

# The inner ear of caviomorph rodents: phylogenetic implications and application to extinct West Indian taxa

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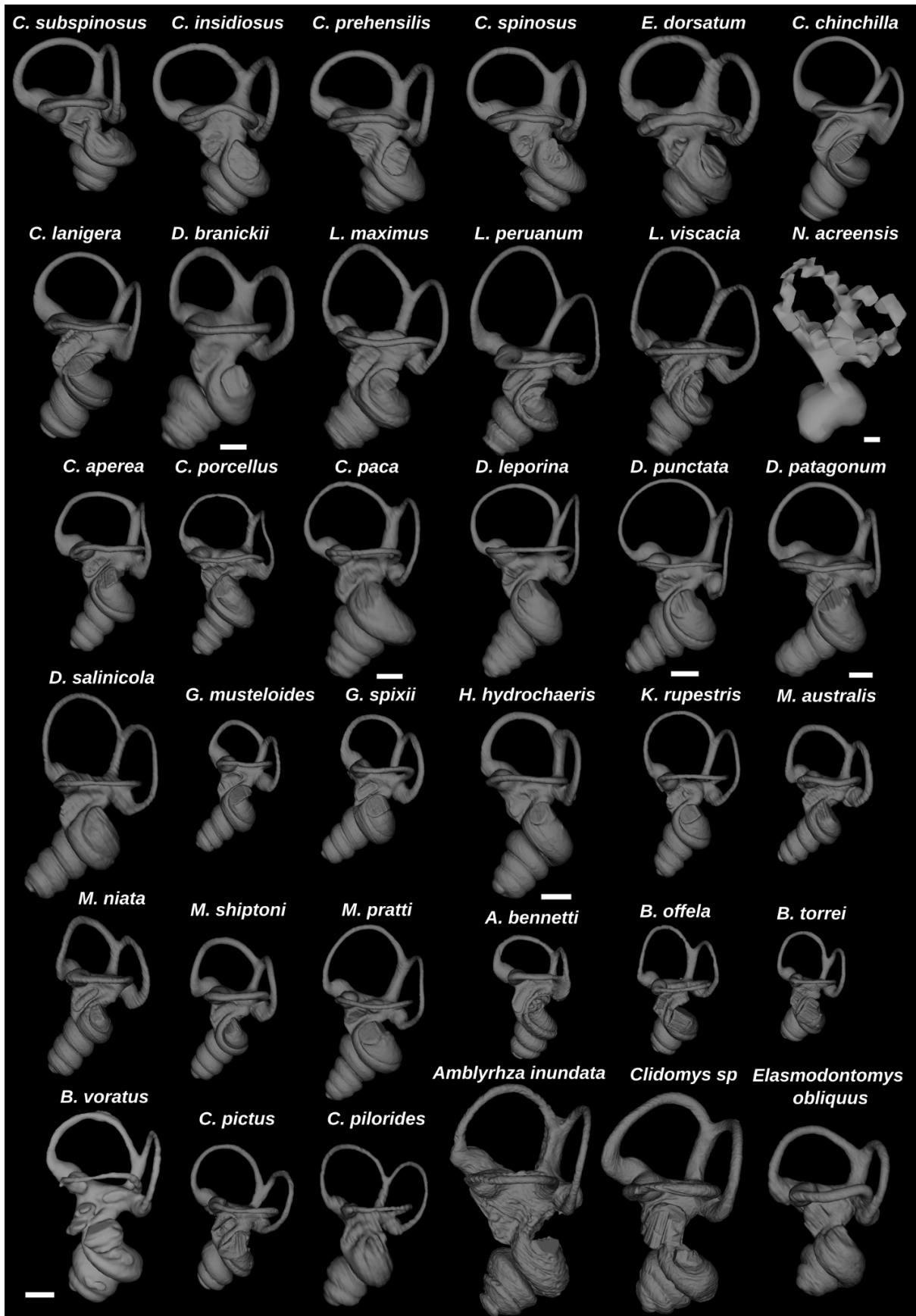
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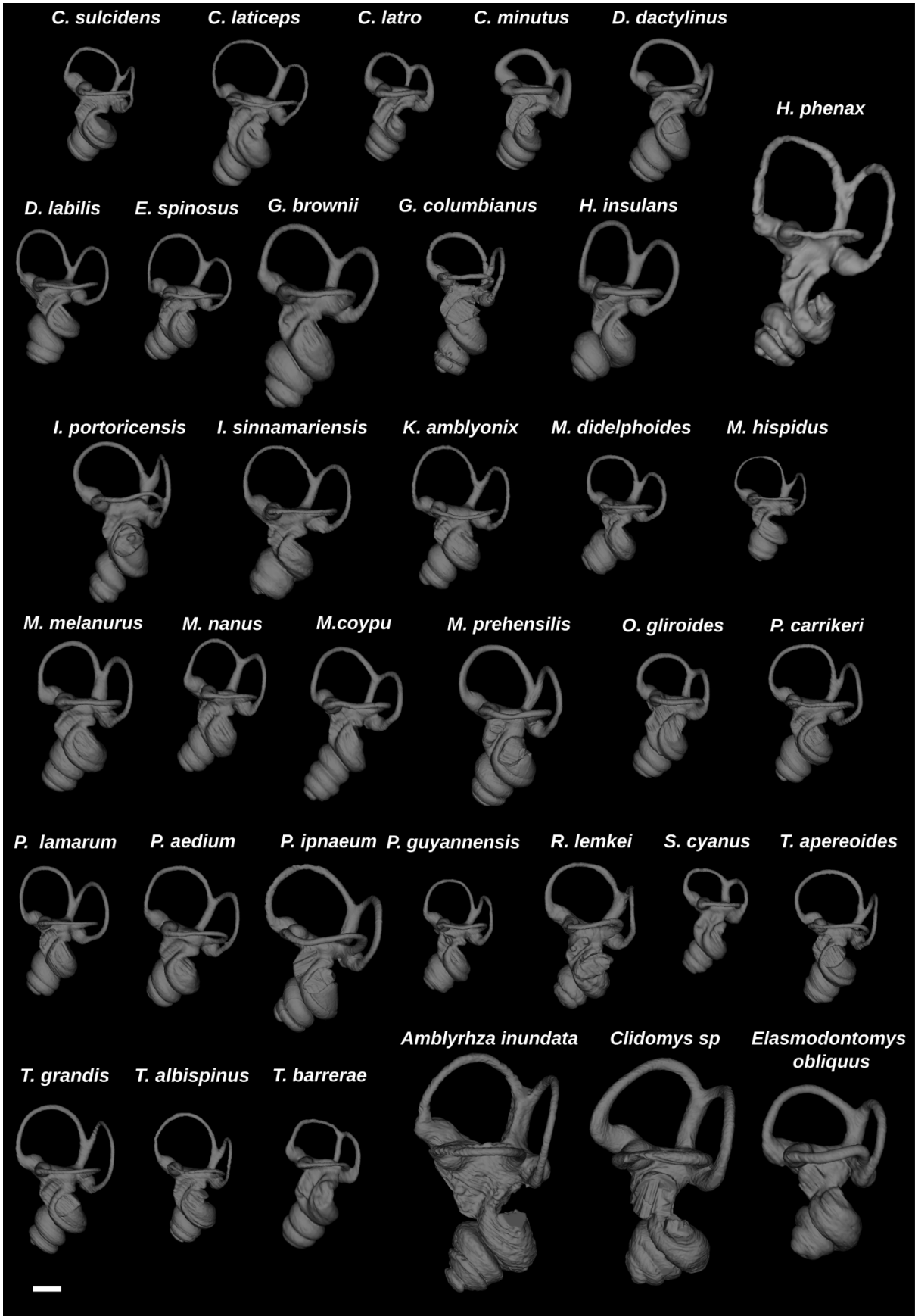
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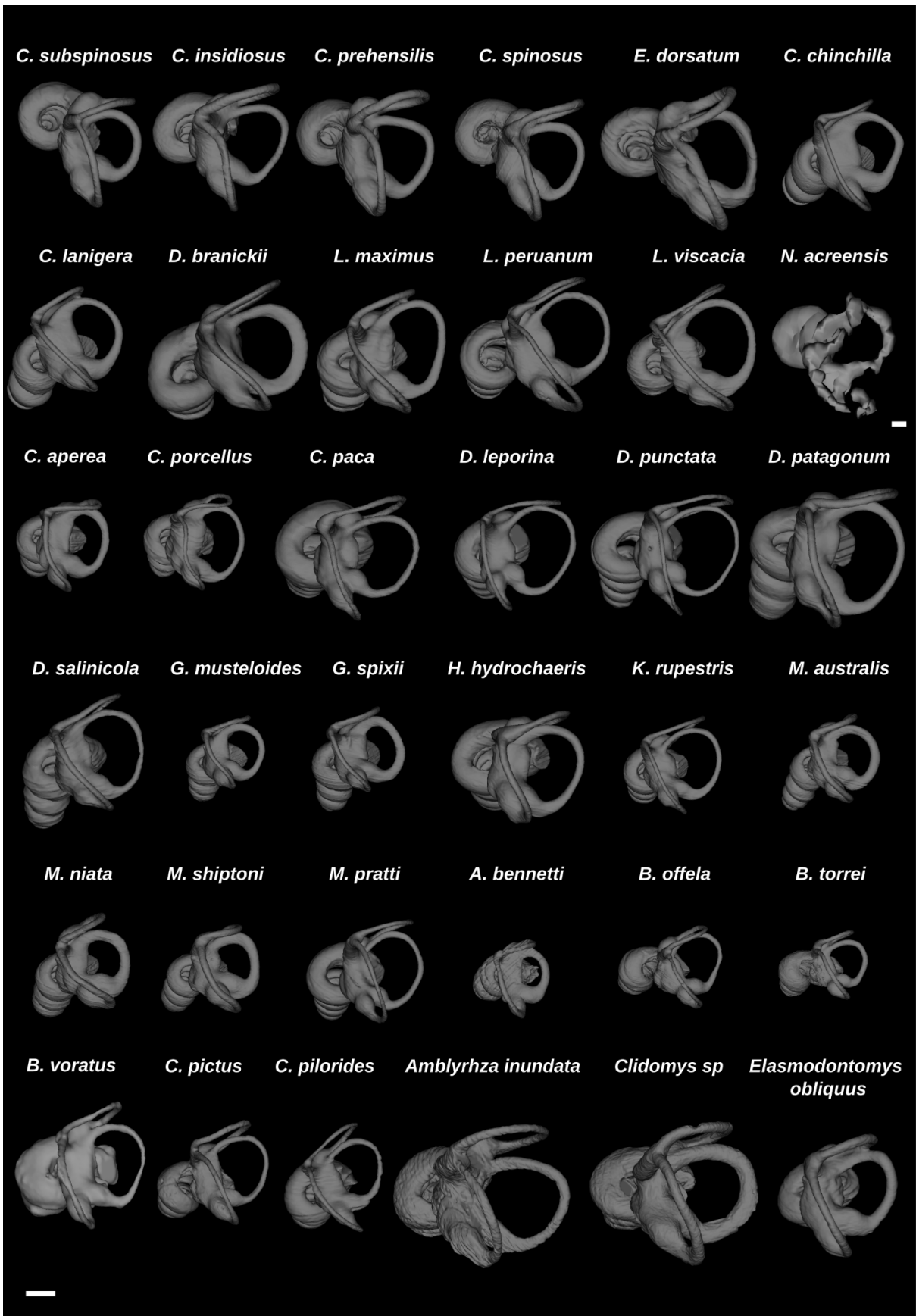
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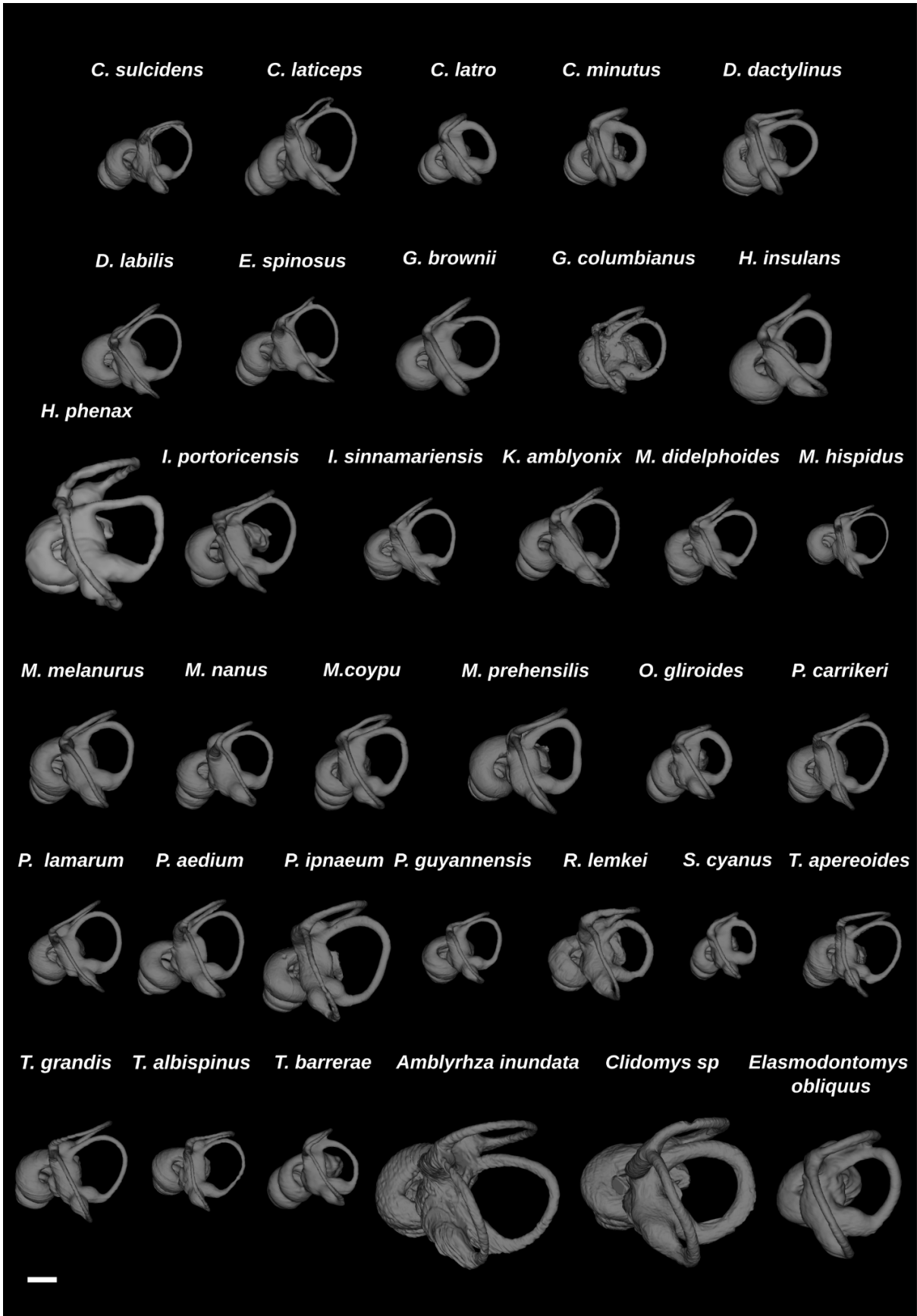
**Fig. S1** First part of the anatomical plate of the left inner ear of Caviomorpha in lateral view. Scale of all specimens is in the bottom left unless another one is specified for the corresponding species. Scale = 1mm



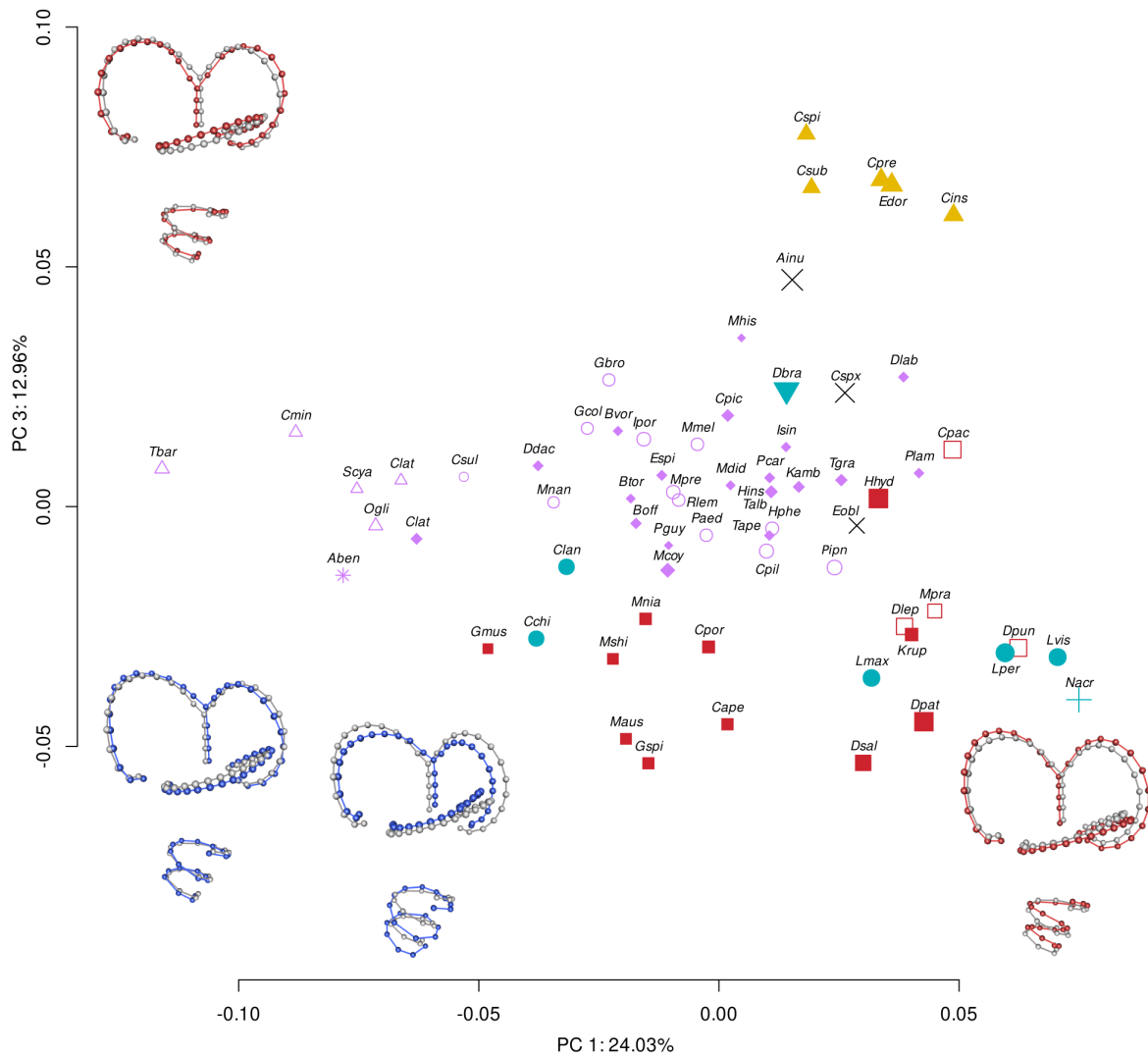
**Fig. S2** Second part of the anatomical plate of the left inner ear of Caviomorpha in lateral view. Scale of all specimens is in the bottom left. Scale = 1mm



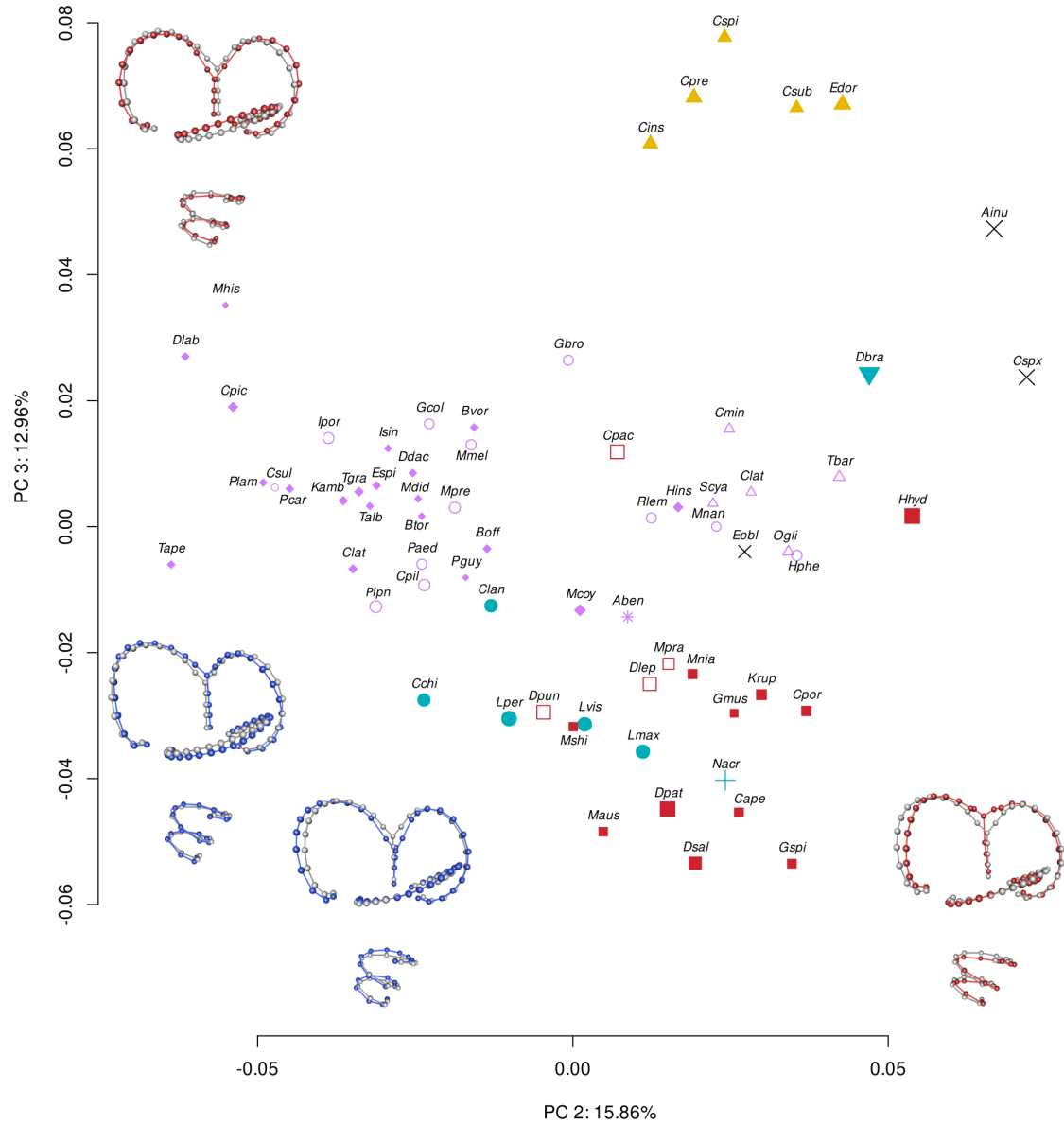
**Fig. S3** First part of the anatomical plate of the left inner ear of Cavimorpha in dorsal view. Scale of all specimens is in the bottom left unless another one is specified for the corresponding species. Scale = 1mm



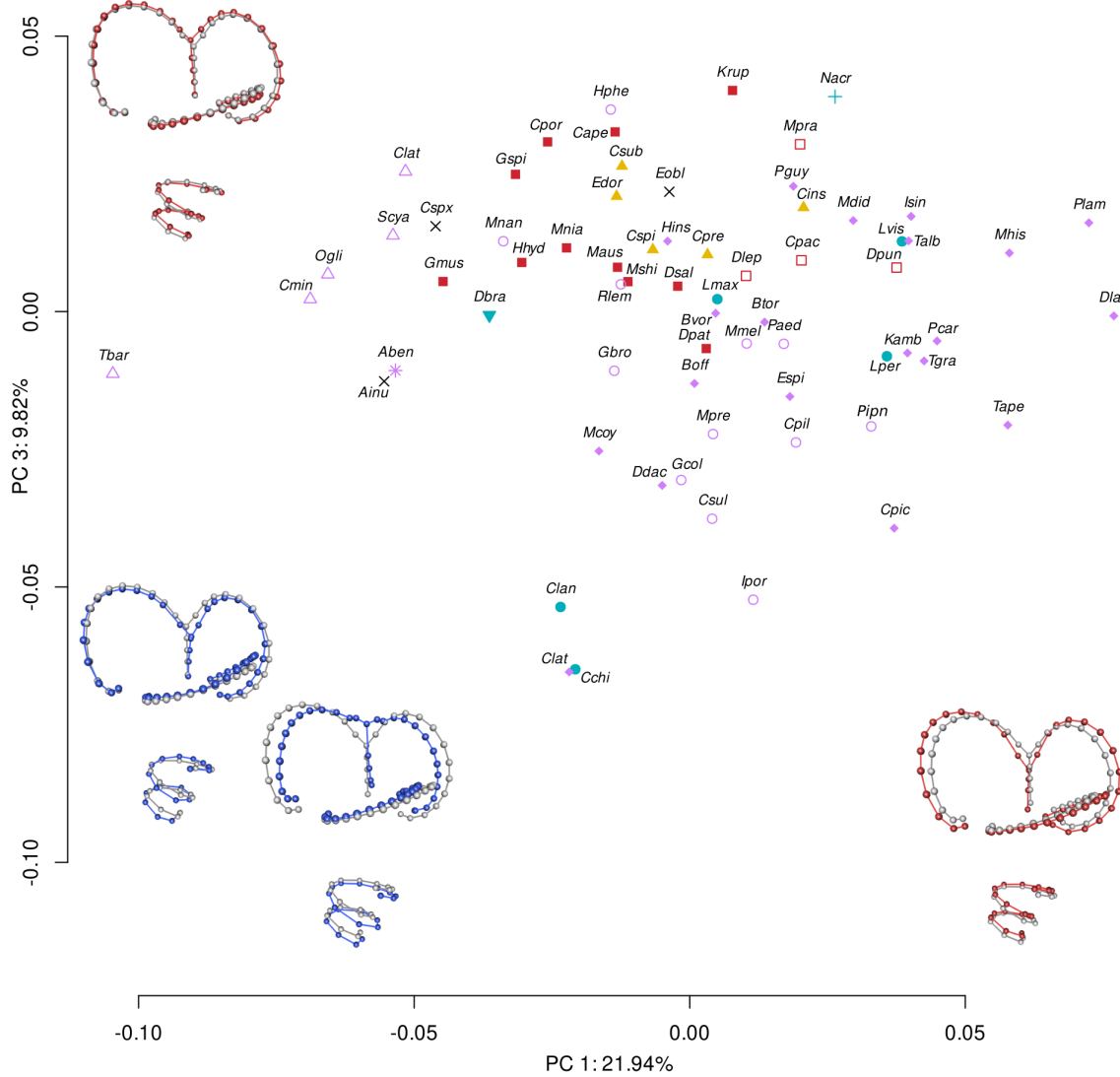
**Fig. S4** First part of the anatomical plate of the left inner ear of Caviomorpha in dorsal view. Scale of all specimens is in the bottom left. Scale = 1mm



**Fig. S5** Principal component analysis (PCA) of the inner ear shape of Caviomorpha and associated line representation of its morphological variation. Bottom inner ears represent extreme shape variation on PC1 and left inner ears on PC3. Minimum shape is represented in a blue line, maximum shape in a red line, and mean shape in a grey line. The size of the points is proportional to the centroid size of the species. Points color and shapes follow the legend of Fig. 1 in the main text. Abbreviations for the species in the figure can be found in the online resource (Supporting Information, Appendix S1)

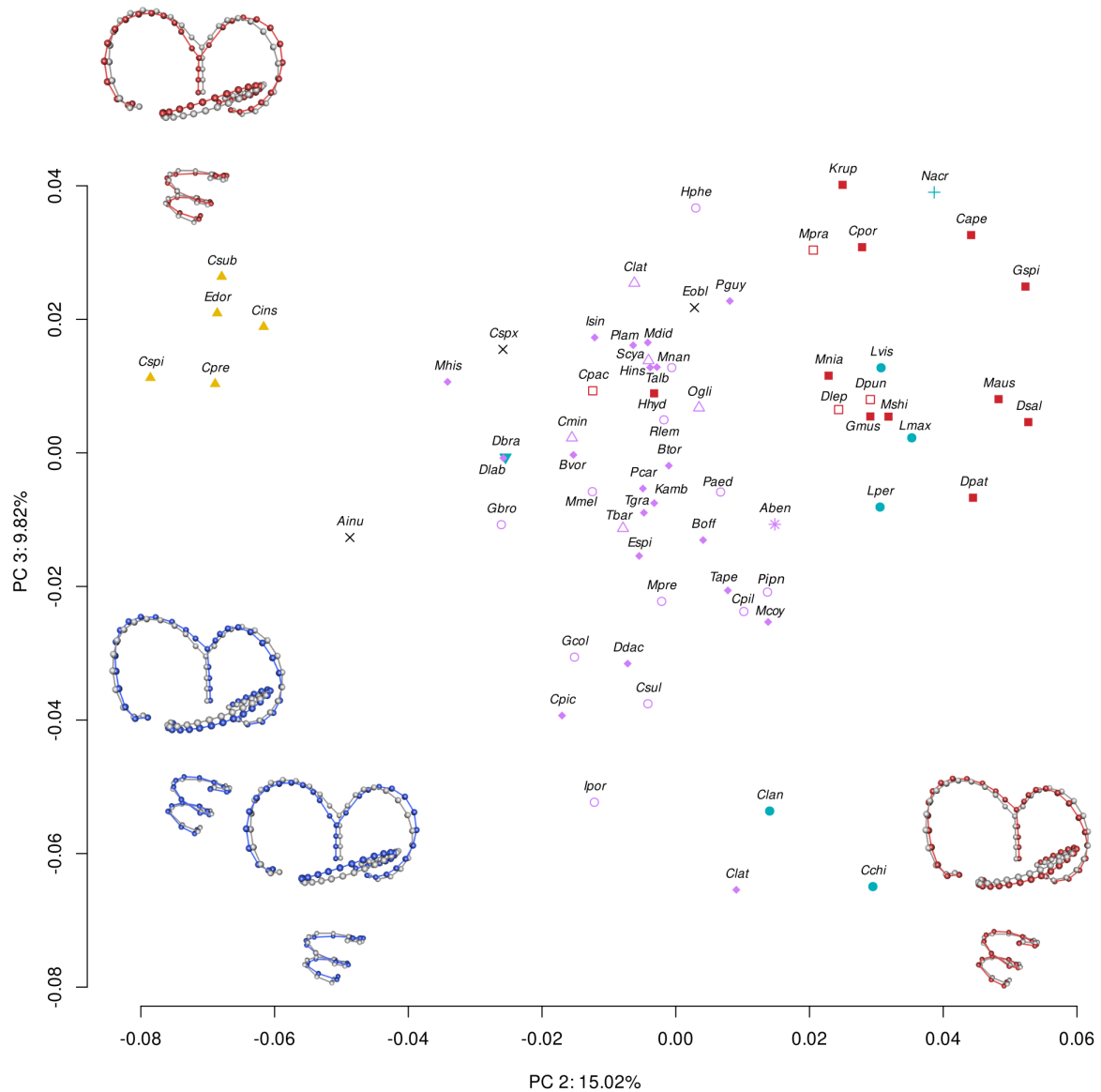


**Fig. S6** Principal component analysis (PCA) of the inner ear shape of Caviomorpha and associated line representation of its morphological variation. Bottom inner ears represent extreme shape variation on PC2 and left inner ears on PC3. Minimum shape is represented in a blue line, maximum shape in a red line, and mean shape in a grey line. The size of the points is proportional to the centroid size of the species. Points color and shapes follow the legend of Fig. 1 in the main text. Abbreviations for the species in the figure can be found in the online resource (Supporting Information, Appendix S1)

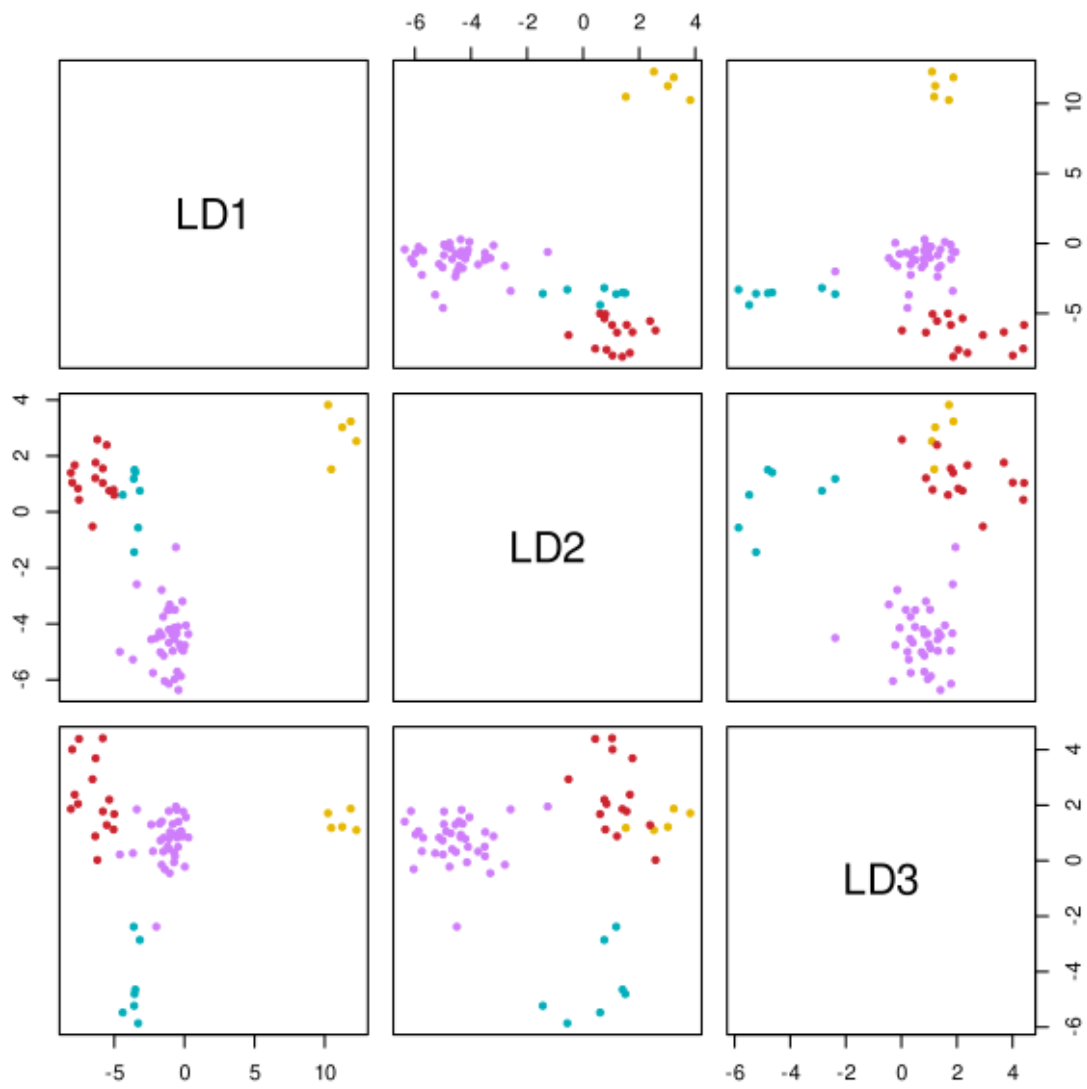


**Fig. S7** Principal component analysis (PCA) of inner ear shape of Caviomorpha corrected for allometry and associated line representation of its morphological variation. Bottom inner ears represent extreme shape variation on PC1 and left inner ears on PC3. Minimum shape is represented in a blue line, maximum shape in a red line, and mean shape in a grey line. Points color and shapes follow the legend of Fig. 1 in the main text. Abbreviations for the species in the figure can be found in the Online Resource (Supporting Information, Appendix S1)

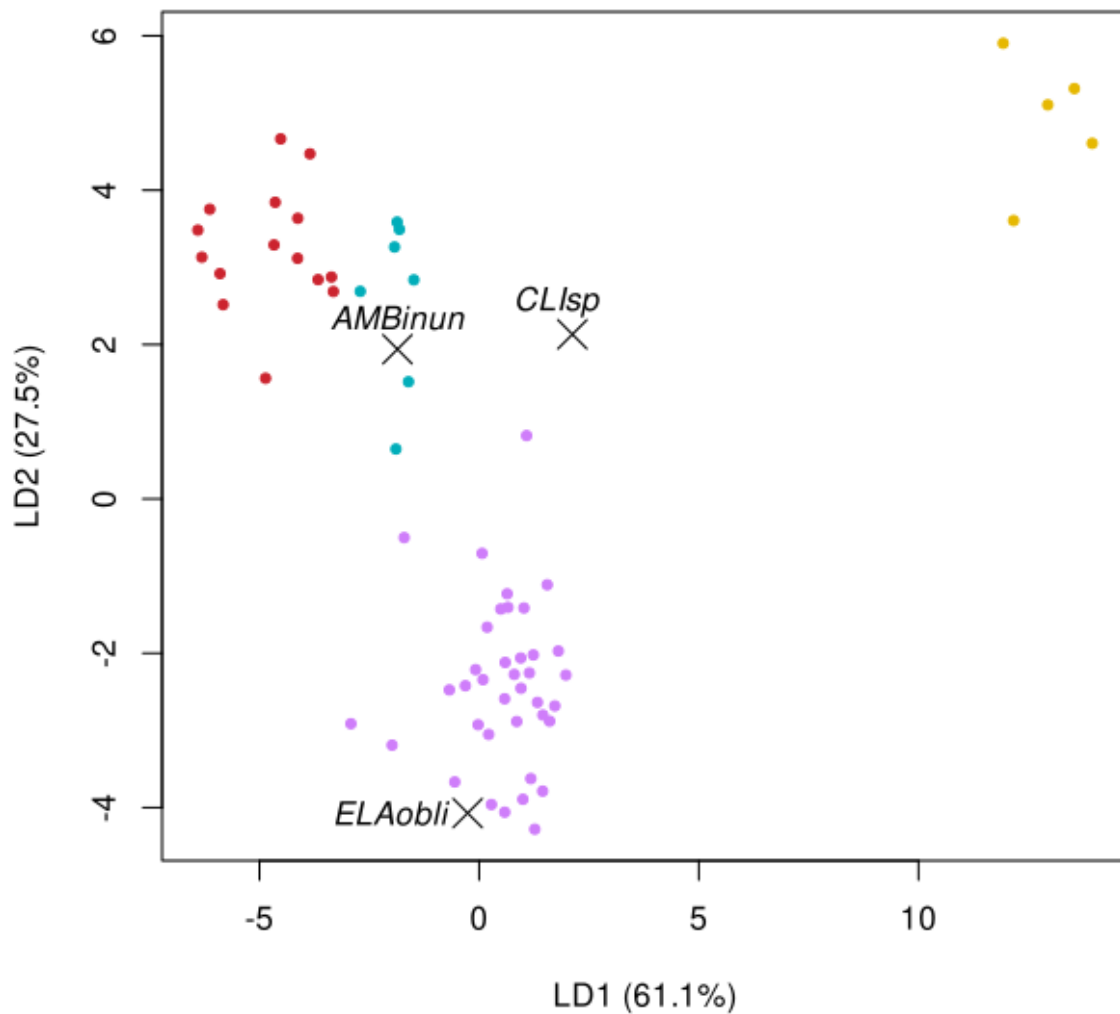




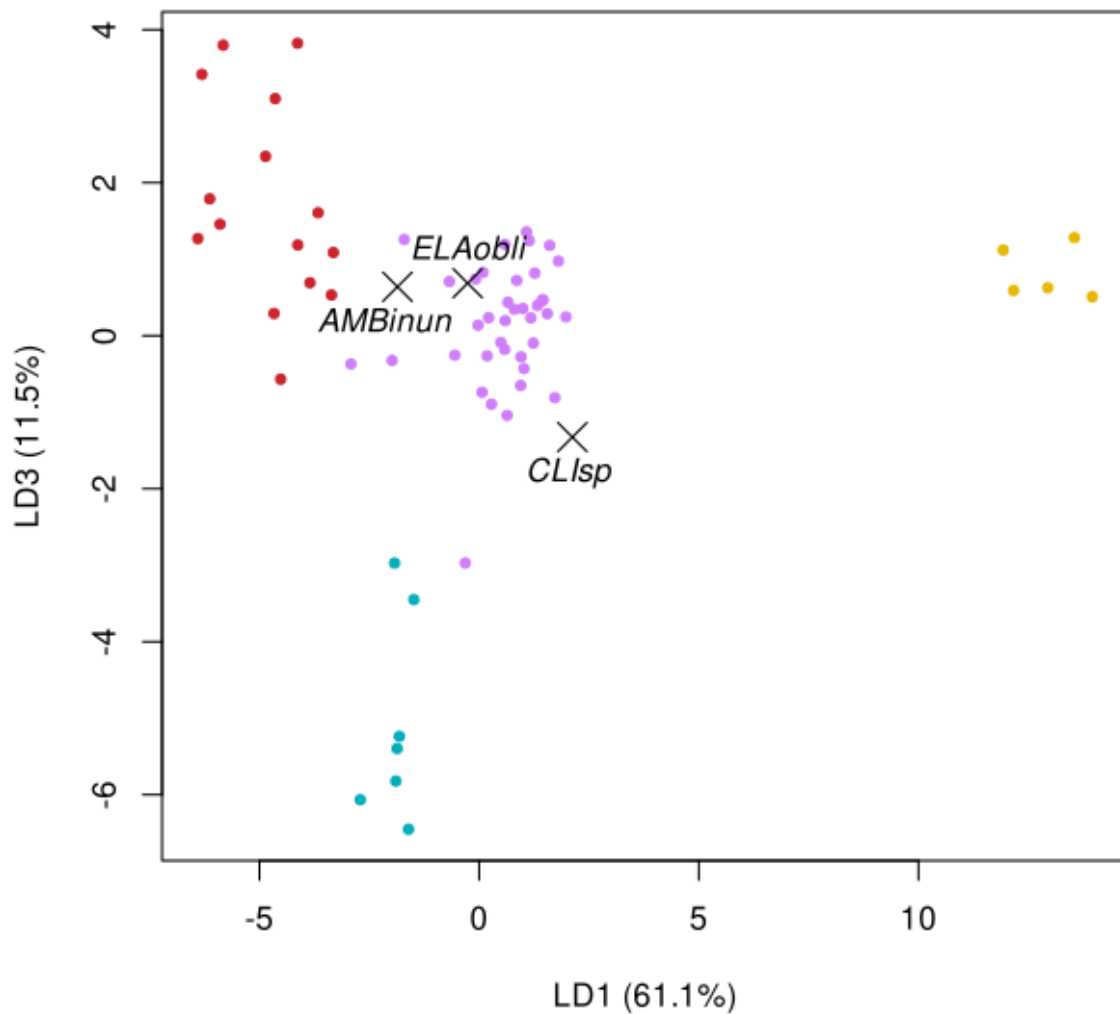
**Fig. S8** Principal component analysis (PCA) of inner ear shape of Cavimorpha corrected for allometry and associated line representation of its morphological variation. Bottom inner ears represent extreme shape variation on PC2 and left inner ears on PC3. Minimum shape is represented in a blue line, maximum shape in a red line, and mean shape in a grey line. Points color and shapes follow the legend of Fig. 1 in the main text. Abbreviations for the species in the figure can be found in the Online Resource (Supporting Information, Appendix S1)



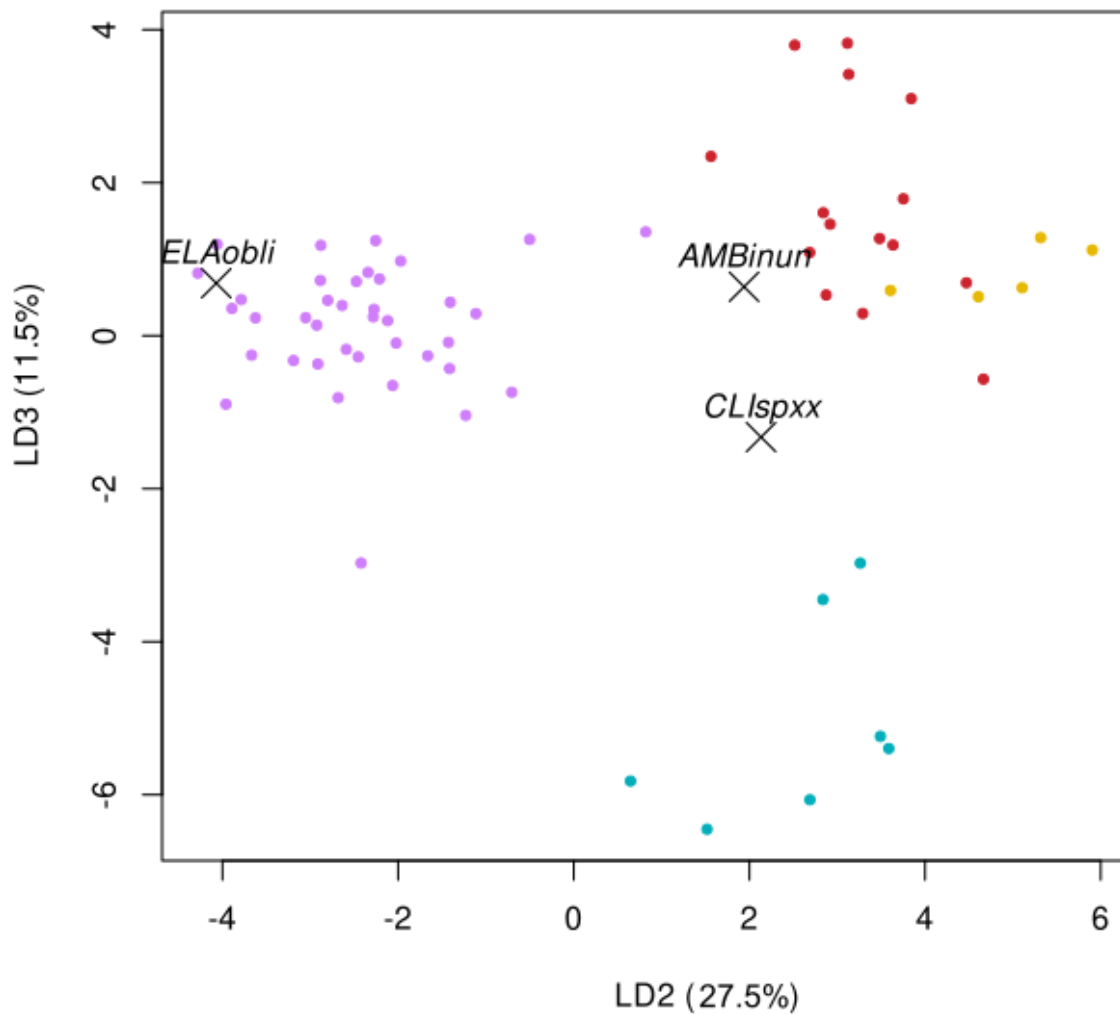
**Fig. S9** Summary of the Linear Discriminant Analysis (LDA) of all species with the exception of Heptaxodontidae. Color of the points correspond to the superfamily: red: Caviioidea, blue: Chinchilloidea, yellow: Erethizontoidea and purple: Octodontoidea



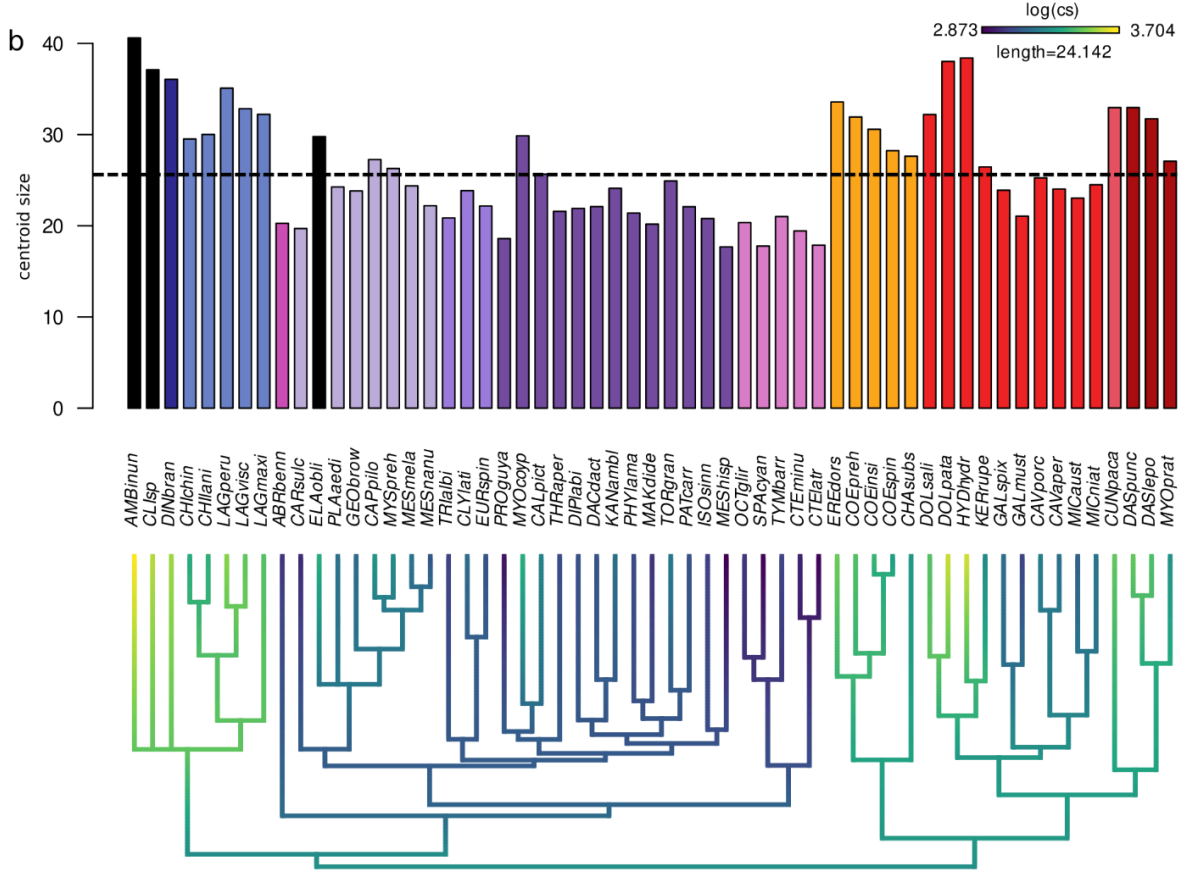
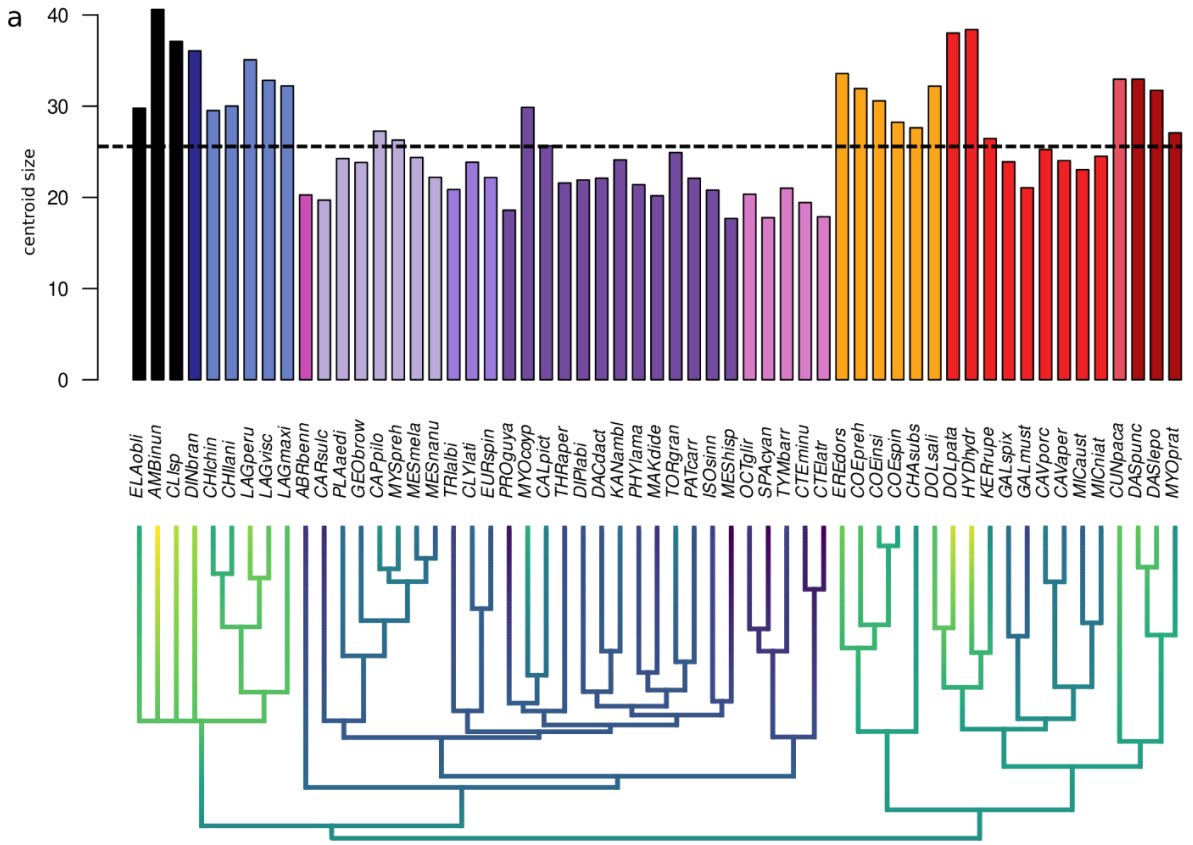
**Fig. S10** Linear Discriminant Analysis (LDA) of all species with a posteriori projection scores of the Heptaxodontidae. LD1 stands for 61.1% of the total variation and LD2 27.5%. Color of the points correspond to the superfamily: red: Cavioidea, blue: Chinchilloidea, yellow: Erethizontoidea and purple: Octodontoidea. Heptaxodontidae are represented by a cross and are colored in black. Abbreviations for the species in the figure can be found in the Online Resource (Supporting Information, Appendix S1)



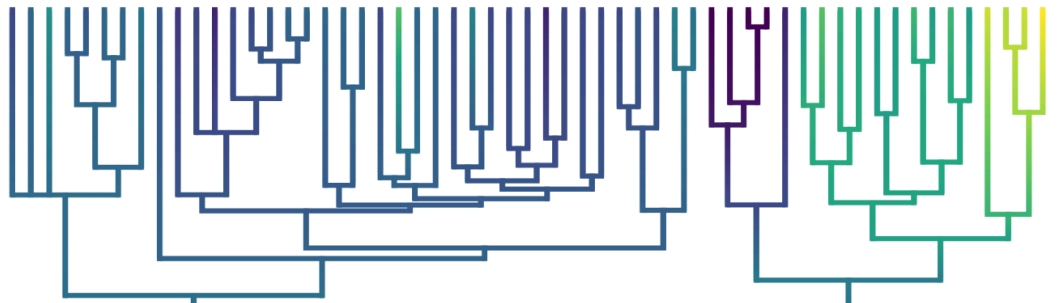
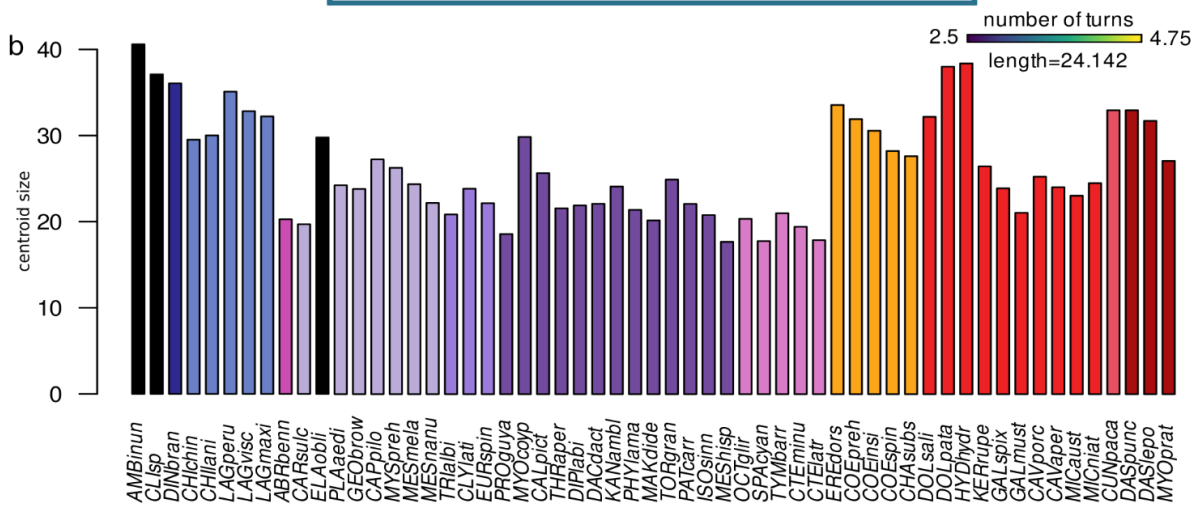
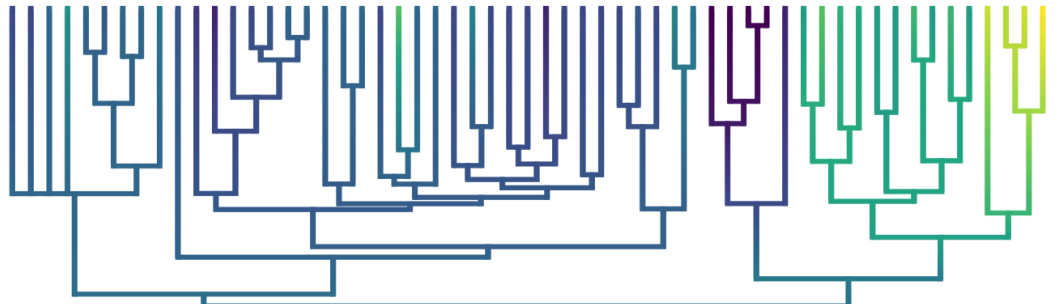
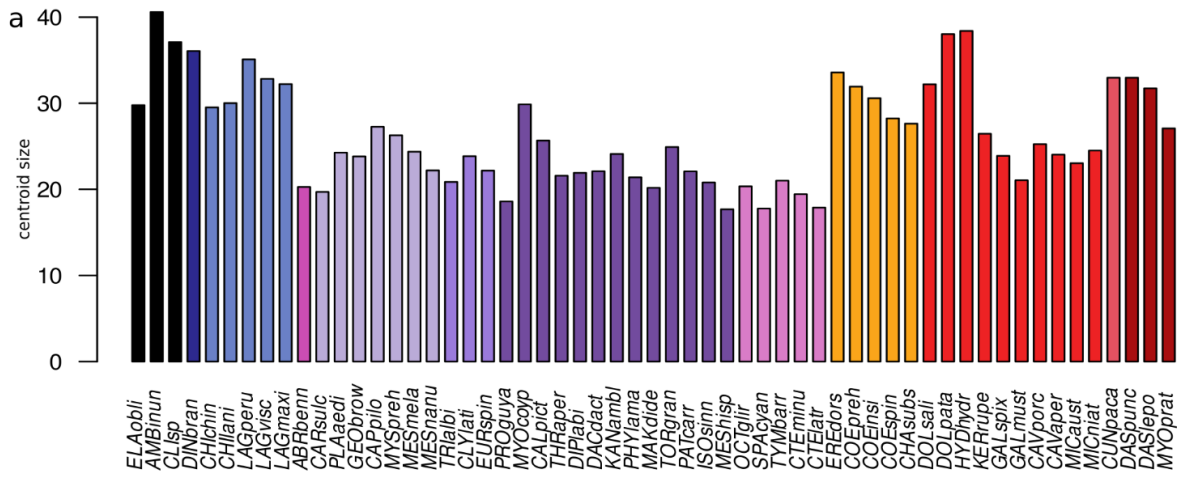
**Fig. S11** Linear Discriminant Analysis (LDA) of all species with a posteriori projection scores of the Heptaxodontidae. LD1 stands for 61.1% of the total variation and LD3 11.5%. Color of the points correspond to the superfamily: red: Cavioidea, blue: Chinchilloidea, yellow: Erethizontoidea and purple: Octodontoidea. Heptaxodontidae are represented by a cross and are colored in black. Abbreviations for the species in the figure can be found in the Online Resource (Supporting Information, Appendix S1)



**Fig. S12** Linear Discriminant Analysis (LDA) of all species with a posteriori projection scores of the Heptaxodontidae. LD2 stands for 27.5% of the total variation and LD3 11.5%. Color of the points correspond to the superfamily: red: Cavioidea, blue: Chinchilloidea, yellow: Erethizontoidea and purple: Octodontoidea. Heptaxodontidae are represented by a cross and are colored in black. Abbreviations for the species in the figure can be found in the Online Resource (Supporting Information, Appendix S1)

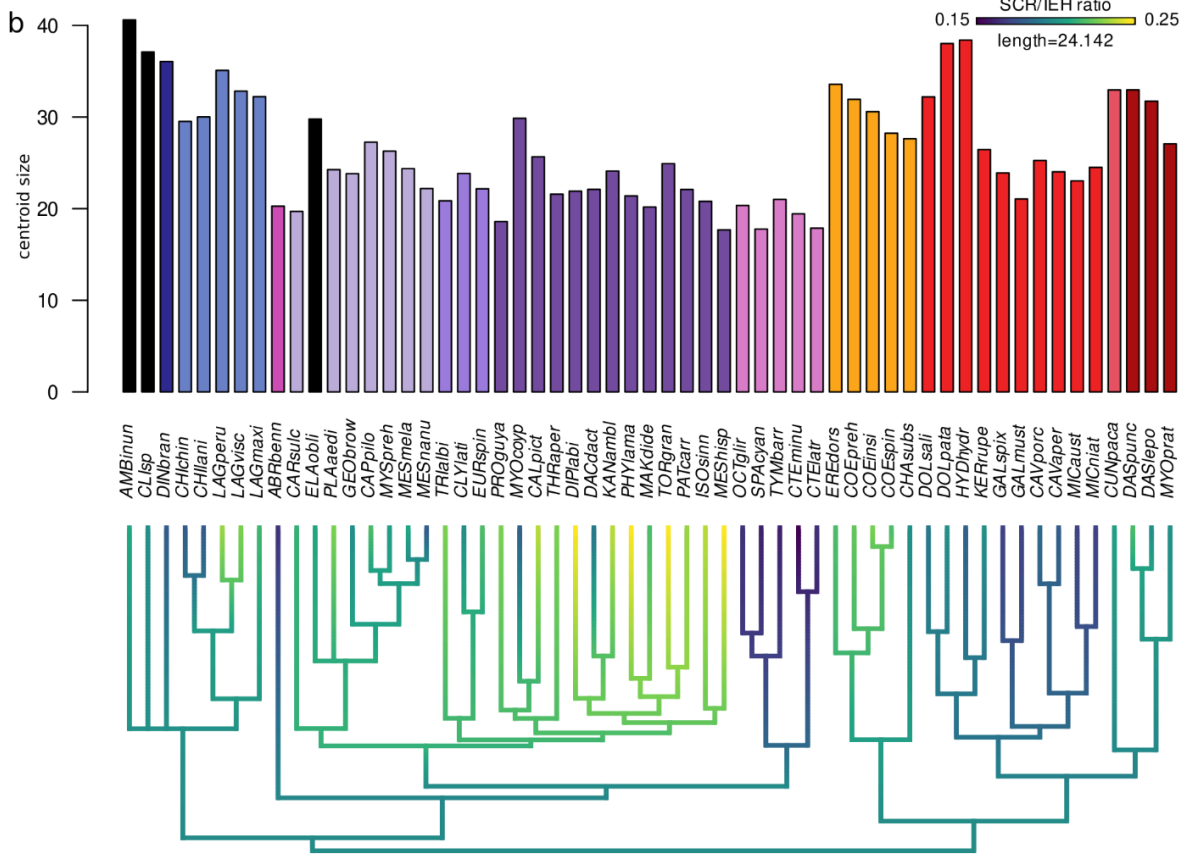
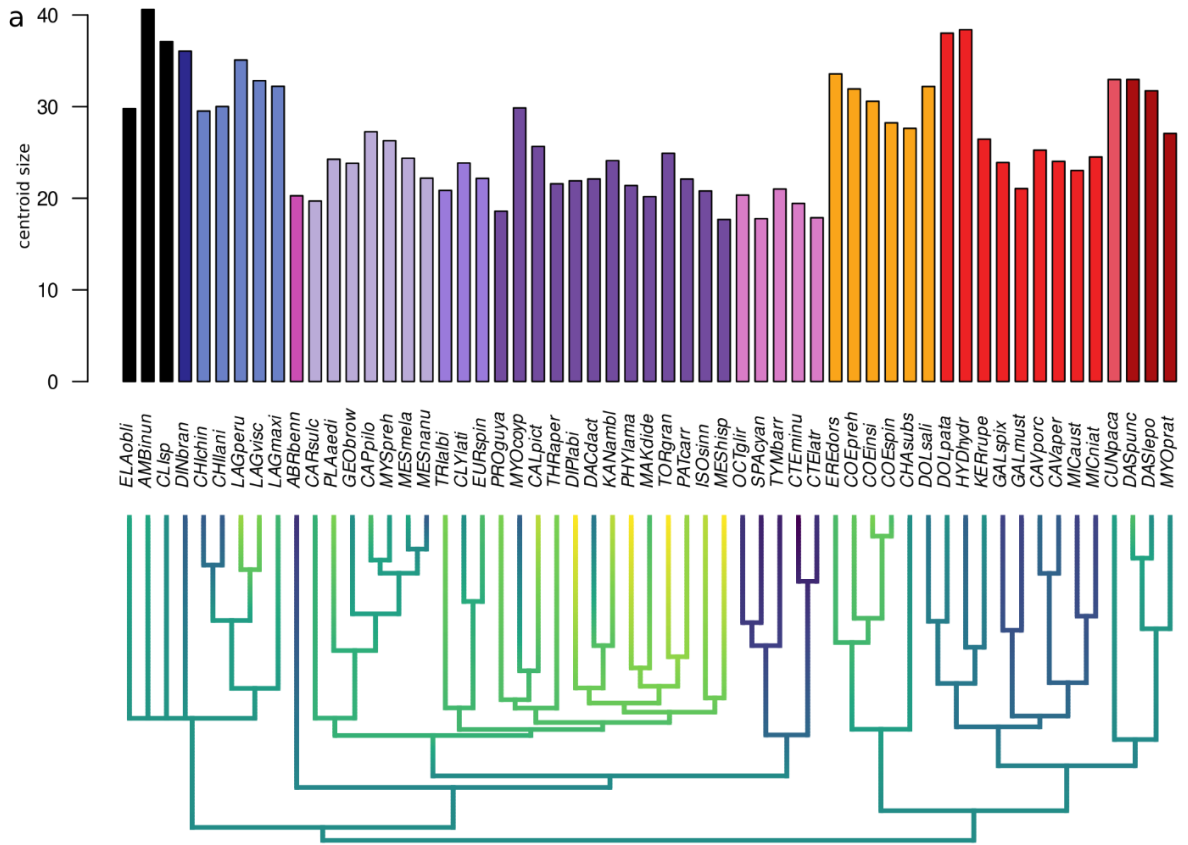


**Fig. S13** Phylogenetic character mapping of the logarithm of the log of centroid size  $\log(cs)$ . The phylogenetic tree of sampled extant species is derived from Upham et al. (2019). The Heptaxodontidae are represented in black and were manually added to the phylogeny in order to illustrate the two evolutive scenarios for the Heptaxodontidae with (a) a monophyletic scenario with *Elasmodotomys obliquus* being part of the Chinchilloidea or (b) a polyphyletic scenario with *Elasmodotomys obliquus* being part of the Octodontoidea. The dashed line correspond to mean centroid size of all species. Colors of the histogram correspond to the different clades of Caviomorpha. From left to right: dark blue: Dinomyidae, blue: Chinchillidae, dark pink: Abrocomidae, light purple: Capromyinae + Carterodontinae, purple: Euryzgomatomyinae, dark purple: Echimyinae, pink: Octodontidae + Ctenomyidae, orange: Erethizontidae, red: Caviidae, light red: Cuniculidae, dark red: Dasyproctidae. Abbreviations for the species in the figure can be found in the Online Resource (Supporting Information, Appendix S1)





**Fig. S14** Phylogenetic character mapping of the number of turns of the cochlea combined with the centroid size. The phylogenetic tree of sampled extant species is derived from Upham et al. (2019). The Heptaxodontidae are represented in black and were manually added to the phylogeny in order to illustrate the two evolutive scenarios for the Heptaxodontidae with (a) a monophyletic scenario with *Elasmodotomys obliquus* being part of the Chinchilloidea or (b) a polyphyletic scenario with *Elasmodotomys obliquus* being part of the Octodontoidea. The dashed line correspond to mean centroid size of all species. Colors of the histogram correspond to the different clades of Caviomorpha. From left to right: dark blue: Dinomyidae, blue: Chinchillidae, dark pink: Abrocomidae, light purple: Capromyinae + Carterodontinae, purple: Euryzygomatomyinae, dark purple: Echimyinae, pink: Octodontidae + Ctenomyidae, orange: Erethizontidae, red: Caviidae, light red: Cuniculidae, dark red: Dasyproctidae. Abbreviations for the species in the figure can be found in the Online Resource (Supporting Information, Appendix S1)



**Fig. S15** Phylogenetic character mapping of the SCR/IEH ratio (see Supplemental Information, Appendix S2) combined with the centroid size. The phylogenetic tree of sampled extant species is derived from Upham et al. (2019). The Heptaxodontidae are represented in black and were manually added to the phylogeny in order to illustrate the two evolutive scenarios for the Heptaxodontidae with (a) a monophyletic scenario with *Elasmodontomys obliquus* being part of the Chinchilloidea or (b) a polyphyletic scenario with *Elasmodontomys obliquus* being part of the Octodontoidea. The dashed line correspond to mean centroid size of all species. Colors of the histogram correspond to the different clades of Caviomorpha. From left to right: dark blue: Dinomyidae, blue: Chinchillidae, dark pink: Abrocomidae, light purple: Capromyinae + Carterodontinae, purple: Euryzomatomyinae, dark purple: Echimyinae, pink: Octodontidae + Ctenomyidae, orange: Erethizontidae, red: Caviidae, light red: Cuniculidae, dark red: Dasyproctidae. Abbreviations for the species in the figure can be found in the Online Resource (Supporting Information, Appendix S1)