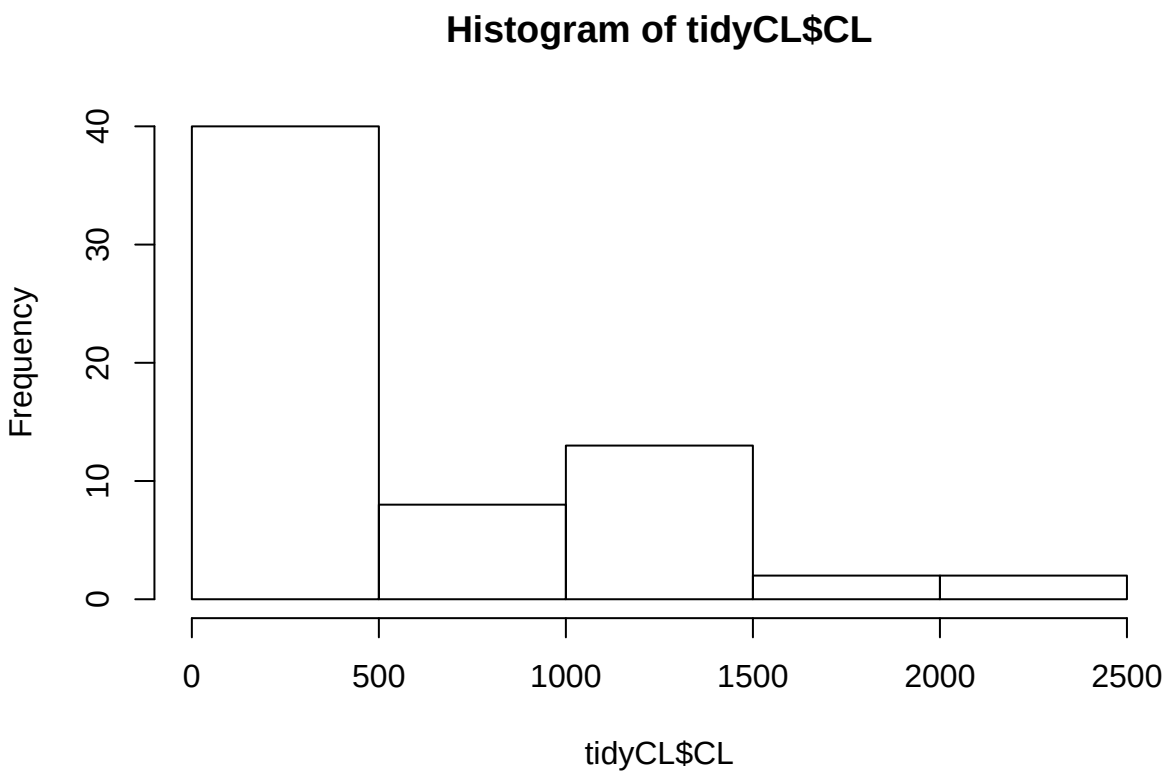
Results

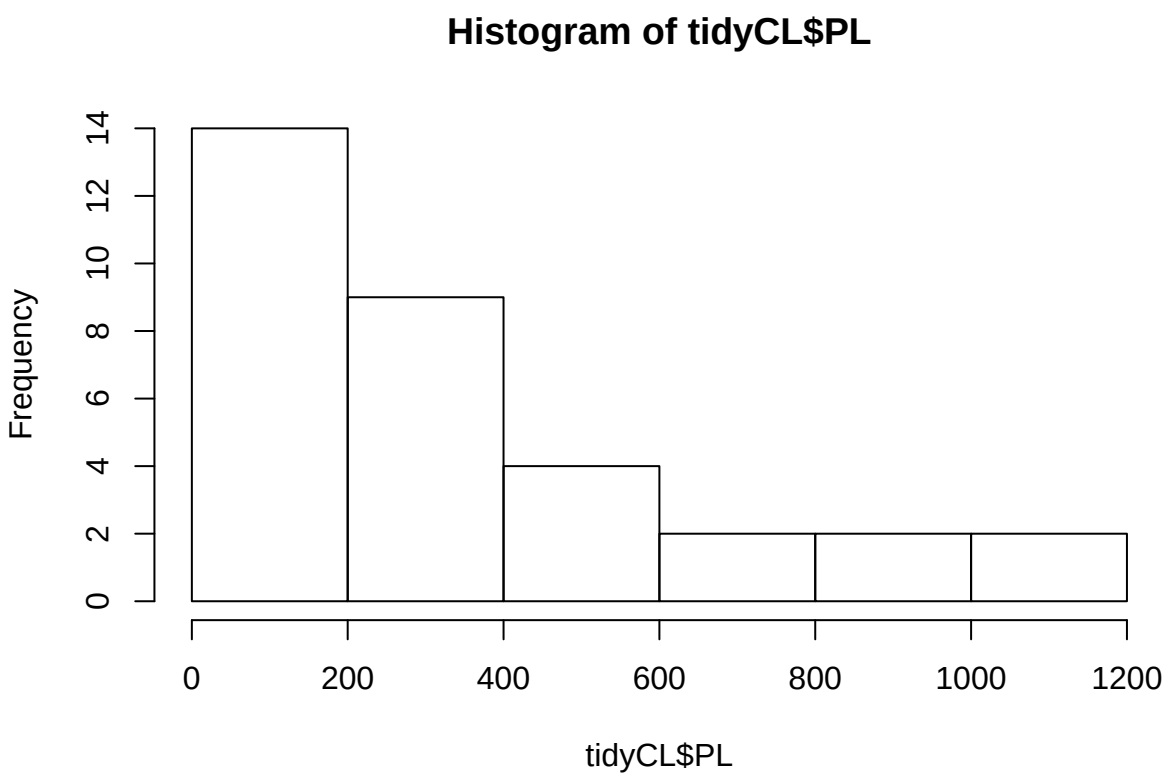
```
##                                                Locality        Country
##  Hohenhöwen, Engen, Hegau, southwestern Germany   :11   USA       :21
##  Arrisdrift                                       : 8   Germany   :18
##  Auchas                                           : 4   Greece    :15
##  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
```

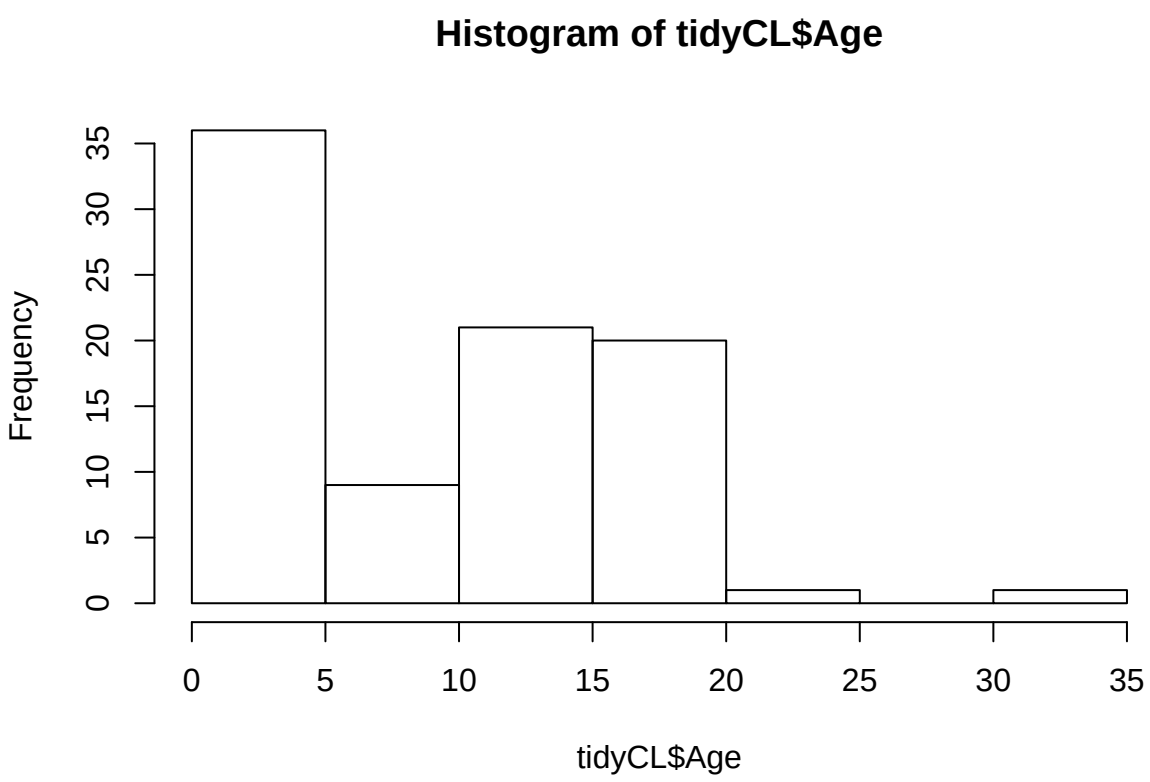
```
##  Gonia Formation                                                 : 4
##  Early Villafranchian                                            : 3
##  (Other)                                                         :49
##      MAmin              Mamax                          Epoch
##  Min.   : 0.00125   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, FFS
##  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 10'98
##  MSGN old collections: PQ AD 73, PQ AD 1293, PQ AD 2789, PQ AD 3478, PQ AD 2108, PQ AD 608. new colle
##  Holotypus: LGPUT MIL 495 post.p.carapace, ref.mat.: 255 fr.plastron, 256a neural, 256c fr.pygal, 983
##  (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 throughou
##  (fragmented)
##  ...Reste von mindestens 2 Individuen. Die Größe der Krallenphalangen kann man die Größe der Schildk
##  (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 de
##  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) a
##  Vlachos E., Tsoukala E., Corsini J., 2014: Cheirogaster bacharidisi, sp. nov., a new species of a g
##  Bachmayer F., M?ynarski M., Symeonidis N., 1980: Fossile Schiildkröten aus dem Pliozän von Megalo E
##  (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$CL
Frequency
0
10
20
30
40
0
500
1000
1500
2000
2500
tidyCL$CL


Histogram of tidyCL$PL
Frequency
0
2
4
6
8
10
12
14
0
200
400
600
800
1000
1200
tidyCL$PL



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.

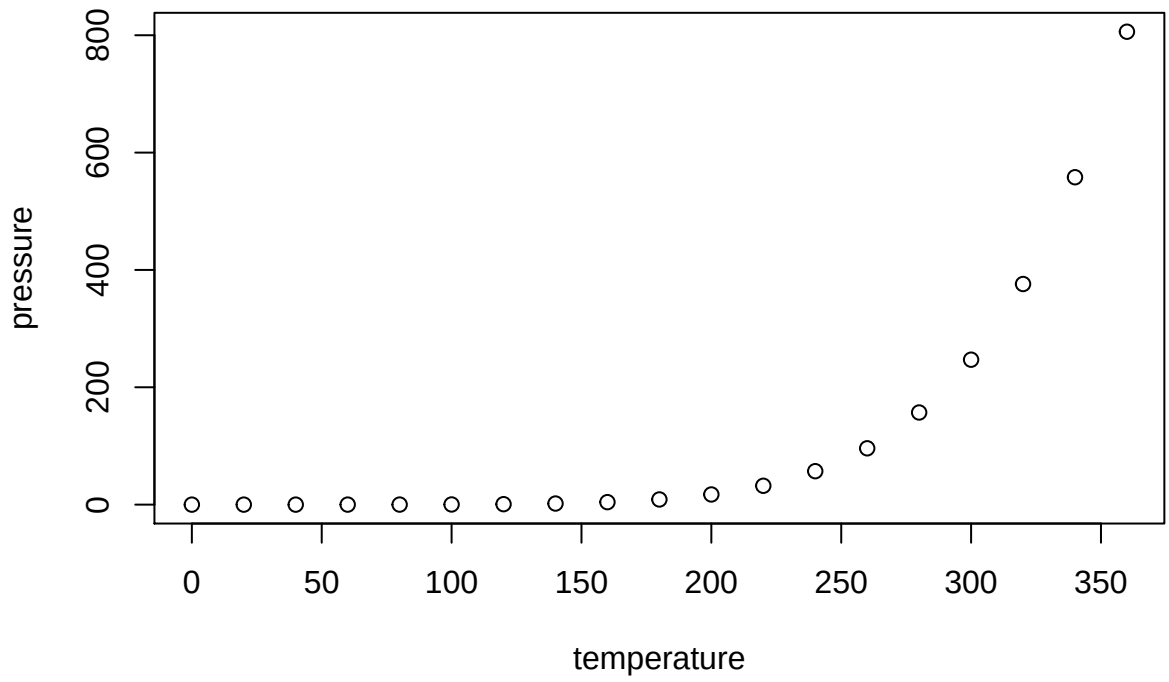
When you click the **Knit** button a document will be generated that includes both content as well as the output of any embedded R code chunks within the document. You can embed an R code chunk like this:

```
##      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.