Bone modifications by scavengers in South Africa and the implications for forensic investigations

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Introduction

- Animal scavenging of human remains is a common phenomenon forensic anthropologists in South Africa are confronted with[1-2].
- Animal bite marks on bone could be misinterpreted as tool marks by human perpetrators[3].
- This study aimed to describe the bite marks on bone caused by Southern African scavengers of forensic interest.

Materials & Methods

Bovid and suid remains were placed at four research sites and scavenged by various animals (table on next slide).

Research sites:

- National Zoological Gardens of South Africa
- University of Pretoria's Mierjie Le Roux Experimental Farm
- University of the Witwatersrand's Rural Facility
- University of the Witwatersrand's Frankenwald Research Site

The bone modifications to surviving skeletal remains were described.

Ethical approval was granted by the following agencies:

- Wits Animal Ethics Research Committee (AREC-101210-002)
- University of Pretoria's Animal Ethics Committee (AEC H001-19)
- South African National Biodiversity Institute Research Ethics and Scientific Committee (NZG/RES/P18/10)
- Department of Agriculture, Forestry and Fisheries (permit: 12/11/1/1/120 [789]).

Materials & Methods


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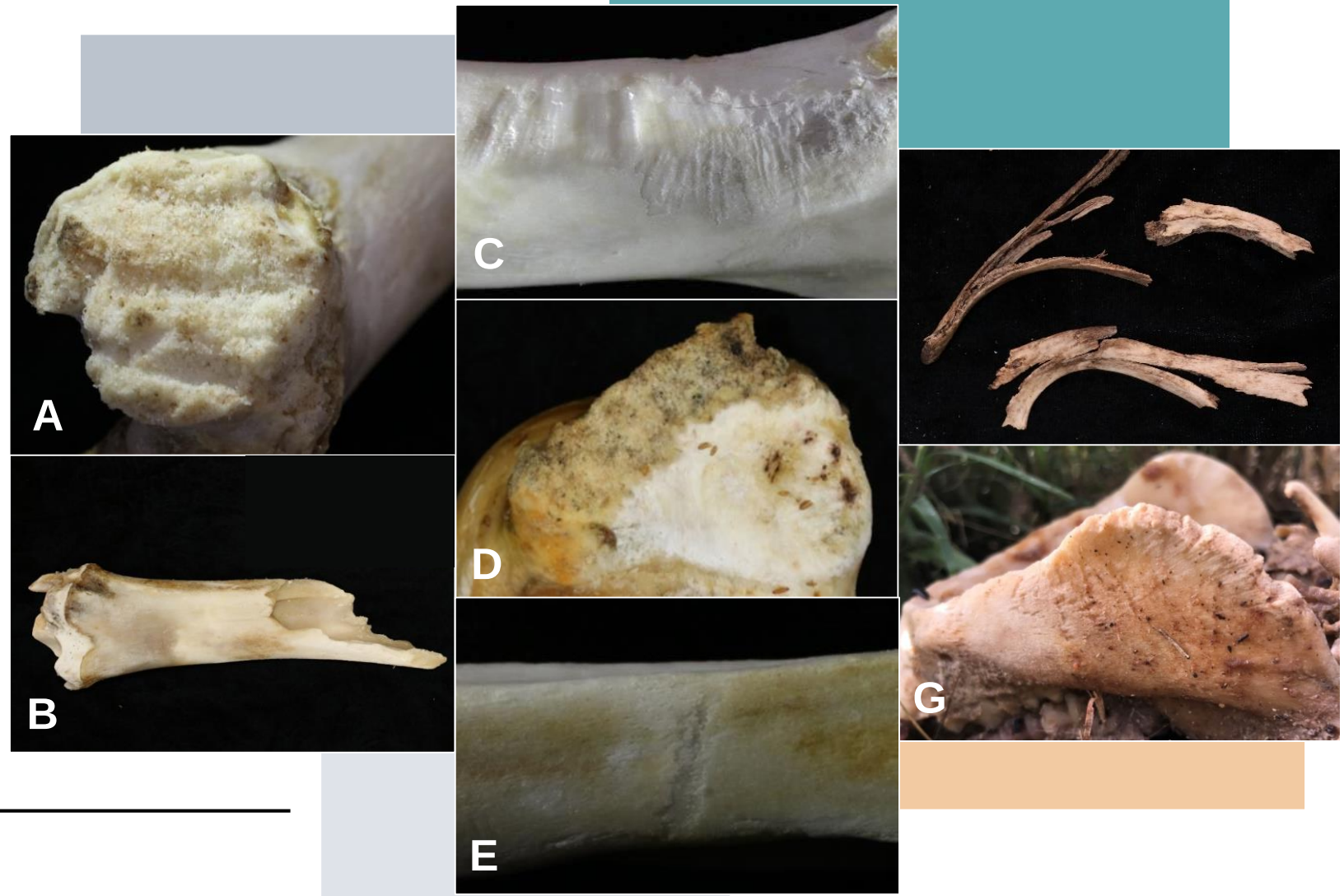
Animal	Research site(s)	Sample(s) scavenged by animals
1. Lion (*Panthera leo*)	• National Zoological Gardens of South Africa	• Bovine limbs and ribs
2. Leopard (*Panthera pardus*)	• National Zoological Gardens of South Africa	• Bovine limbs and ribs
3. Caracal (*Caracal caracal*)	• National Zoological Gardens of South Africa	• Bovine limbs and ribs
4. Black-backed jackal (*Canis mesomelas*)	• National Zoological Gardens of South Africa • University of Pretoria's Mierjie Le Roux Experimental Farm	• Bovine limbs and ribs • Pig carcasses (*Sus scrofa domesticus*)
5. Wild dog (*Lycaon pictus*)	• National Zoological Gardens of South Africa	• Bovine limbs and ribs
6. Cape porcupine (*Hystrix africaeaustralis*)	• National Zoological Gardens of South Africa • University of Pretoria's Mierjie Le Roux Experimental Farm	• Bovine limbs and ribs • Pig carcasses (*Sus scrofa domesticus*)
7. Spotted hyena (*Crocuta crocuta*)	• National Zoological Gardens of South Africa	• Bovine limbs and ribs
8. Common Warthog *(Phacochoerus africanus)*	• University of the Witwatersrand's Rural Facility	• Pig carcasses (*Sus scrofa domesticus*)
9. Slender mongoose (*Galerella sanguinea*)	• University of the Witwatersrand's Frankenwald Research Site • University of Pretoria's Mierjie Le Roux Experimental Farm	• Pig carcasses (*Sus scrofa domesticus*)



Results

- Felids (lion, leopard, and caracal) gnawed the greater tubercle of the humeri and greater trochanter of the femora, leaving deep, parallel furrows (Figure A).
- Hyenas caused massive trauma to bone with one third of the tibia shaft surviving with jagged fracture edges (Figure B).
- Porcupines left distinctive fan-like parallel scores; and oval depressions (Figure C).
- Wild dogs caused superficial, nonspecific scores, furrows and punctures (Figure D).
- Jackals did not leave any distinctive patterns other than superficial scores (Figure E).
- Warthogs caused splintering of ribs and transverse processes of vertebrae (Figure F).
- Mongooses gnawed the angle of the mandible leaving a stepped appearance and multiple parallel scores on the flat surfaces (Figure G)

Discussion & Conclusion

- Felids, hyena, porcupine and mongoose cause distinctive bite mark patterns which can be used to determine the general family of perpetrating animals however the exact taxa or species cannot be determined[2].
- Non-specific bone modifications caused by vultures, warthogs, wild dogs, and jackals are not distinct enough to determine the animal, however they are discernible from perimortem trauma, other taphonomic alterations and tool marks.
- These descriptions will assist forensic anthropologists in South Africa to differentiate between scavenging modifications, tool marks by human perpetrators and other taphonomic influences.

** A portion of the results of this study have been published in the following article: Keyes, C.A., Myburgh, J. and Brits, D., 2019. Taphonomic bone trauma caused by Southern African scavengers. International Journal of Legal Medicine, pp.1-12.*

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