Skeletal Variation in *Didelphis virginiana* (Virginia opossum)

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Introduction

- Skeletal shape and size can be used as a proxy for understanding the ecology of modern and fossil organisms. In mammals, **sexual dimorphism can be used for insight into the degree to which males compete for mating privileges**. In addition, **understanding how individual skeletal elements co-vary in size can be used to infer overall body size** when elements are found in isolation (which is frequently the case in fossil sites).
- This study focuses on sexual dimorphism and skeletal element covariation in ***Didelphis virginiana* (Virginia opossum)**. Specimens are collected from across Georgia after death via natural causes. Specimens were processed following the procedure outlined below.
- **Specimens were collected from:** Baldwin, Clarke, Dawson, Gwinnett, Hall, and Lumpkin Counties, Georgia. Our current sample size is **68 individuals**.

Processing Flow Chart

Carcass Arrival and Database Entry

Specimens that have been collected and bagged arrive at the facility and receive a tracking tag. Information regarding the species, sex, collection date, location, and collector etc. are logged and entered into a cloud-based data recording system. These data are backed up weekly.

Freezing Process

Bagged and tagged specimens enter and remain in the freezer to kill parasites

Carcass Dissection

Frozen carcasses are removed from freezer to thaw a few days prior to dissection. The majority of tissue is removed from skeleton (including skin, muscles and organs). Sample is then refrozen until placement in beetle colony

Dermestid Beetle Colony

Sample is placed within the dermestid beetle colony where the remainder of the tissue is removed.

Skeletal Soak and Drying

Bones are then soaked in ammonium hydroxide to remove any remaining oil from the bones (to permit long-term storage). Bones are then dried to be measured and stored.

D. virginiana Skeletal Measurements

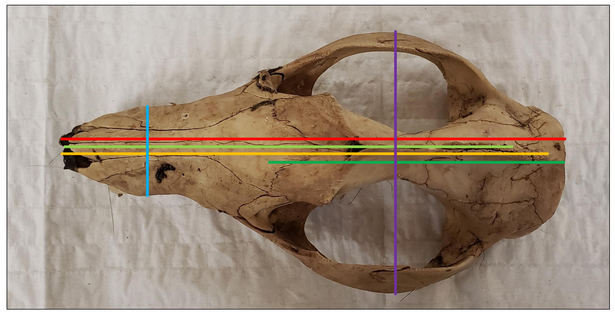


Figure 1: Cranium of UNGD-NH-6, a male *Didelphis virginana* collected as roadkill in Lumpkin County

Cranial Measurements:

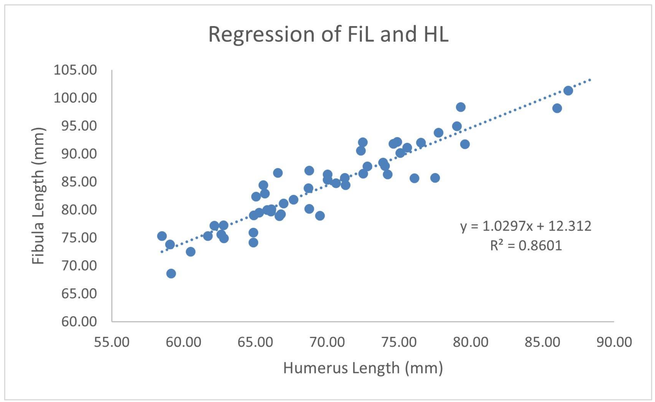
GLS – Greatest Length of Skull
CL – Condylobasal Length
BL – Basal Length
PL – Post-palatal Length
NB – Nasal Breadth
ZB – Zygomatic Breadth

Figure 2: Example of post-cranial bones of a male *Didelphis virginiana.* Top Left: Humerus Bottom Left: Scapula Right: Femur

Cranial Measurements	Abbreviation
Greatest Length of Skull	GLS
Condylobasal Length	CL
Basal Length	BL
Post-Palatal Length	PL
Nasal Breadth	NB
Zygomatic Breadth	ZB
Post-Orbital Constriction	PC
Bicanine Width	BW
Length of Mandible	LM
Maxillary Tooth Row Length	MxTR
Mandibular Tooth Row Length	MnTR
Post-Cranial Measurements	**Abbreviation**
Scapula Length	SL
Humerus Length	HL
Radius Length	RL
Ulna Length	UL
Pelvis Length	LP
Femur Length	FL
Tibia Length	TL
Fibula Length	FiL

Table 1: All measurements and their abbreviations of *D. virginiana* (Post-Cranial Measurements are all Greatest Length) **(1)**

D. virginiana Skeletal Predictions



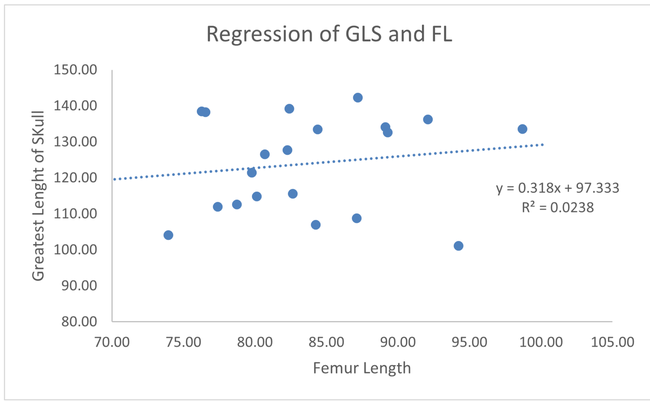


Figure 3: We compare measurements to determine what bones can function as predictors of others. This can help determine the size of an individual based on a few bones instead of an entire specimen. Not every bone shows correlation **(2).**

Discussion

- Our analyses indicate that **males and females differ in skeletal size** (as suggested by Patterson and Mead, 2007). This implies that males compete with one another physically for mating privileges.
- We find that **certain skeletal elements co-vary more than others** (e.g., FiL and HL predict better than GLS and FL). Found in isolation, these elements can help to predict total body size of the individual.
- Future collections associated with this study will be included to further evaluate the robusticity of the findings presented here.

Acknowledgements

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References

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2. De Mendonça, M. C. "Estimation of height from the length of long bones in a Portuguese adult population." *American Journal of Physical Anthropology* 112.1 (2000): 39-48.

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