

Multivariate analyses of cranial morphology inform the taxonomy and evolution of geomyoid rodents

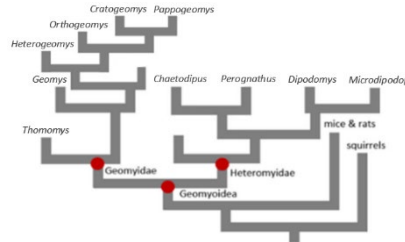
DEPARTMENT OF EVOLUTION, ECOLOGY, & ORGANISMAL BIOLOGY

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Introduction



Geomyidae (pocket gophers) (Keller, 2017)



Assessing species-diversity and morphological disparity of one of the most diverse groups of mammals on the planet



Heteromyidae (kangaroo rats and their relatives) (Hedin, 2013)

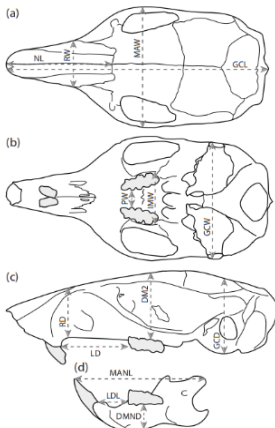
Hypothesis

(1) There are statistically significant differences in cranial shape and size between families, genera, and species of geomyoid rodents (the group that includes Geomyidae and Heteromyidae).

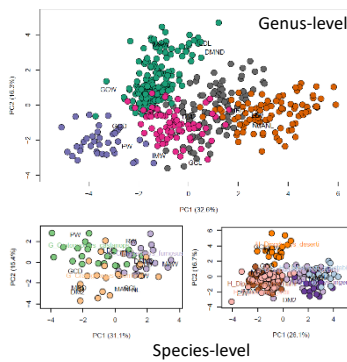
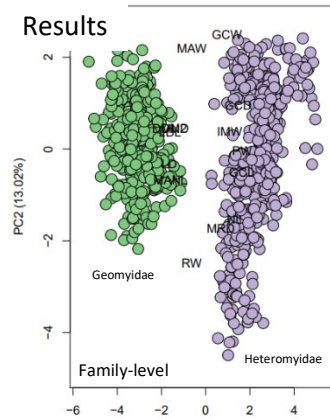
(2) Cranial morphology is effective at categorizing specimens into taxonomic units.

Material & Methods

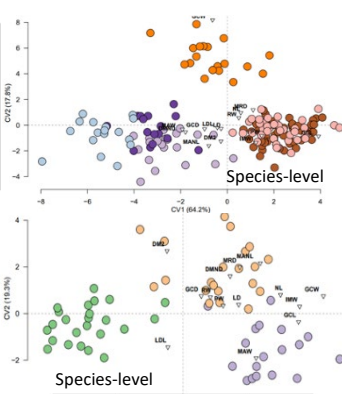
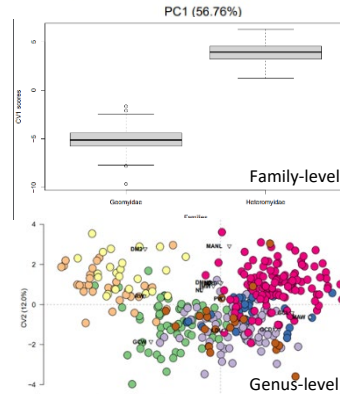
Landmarks on the dorsal, ventral, lateral, and occlusal views of the skull, used for 815 specimens



Results



Results for the principal component analyses at the family, genus, and species levels



Results for the canonical variate analyses at the family, genus, and species levels

ACKNOWLEDGEMENTS: I would like to thank my research adviser, Dr. Jonathan Caledo for his guidance and support. I would also like to thank the American Museum of Natural History, the Carnegie Museum of Natural History, the Cleveland Museum of Natural History, the Natural History Museum of Los Angeles County, the University of California Museum of Vertebrate Zoology, the United States National Museum of Natural History, the University of Vermont Museum of Natural History, the University of Florida Museum of Natural History, and the Ohio State University Museum of Biological Diversity for access to specimens.

Discussion

- The main axis of variation (PC1) differentiates between the two families with no overlap.
- Heteromyidae had high PC1 scores for MAW, RW and MRD, while Geomyidae had high scores for MANL, DM2, DMND, LD, and LDL.
- The family Heteromyidae shows more variation along PC2 than the family Geomyidae.
- The PC1 scores show the seven genera of Geomyidae and five genera of Heteromyidae can be distinguished by cranial measurements.
- The seven genera of Geomyidae overlap more than the Heteromyidae do.
- Heteromyidae genera have overlapping for DM2 PCA scores, whereas Geomyidae have overlapping PCA scores for RW, and MANL.
- The PC1 scores for the species within the two families are significantly different.
- Family-level identifications correct nearly 100% of the time.
- Geomyid genera have lower classification percentages than heteromyid genera. Within geomyids, *Zygoeomys* is most often correctly identified.
- Within Heteromyidae, *Dipodomys* is the most accurately classified genus.
- CVA shows that cranial morphology can differentiate between the species, within both families.
- Multivariate coefficients of variation show more variation among Heteromyidae than Geomyidae.

Future Work

- Further collection of dataset
- Assessing allometric patterns using phylogenetic generalized least squares analysis
- Identify size, shape, and allometric patterns
- Conover's squared ranks test, finding differences in multicV values at the family, genus, and species level
- Work towards publication

References

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