

SUPPLEMENTARY INFORMATION FOR

The rise of carnivoran mammals in Europe through the lens of body mass

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SUPPLEMENTARY METHODS

Modifications of the tree from Faurby et al.

We replaced the following OTUs by congeneric taxa we have body mass data for:

Amphictis aginensis is replaced by *Amphictis ambigua*
Amphictis antiqua is replaced by *Amphictis milloquensis*
Apterodon altidens is replaced by *Apterodon rauenbergensis*
Bathygale lemanensis is replaced by *Bathygale julieni*
Cephalogale shareri is replaced by *Cephalogale brevirostris*
Cephalogale ginesticus is replaced by *Cephalogale minor*
Hyaenodon brevirostris is replaced by *Hyaenodon exiguus*
Hyaenodon chunkhtensis is replaced by *Hyaenodon heberti*
Hyaenodon crucians is replaced by *Hyaenodon minor*
Hyaenodon eminus is replaced by *Hyaenodon requieni*
Miacis deutschii is replaced by *Miacis? macintyri*
Mustelictis piveteaui is replaced by *Mustelictis cf major*
Pachycynodon tedfordi is replaced by *Pachycynodon crassirostris*
Palaeoprionodon lamandini is replaced by *Palaeoprionodon mutabilis*
Paramiacis teilharti is replaced by *Paramiacis teilhardi*
Plesictis humilidens is replaced by *Plesictis branssatensis*
Plesictis julieni is replaced by *Plesictis stenogalinus*
Pseudocyonopsis antiquus is replaced by *Pseudocyonopsis ambiguus*
Stenogale aurelianensis is replaced by *Stenogale branssatensis*
Stenogale brevidens is replaced by *Stenogale crassa*
Stenogale julieni is replaced by *Stenogale gracilis*
Stenoplesictis muhoronii is replaced by *Stenoplesictis minor*
Viverravus acutus is replaced by *Viverravus lawsoni*

We also added taxa as sister lineages to OTUs or clade:

Bavarictis gaimersheimensis is added as the sister lineage to the clade containing:
Plesictis genetoides+*Plesictis dieupentalensis*+*Plesictis stenogalinus*+*Plesictis bransattensis* (*Plesictis*)

Brachycyon gaudryi is added as the sister lineage to the clade containing: *Cynelos lemanensis*+*Cynelos rugosidens*+*Cynelos crassidens*+*Ysengrinia tolosana*+*Crassidia intermedia*+*Goupilicteis minor*+*Pseudocyonopsis ambiguus* (*Amphicyoninae*)

Brachycyon palaeolycos is added as the sister lineage to *Brachycyon gaudryi*

Harpagocyon inusitatus is added as the sister lineage to the clade containing:
Brachycyon gaudryi+*Cynelos rugosidens*+*Brachycyon palaeolycos* (*Brachycyon*)

Symplectocyon praecursor is added as the sister lineage to the clade containing: *Harpagocyon inusitatus*+*Brachycyon gaudryi*+*Cynelos rugosidens*+*Brachycyon palaeolycos* (*Brachycyon* + *Harpagocyon*)

Cartierodon egerkingensis is added as the sister lineage to the clade containing: *Leonhardtina godinoti*+*Leonhardtina gracilis* (*Leonhardtina*)

Cynodictis compressidens is added as the sister lineage to *Cynodictis lacustris*

Cynodictis palmidens is added as the sister lineage to *Cynodictis compressidens*

Haplocyon dombrowskii is added as the sister lineage to *Haplocyon elegans*

Leonhardtina meridianum is added as the sister lineage to *Leonhardtina gracilis*

Matthodon peignei is added as the sister lineage to *Matthodon tritens*

Oxyaenoides aumelasiensis is added as the sister lineage to *Oxyaenoides lindgreni*

Eusmilus bidentatus is added as the sister lineage to the clade containing: *Hoplophoneus bidentatus*+*Hoplophoneus cerebralis*+*Hoplophoneus mentalis*+*Hoplophoneus occidentalis*+*Hoplophoneus primaevus*+*Hoplophoneus sicarius*+*Hoplophoneus villebramarensis* (*Hoplophoneus*)

Eusmilus villebramarensis is added as the sister lineage to *Eusmilus bidentatus*

Pachycynodon boriei is added as the sister lineage to *Pachycynodon crassirostris*

Pachycynodon cf dubius is added as the sister lineage to *Pachycynodon boriei*

Pseudocyonopsis landesquei is added as the sister lineage to *Pseudocyonopsis ambiguus*

Storchictis miacinus is added as the sister lineage to the clade containing: *Cynodictis lacustris*+*Cynodictis palmidens*+*Cynodictis compressidens* (*Cynodictis*)

Sarcocyon ferox is added as the sister lineage to the clade containing: *Haplocyon crassidens*+*Haplocyon elegans*+*Haplocyon crucians* (*Haplocyon*)

Viretictis gaillardi is added as the sister lineage to the clade containing: *Stenoplesictis cayluxi*+*Stenogale crassa* (*Stenogale* + *Stenoplesictis*)

SUPPLEMENTARY FIGURES

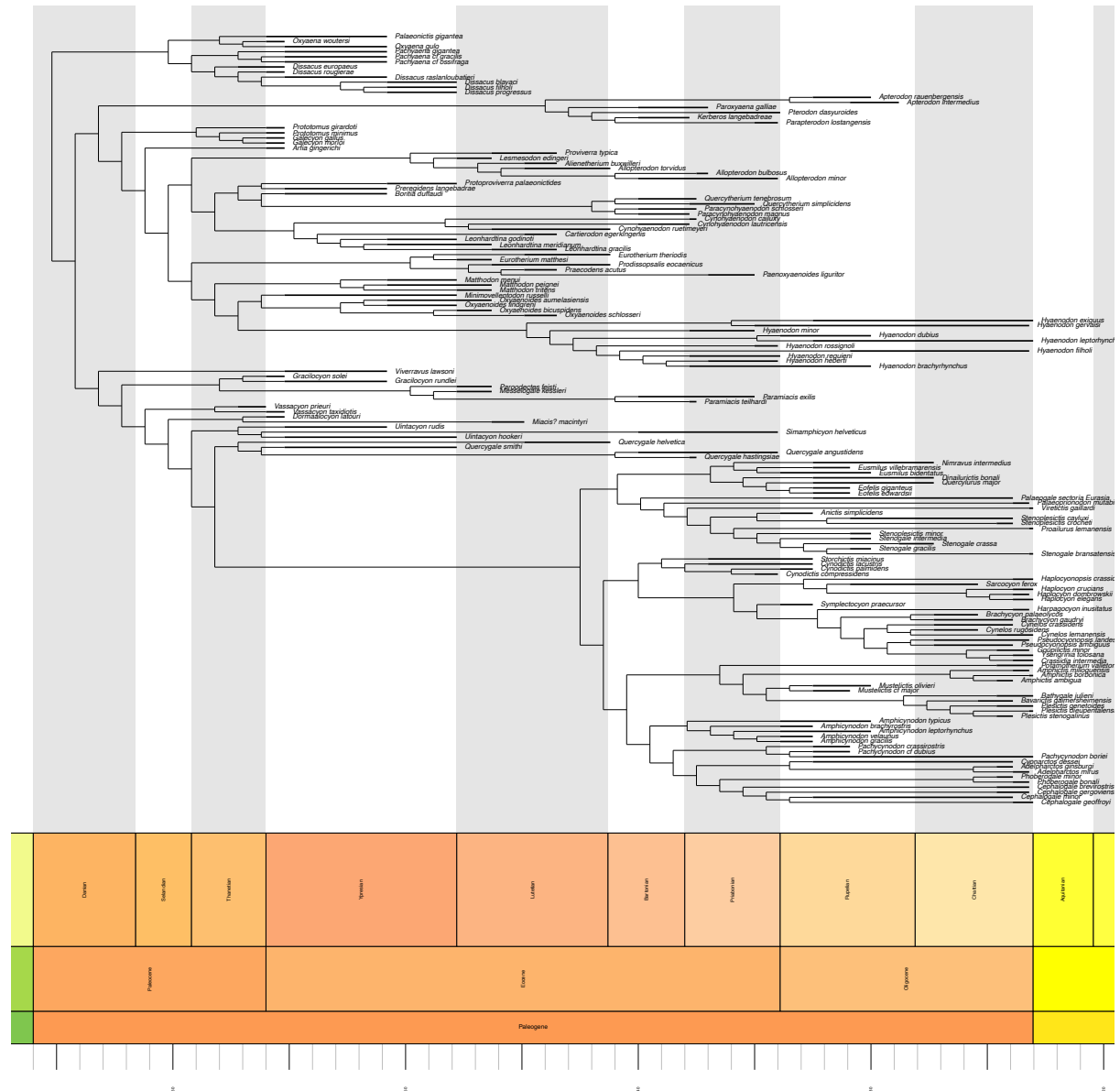
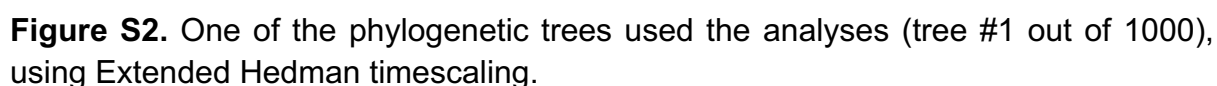


Figure S1. One of the phylogenetic trees used the analyses (tree #1 out of 1000), using minimum branch length timescaling.



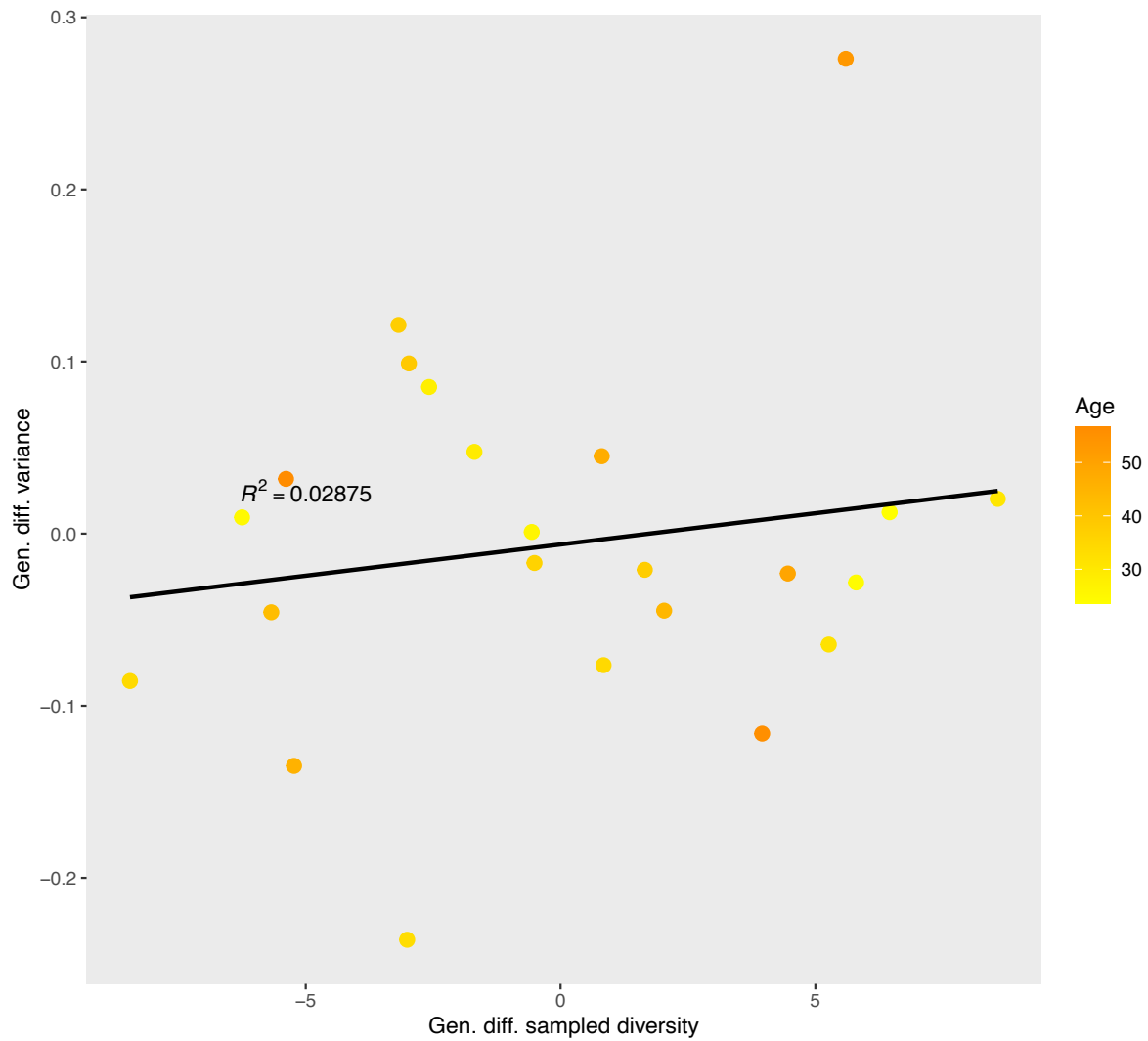


Figure S3. Correlation between sampled diversity (after generalised differencing) and body mass variance (after generalised differencing), per temporal bin (MP ages).

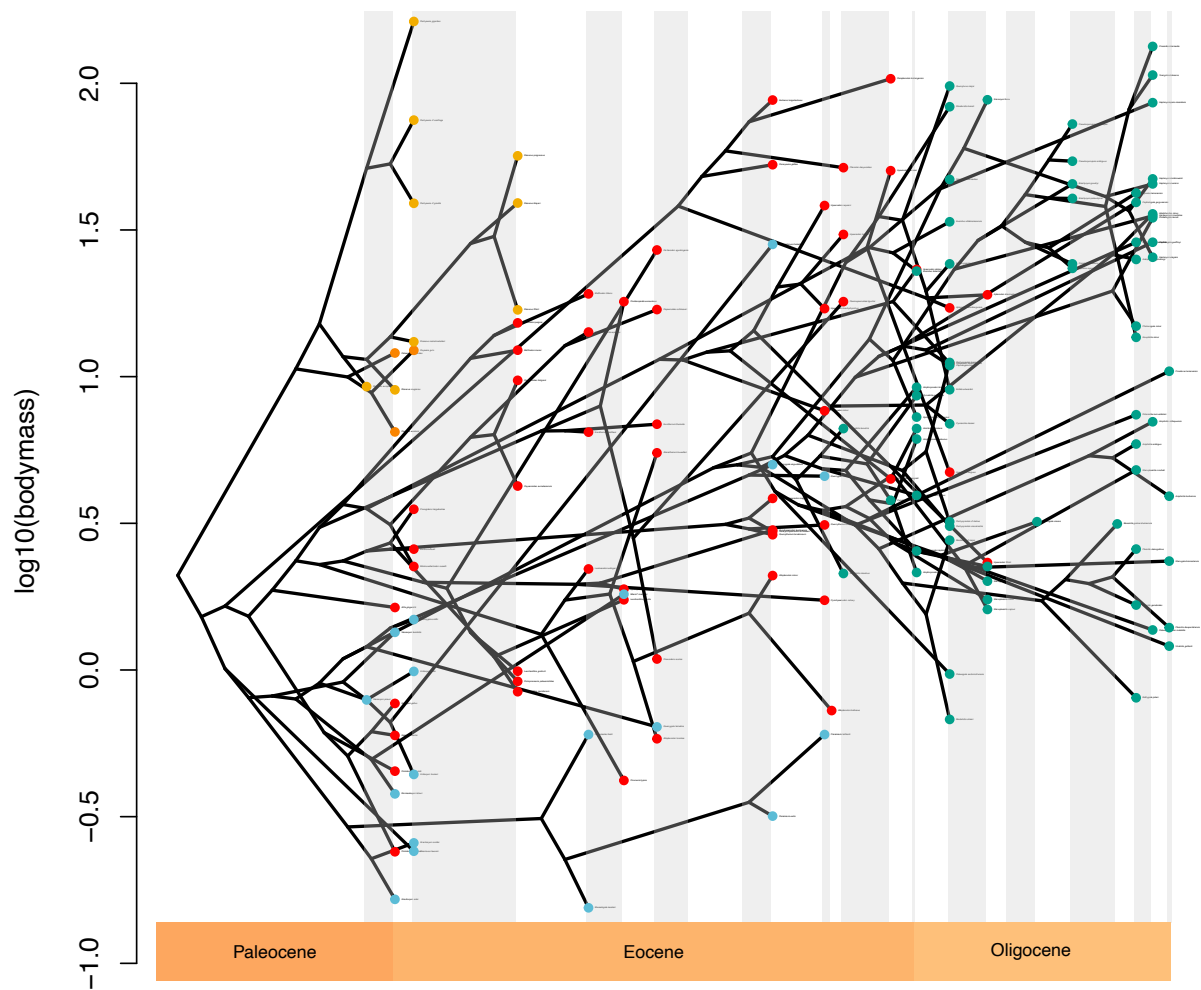


Figure S4. Phenogram of body mass evolution through time for the European carnivorous mammals we sampled; minimum branch length timescaled tree #1. See figures 1, 2 for the clade colour legend.

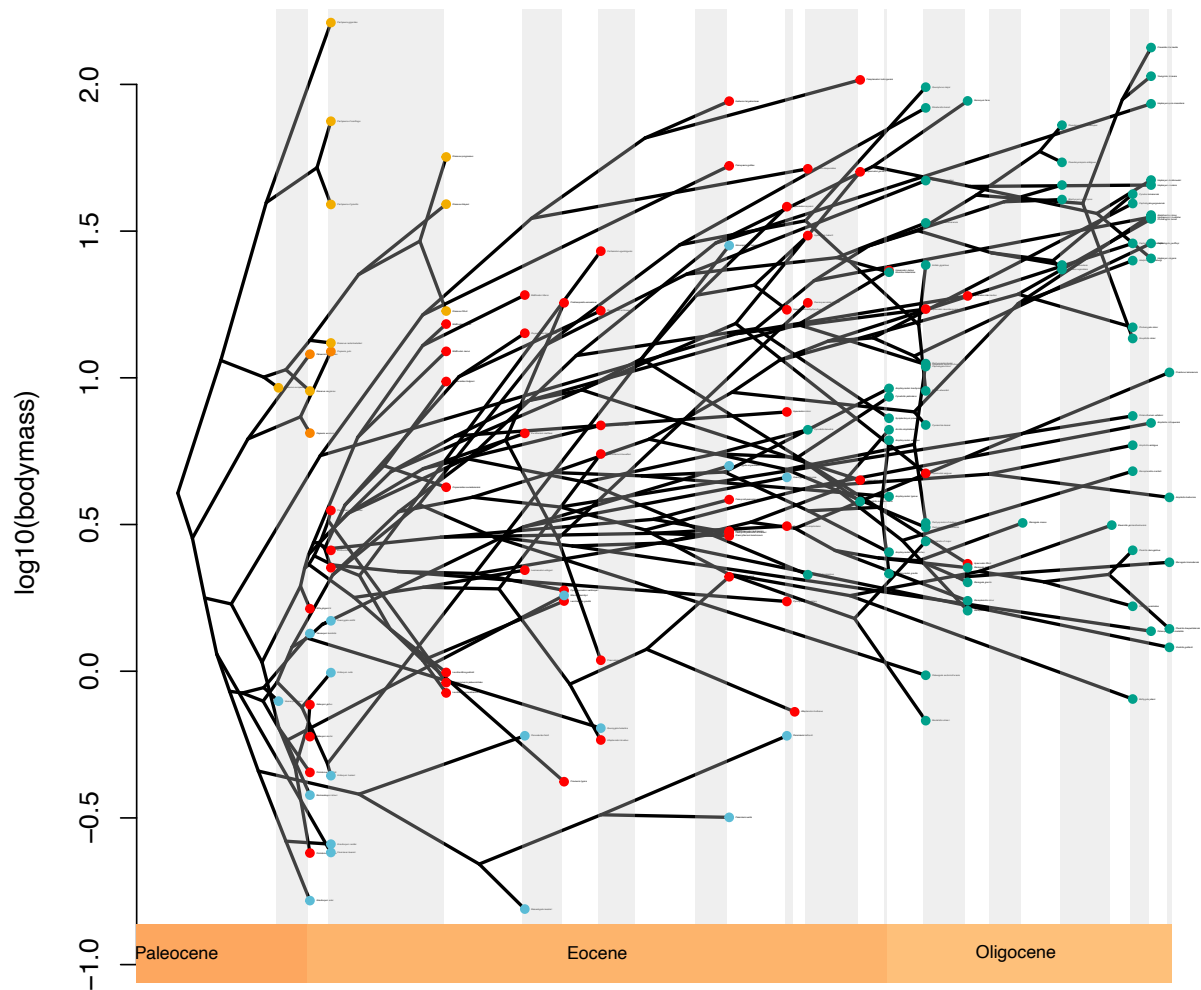
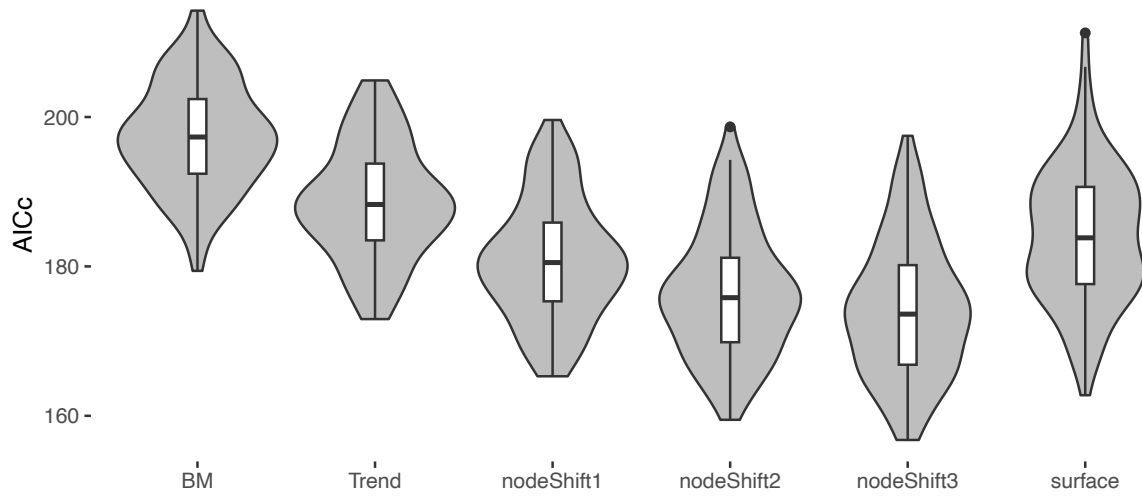


Figure S5. Phenogram of body mass evolution through time for the European carnivorous mammals we sampled; Extended Hedman timescaled tree #1. See figures 1, 2 for the clade colour legend.

A MBL trees



B Extended Hedman trees

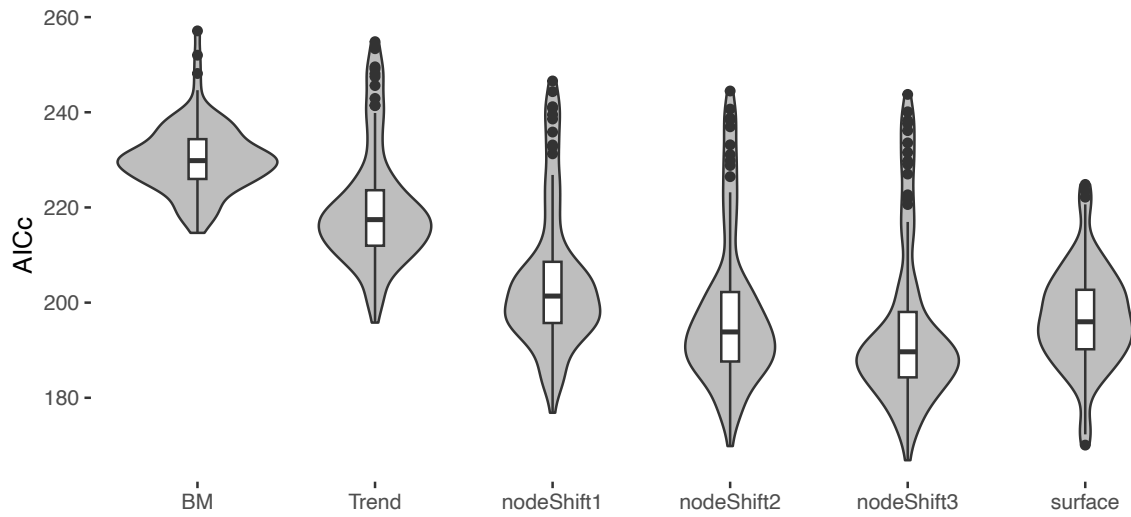


Figure S6. Distribution of AICc values across models for trees timescaled using the mbl (A) and the Extended Hedman (B) algorithms.

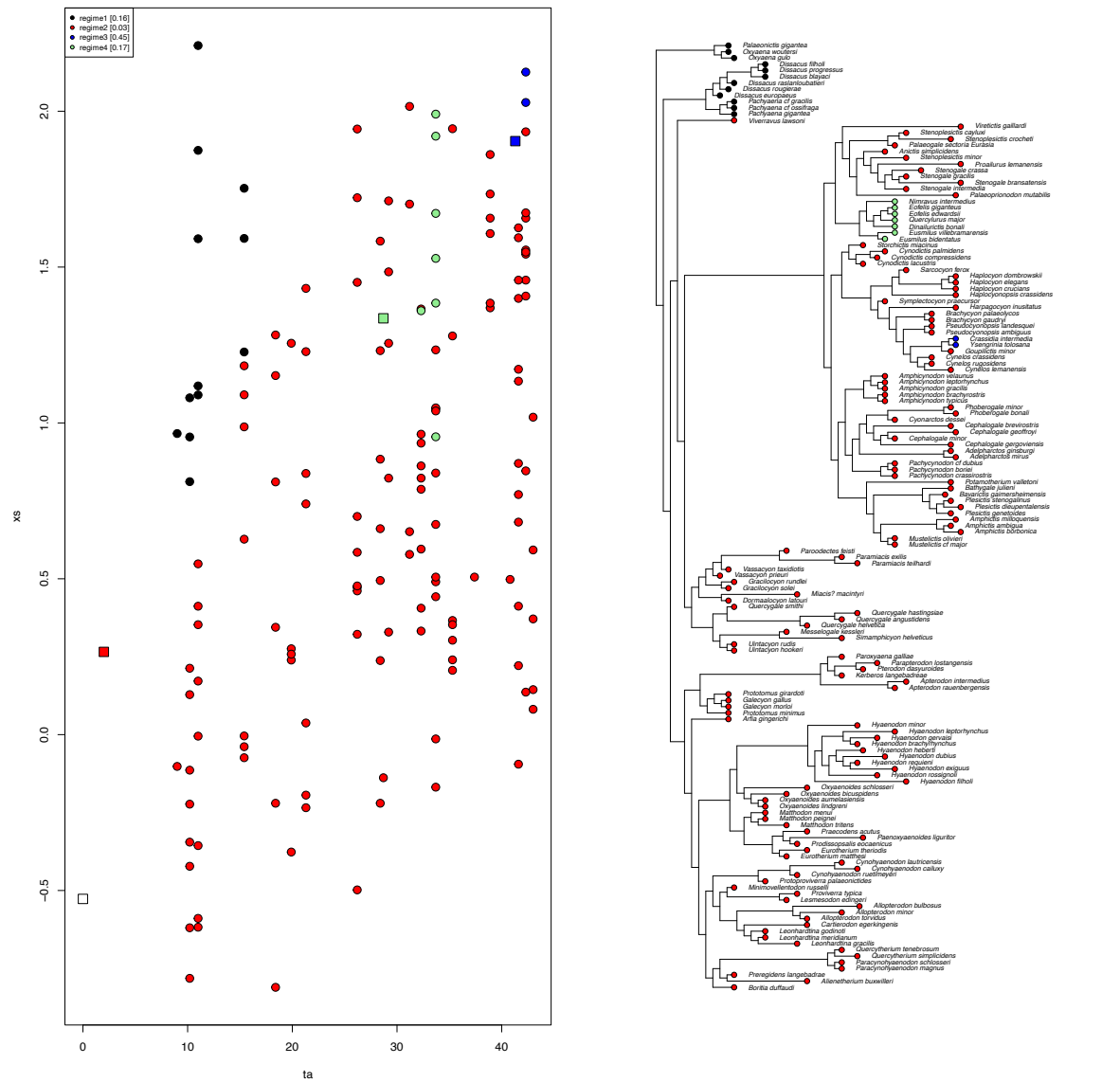


Figure S7. The best (lowest AICc) model for the randomly sampled (100 in total) minimum branch length timescaled trees: 3 node shift trend model on tree #100. Left panel shows body mass tip values (Y-axis) with time in million years accumulated since the root (X-axis) and coloured by regime; squares are ancestral states assuming Brownian motion and the white one is the tree root. The right panel is the timescaled tree with the tips coloured by their regime.

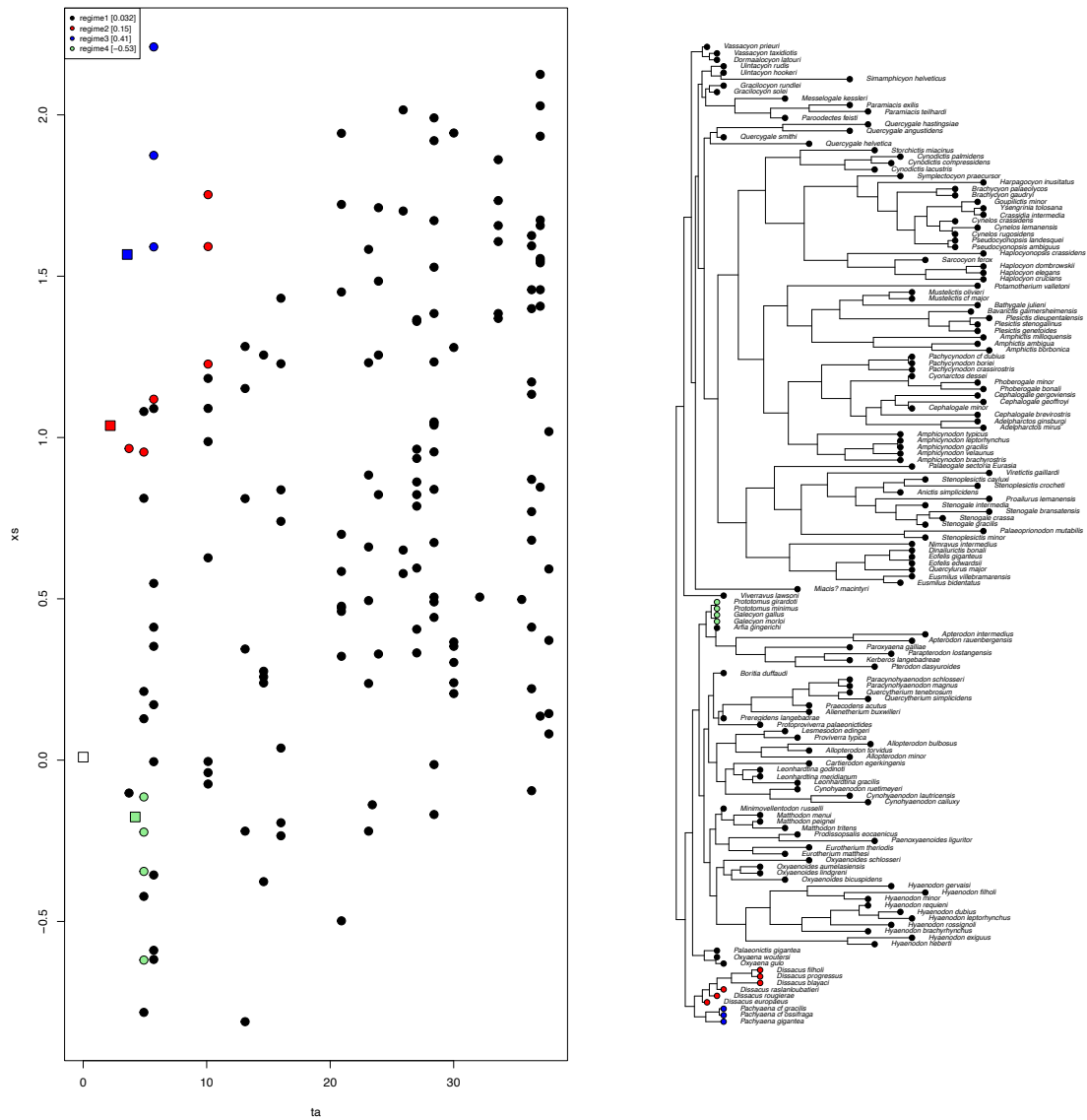


Figure S8. The best (lowest AICc) model for the randomly sampled (100 in total) Extended Hedman timescaled trees: 3 node shift trend model on tree #65. Left panel shows body mass tip values (Y-axis) with time in million years accumulated since the root (X-axis) and coloured by regime; squares are ancestral states assuming Brownian motion and the white one is the tree root. The right panel is the timescaled tree with the tips coloured by their regime.

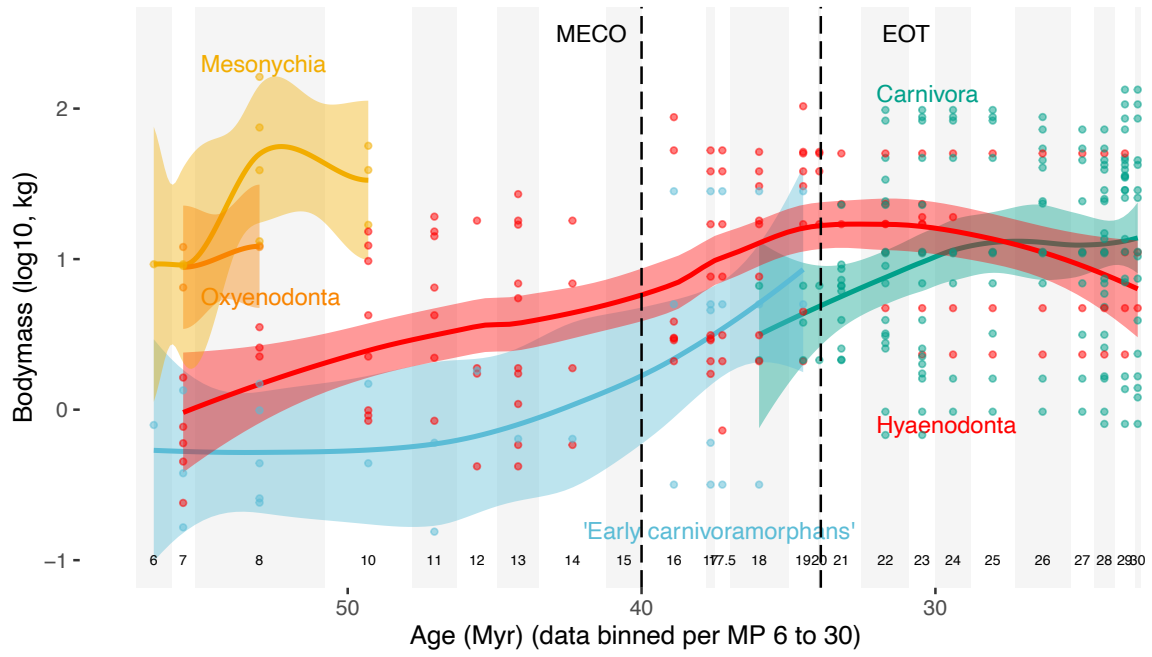


Figure S9. Temporal evolution of body masses of the European carnivorous mammals we sampled, grouped per large clade, and with LOESS regressions.

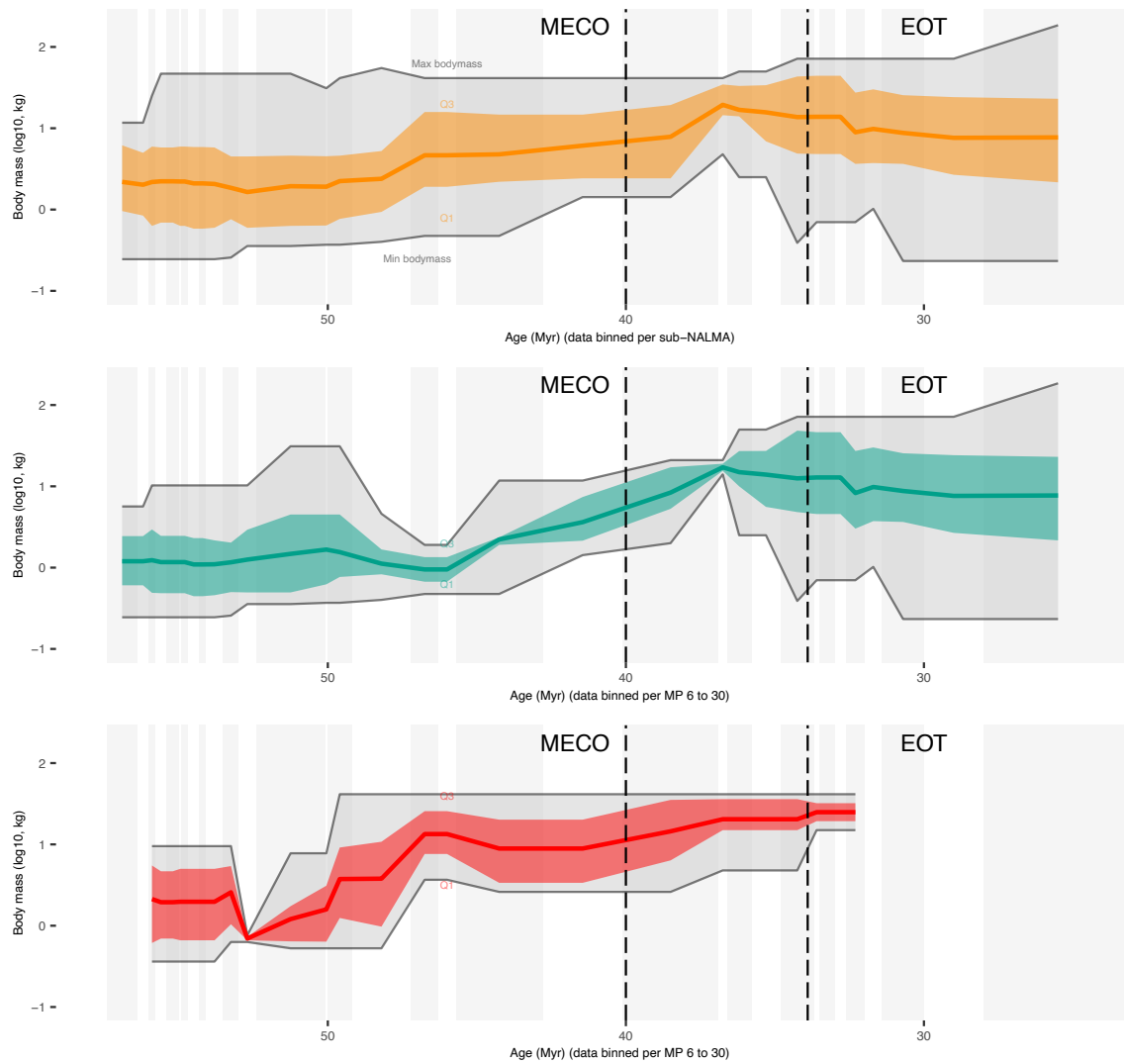


Figure S10. Temporal evolution of body masses (maximum, minimum, 1st and 3rd quartiles [light colours], mean [thick line]) of the North American carnivorous mammals from Juhn et al. 2024. Top: all taxa, middle: Carnivoramorpha, bottom: Hyaeenodonta.

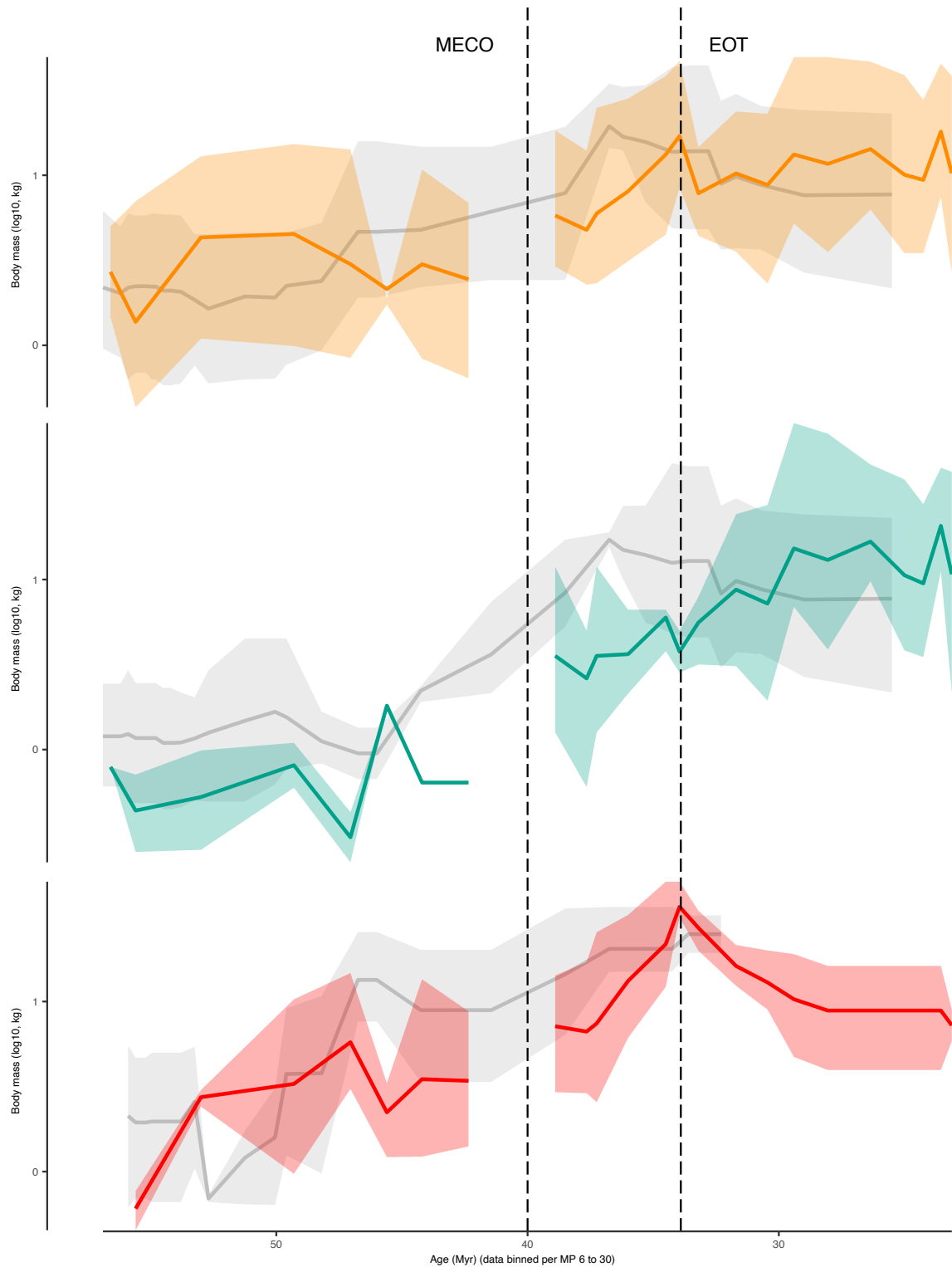


Figure S11. Temporal evolution of body masses (1st and 3rd quartiles [light colours], mean [thick line]) of the North American (grey) and European (coloured) carnivorous mammals. Top: all taxa; middle: Carnivoramorpha; bottom: Hyaenodonta.